

THE IMPACT OF TRADE LIBERALIZATION ON TUNISIAN MANUFACTURING: STRUCTURE, PERFORMANCE AND EMPLOYMENT

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Abstract — The aim of this article is to establish a comparison concerning the Tunisian manufacturing industry between two periods that feature different commercial regimes: relative protectionism (1987 – 1995) and liberalization (after 1995).

The analysis deals with different elements of conduct and performance: productivity growth, employment growth, exports growth, capital intensity growth...The significance of the difference between these conduct and performance indicators across the two policy regimes is firstly evaluated using a statistical test. An econometric analysis is then conducted. A country- specific analysis is likewise carried out.

The results of statistical and econometrics tests are alike and suggest that the reduction in tariffs and non tariffs levels conducted in this first active phase of liberalization in Tunisia had no significant effects on manufacturing growth nor on employment growth. No significant improvements were recorded in the overall production growth, which appears to be due mainly to a decrease in productivity growth. The regulations and limits upon factor mobility in Tunisia in the considered period are the main factors that account for the delay in adjustment and the dilution of the benefits of trade reform.

Key words: TRADE LIBERALIZATION, PERFORMANCE, GROWTH, STRUCTURE, MANUFACTURING SECTOR, TUNISIA.

JEL classification: F14, F16, F43, O41, O47.

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1. INTRODUCTION

Tunisia was among the countries that broke away from import substitution industrialization as a development strategy. Import substitution was designed to protect domestic "infant" manufacturing industries from import through the use of protective instruments, such as tariffs and quota controls. Since 1986, numerous measures have thus been taken towards a further liberalisation of trade. To this extent, it is worth noting that Tunisia substantially reduced its tariff and non tariff barriers in the early 1990's. The Tunisian experience does therefore provide an interesting case to study. The cross-industries and cross-time variations in protection levels offer identification for many econometric questions.

This paper compares major aspects of the conduct and performance of Tunisian manufacturing operating under two different policy regimes: protection and liberalization. The analysis deals with different elements of conduct and performance: productivity growth, employment growth, exports growth, capital intensity growth, et cetera...The significance of the difference between these conduct and performance indicators across the two policy regimes is firstly evaluated using a statistical test. An econometric analysis is then conducted. A country-specific analysis is likewise carried out.

Our concern is foremost about the consequences of liberalization on the industrial structure in Tunisian manufacturing. We will investigate whether Tunisia industry has experienced a restructuring in terms of employment and production over the period in question as is theoretically expected.

Our focus will secondly be on evidence of the association between liberalisation and manufacturing performance. To what extent has liberalisation led to growth? The theoretical reasons as to whether liberalization should be conducive to growth or not have been carefully presented by Rodrik (1992, 1997) and others.

Empirical studies covering many countries and a wide range of techniques and of liberalisation measures suggest a variety of results: "in some cases there is a positive correlation, in some a negative one, in others there is no apparent correlation whatsoever" (Greenway and al, 1998). The literature that feeds into the empirical analysis of trade policy in relation to economic growth is abundant. Yet, the nature of this relationship remains a bone of contention among economists. Differences in the quality and details of the data being analysed are one source of disagreement among economist on the subject. In many cases the indicators of openness, used by researchers as measures of trade barriers, are problematic. In other cases, confusing results arise from obvious misspecification. The nature of the relationship between trade policy and economic growth remains therefore very much an open question (Rodrick, 1997). Rodrigues and Rodrick (2000) show that openness in the mere sense of liberal trade policies seems to be no guarantee of faster growth; it must be accompanied by social, economic and institutional reforms to promote

economic growth. To sum up, empirical studies provide conflicting explanatory models, probably due in part to differences between the nations and sectors covered as well as between the data and methodology employed in correspondingly different studies.

One of the major questions that come within the purview of this paper is: does openness enhance productivity growth and output growth in Tunisian manufacturing?

Our third concern is about evidence on the interrelation of liberalization and employment. There is considerable disagreement among analysts on the impact of recent trade reforms on labour. Our contribution to these debates is essentially of an empirical nature. The analysis of Tunisian manufacturing data may be viewed as an attempt to apprehend how employment in such a developing country, is adjusted to the trade reforms. Several studies that measure the impact of trade reform on employment find insubstantial or almost no impact on employment. A possible explanation of the absence of the impact of trade policies on employment is that labour regulations, particularly in developing countries, inhibit the reallocation of labour (Currie and Harrison, 1997). This paper takes into account this phenomenon by introducing a dynamic adjustment process.

In this paper we take due cognizance of the adjustment process at work in different indicators, made all the more necessary by the fact that performance and employment indicators will be slow in responding to liberalisation. We estimate dynamic panel models to evaluate and to distinguish between the short and the long run impact of liberalisation on performance and employment in the manufacturing sector.

We include year effects to take into account common aggregate shocks, particularly technological shocks that are not otherwise captured by our specifications. This permits us to disentangle the effects of trade reforms from other policy shifts and exogenous shocks.

In an attempt to solve measurement problems associated with the trade policy measures, we carry out a "before and after" analysis. We also attempt to associate changes in conduct and performance directly with measures of change in trade protection, rather than simply linking them to changes in imports and exports which would be more common practice.

The rest of the paper is organized as follows. Section 2 presents a review of trade reform in Tunisia. Section 3 affords a discussion of necessary background analysis regarding the impact of trade on performance and employment. Section 4 puts forward the data, some basic descriptive statistics and the results of statistical tests evaluating the significance of the difference between conduct and performance indicators across the two policy-regimes. Section 5 lays down the main models to be used as framework for the econometric analysis and discusses the main econometric results. Section 6 is made up of the conclusion to this paper.

2. TRADE LIBERALIZATION IN TUNISIA

Since 1986, numerous measures have been taken to further liberalise trade: the structural adjustment plan (1986), adherence to the GATT (1989), adherence to the WTO (1994) and the ratification of a free-trade agreement with the European Union (1995). The Tunisian trade liberalization program can be divided into three stages (Cherkaoui and Naini, 2002): The pre-structural adjustment program (SAP) adopted in 1986, during the SAP period (1987-94) and after 1995. Before 1986, over 94 percent of imports were subject to licensing, and tariff rates averaged 41 percent. In 1987, import licensing was gradually decreased and by 1991 only 30 percent of imports were subject to a license. The average import duties declined from 41 percent to 33 percent in 1987 and to 29 percent in 1990. The highest duty rate was reduced from 200 percent to 43 percent. The removal of licensing requirements continued in 1992 and 1994. Since 1995 trade policy has been dominated by the free trade association agreement with the European Union. The agreement stipulates a removal of tariffs on industrial imports from Europe over a twelve-year period. This removal started in 1996.

The scope and speed of this trade liberalization process is apparent from table 1. The mean effective rate of protection¹ fell from 555 in 1985 to 80 in 1991 for the IAA sector, from 203 in 1985 to 58 in 1991 in the ITHC sector and from 203 in 1985 to 49 in 1991 in the ICH sector. Disaggregated by industries, the percentage declines in effective rates of protection, particularly between 1986 and 1990, which are impressive in all industries.

Theoretically the effective rate of protection is obtained by the proportional increase in value added resulting from the imposition of protective measures. Thus the effective rate of protection can be raised as a consequence of the imposition of any tariff or non tariff protective measures. However, one often finds the empirical method constrained to inferring only the effects of tariffs on value added, because information on non-tariffs barriers is neither available nor easily calculable. This is the case for our effective rate of protection (tpe) measure which is presented in table 1; it records only the effects of tariffs, and is therefore a measure of the effective tariff rate. Our tpe measures the proportional increase in value added permitted by the imposition of tariffs on final goods and intermediate inputs; it is a measure of net protection to the production process². This effective protection rate measure is useful and in general indicative of the relative price effects of trade reform (Milner and Morrissey, 1997); however, like the vast majority of trade reform

¹ The effective rate of protection is defined as the proportional increase in value added resulting from the imposition of protective measures. It measures the percentage by which value added can increase over the free-trade level as a consequence of a tariff structure. The effective rate of protection captures protection of intermediate and final goods. It also captures tariff or non-tariff protective measures. A negative rate implies that input industries are particularly favoured. These negative rates indicate higher tariffs on input imports than on final goods.

² The nominal tariff rate is an indicative measure of gross protection on output, which fails to account for the effects of tariffs on intermediate inputs.

indexes, it is subject to limitations. One of these limitations is that the effective protection rate used here does not account for non-tariff restrictions which are often reduced under trade liberalisation. Another fundamental limitation is that the effective protection is essentially a partial equilibrium concept, yet it is generally used for an analysis on a general equilibrium issue, namely resource allocation. Trade liberalisation requires a general, rather than a partial, equilibrium framework within which to measure changes in relative prices and to analyse resource pulls from low protection activities to high protection activities. This question has been debated at length in relevant publications (Greenway and Milner, 1989). It is important to point out that there are a range of informational and data quality barriers to any investigators seeking to measure trade policy stance in a developing country.

Table 1: Effective rates of protection in Tunisia in percentage terms (for domestic oriented goods)

	IAA	IMCCV	IME	ICH	ITHC	ID	All the manufacturing sector
1983	191	185	67	161	175	150	178
1984	404	197	92	92	98	122	-
1985	555	232	104	100	203	134	-
1986	421	40	88	88	194	101	124
1987	120	36	73	67	107	88	81
1988	134	66	63	62	82	74	78
1989	110	91	98	70	76	78	87
1990	100	82	101	78	73	80	84
1991	80	61	55	49	58	54	-
1992	90	65	59	50	65	65	-
1993	85	75	65	60	105	90	-
1994	-	-	-	-	-	-	-
1995	71	85	64	65	126	102	90
1996	.	-	-	-	-	-	-
1997	51	154	126	136	69	196	92
1998	.	-	-	-	-	-	-
1999	50	120	100	106	91	140	90
2000	51	57	70	63	73	60	63
2001	56	58	44	50	67	46	57
2002				45	59	41	

IAA: Agro-food industry.

IMCCV: Pottery, glass and other non-metallic mineral industry.

IME: Mechanical, electrical and electronic industry.

ICH: Chemical industry.

ITHC: Textiles, wearing apparel, leather and footwear industry.

ID: Other manufacturing industries.

Source: Institut de l'Economie Quantitative.

In brief, during the initial period of trade liberalization (1986-90), the degree of protection was greatly lowered. However, during the second period (1991-95) the nominal and the effective rates of protection increased except for some products. This increase is explained by the consequences of the Uruguay

Round that transformed non-tariff protection into their tariff equivalent. This increase could also be explained by the fact that inputs protection was greatly lowered relatively to the output protection. We have to note that the liberalization program remains relatively timid over the first period (1987-1995) and particularly concerns equipment and inputs. This is mainly due to the government's preoccupation with maintaining social stability and preparing companies for competition. The government has adopted a more active liberalization policy after 1996.

However, our sample period covers an important phase of Tunisian trade reform (1996-2003), as compared to the protectionist period before 1995. The cross section dimension of our data covers different activities which are differently protected. This suggests that if trade has a significant effect on manufacturing conduct, it should be apparent in these data characterized by the two dimensions: the temporal and the sectoral dimensions.

3. TRADE LIBERALIZATION AND MANUFACTURING PERFORMANCE AND CONDUCT: THEORETICAL AND EMPIRICAL ISSUES

Several authors (Edwards, 1992) argue that greater openness may accelerate developing countries' adoption of technological innovations originating in industrial countries. Technical progress embodied in new materials, intermediate manufactured products, capital equipment are traded on international markets, thus allowing countries to import the R&D carried out by others. Technical changes (via liberalization) promote investment and additional exports (by reducing costs). The outcomes are then greater capacity utilisation and faster output growth. The focus on endogenous growth has pointed to the opportunities for growth made possible by ideas and knowledge capital acquired through imports. Imported technologies are then an important source of output growth in developing countries. But the effects on growth depend on the efficiency with which technology transfers are absorbed and diffused (Henry and al., 2003).

The Heckscher-Ohlin model describes observed specialisations in trade and applies best (after liberalisation) to sectors in which traditional inputs in developing countries such as natural resources and or unskilled labour predominate. When the developing country reduces trade barriers on the imported product, the Heckscher-Ohlin model predicts that the decline in the price in the import-competing sector will negatively affect the factor of production used relatively intensively in the production of the imported goods (skilled labour in developing countries) and benefit the factor of production used intensively in the export sector (unskilled labour in developing countries).

Furthermore, loosening trade restrictions marks a macroeconomic policy-shift that is bound to have an impact on industrial performance. Specifically, competitive pressure is expected to discipline or eliminate inefficient producers. Competition should have favourable effects on industrial efficiency. The reduction or elimination of tariff and non tariff barriers may reduce the

opportunity for profit-seeking activities and increase the competition between domestic producers facing imported goods. Nonetheless, in raising the level of competition to which domestic products are subject in home markets, imports provide incentives for firms to improve their operations. Moreover, in response to the competition in foreign markets, exporting firms try to keep up with modern technology in order to maintain or improve their market position. This provides a stimulus and opportunity to increase efficiency and thus productivity. The exposure to trade, or increases in this exposure, forces the least efficient firms out of the industry.

Moreover, with an increasingly open environment, growth through geographical diversification would have been a strategy favoured by firms, due to either insufficient domestic demand or to export obligations that may have been imposed by the government. There may have been some orientation towards external markets (Narayanan, 2001). A liberalised trade regime permits low-cost producers to expand their output well beyond that demanded in the domestic market. The creation of larger markets through trade liberalization will increase the demand for products leading to more exports.

In the case of developing countries, several empirical studies have confirmed a positive link between trade reform and economic performance, yet many researchers continue to question the impact of trade liberalization on economic performance.

For instance, the impact of trade liberalization on growth is ambiguous, as both positive growth and negative growth impacts have been found in empirical studies. Thus in some cases, the growth performance is deteriorated as a consequence of liberalization. Of course it may not have deteriorated as much as would have been the case without reforms, and any short-term reduction in growth may be purely temporary (Greenway and al, 1998). A reduction in protectionism could be accompanied by a decrease in industrial output since increased competition may force producers to exit instead of expanding (Semenick and Morrison, 2000).

The basic insight of the Heckscher-Ohlin model that trade should benefit a country's abundant factor is also compelling. More recent episodes of trade liberalization appear not to have been associated with large improvements in prospects for the typical worker (Hasan, 2001), (Pavnick and al, 2003). It is hard to avoid the conclusion that there is a genuine conflict of evidence. There are various factors that may explain the apparent divergence between the expectations of the advocates of liberalization and recent evidence (Wood, 1997). A possible explanation is that over the past couple of decades, global technology has changed and raised the relative demand for skilled labour. Technological change has been skill biased. Increased openness in a developing country affects the skill structure of labour demand. This is the result of changes in the production technology available through increased imports of advanced capital goods or through opportunities for exporters to learn from foreign buyers and who are exposed to foreign markets. Trade liberalisation may also affect the efficiency with which firms make use of different factors; greater competition

from imports is likely to induce greater efficiency and bring about a reduction in demand for labour. The net impact of trade liberalisation on employment depends on the scale of three categories of effects: the Hecksher-Ohlin, the technological and the efficiency effects.

Another possible explanation is in order to benefit by trade liberalisation as expected by theory factors should be mobile and reallocated from import competing sectors to exporting sectors. For instance, labour market regulations can explain the sluggish labour market response to trade reforms in some countries. Organized labour is usually viewed as a hindrance to labour market adjustment. In fact, hiring and firing laws may affect labour mobility. Legislations which make it difficult for firms to lay off workers are likely to impinge on a firm's ability to reallocate resources to new lines of production (Hasan, 2001). Regulations and limits upon labour market mobility are likely to impede adjustment and dilute the benefits of trade reform for workers as a whole. In this case labour markets will remain unaffected and firms will adjust to greater competition through other changes such as reductions in profit margins (Currie and Harrison, 1997).

Has liberalization led to a superior performance in Tunisian manufacturing? Our concern here is with the evidence and not with theory.

4. DATA AND DESCRIPTIVE ANALYSIS

The data used in this study are taken from the Quantitative Economy Institute (IEQ). We have a panel of 6 manufacturing industries observed from 1987 to 2003: agro-food (IAA), chemical (ICH), ceramic (IMCCV), diverse (IMD), electric (IME) and textile, wearing, leather and footwear (ITHC) industries. The data set includes: value added (y), capital stock (K) evaluated at historical values, labour (number of employees L), exports (X) and imports (M). The number of employees is adjusted according to whether it is a part-time or fulltime equivalent employment. The value added is transformed to fixed 1990 prices using consumer price index. Exports and imports are measured as constant total value of respective variable in 1990 prices.

Since we are dealing with a pooled sample of industries, the issue of industry heterogeneity is an important one. In our sample, heterogeneity may result from the fact that industries can be expected to operate under different technologies. We can assume that what we tackle here is a source of industry-specific heterogeneity.

In our empirical analysis the observations are classified into two periods: 1987-1995 and 1996-2003. The first period covers the initial phase when the economy was partially opened up in the form of relaxation of restrictions on imports of technology and inputs. This is mainly due to the government's preoccupation with maintaining social stability and preparing companies for competition. The government has adopted a more active liberalization policy after 1995. The period beginning in 2000 represents the period when major changes in the macroeconomic environment came into play.

To examine the effects of liberalization, we make "before and after" comparisons of a number of industries using time series data. Trying to get round measurement problems associated with the trade policy measures, we carry out a "before and after" analysis.

4.1. Manufacturing structure

This section is devoted to examining the consequences of liberalization on the industrial structure in Tunisia manufacturing. One of the key issues that need to be broached is the following: do the variations in tariff-rates across time and sectors make any difference?

We use data on several industry sectors to analyse the movement of labour and product between industrial sectors over the whole period 1987-2003. We will probe whether Tunisian industry has experienced a restructuring in terms of employment and production over the period in question. We will analyse movements between sectors: sectoral reallocation of labour and production, changes in sectoral employment and production shares are considered. We describe structural changes and aggregate flows of labour which have occurred over this period. The mobility of labour and in general of factors is a crucial determinant of the flexibility and competitiveness of an economy (Greenway and al., 1999).

Textiles ITHC is the most important sector within the manufacturing industry, accounting for 6.5 percent in GDP and more than 48% in total exports of goods and services in 1999. This sector employs more than half of the manufacturing labour force and is heavily export-oriented. The EU represents Tunisia's first commercial partner in this sector, both as a supplier of raw materials and technology and as a buyer of finished products. However the weight this sector had within the manufacturing industry in the first period (with an average of 52% of the manufacturing employment) has decreased in the second considered period (with an average of 50% of manufacturing employment). The contributions of ITHC to employment and production in manufacturing have fallen significantly since 2000. This slowdown reflects the heavy competitive pressure from Asian countries and new members countries of the European Union to which this sector has been exposed since the progressive opening up of European markets.

The IME electrical and electronic industry grew significantly in the 90's, in accordance with massive investments made by large multinationals. Its contribution to the manufacturing labour has grown during the second period considered (12% in average) compared to the first period (10% in average).

The contribution loss of the ITHC is compensated by the contribution gain for the IME sector. The contributions of the other sectors to the manufacturing labour are relatively constant over the whole period.

The results indicate some structural change in manufacturing output but not in compliance with theoretical expectation (HO). In fact, a contribution loss

is observed in the most important sector in terms of exports, the ITHC sector, in which unskilled labour predominates.

4.2. Manufacturing growth

Table 2 provides the group means of growth across the two policy regimes. From this table it arises that there is a small difference between the growth in the first and in the second period. Growth reveals a somewhat declining trend. On the whole, manufacturing sectors grew at a lower rate in the post 1996 (3.4% per annum) era when compared to the period 1987-1995 (4.6% per annum). The IC and ITHC industries are clearly adversely affected by the liberalisation.

Table 2: Annual average growth of Added Value of manufacturing sectors (%)

Sectors	Period 1 (1987-1995)	Period 2 (1996-2003)	W-Wilcoxon	Significance (p value)
All				
IAA	2.6	4.5	- 0.42	0.67
IMCCV	6.3	3.6	1.05	0.29
IME	6.3	3.6	1.05	0.29
IC	13.0	3.8	2.30	0.02
ITHC	8.2	3.8	1.99	0.04
ID	5.8	4.9	1.15	0.24

The significance of the difference in the rate of growth of manufacturing sectors between the two policy regimes is evaluated by a non-parametric test. It is basically used to test the equality of a group's means by a variable. The testing criterion is the Wilcoxon Lambda (W) (the Mann Withney test). Table 2 presents the results of the test for the six considered sectors. From the W values given in this table 2, the difference in growth is not significant across the two periods for all the sectors except the ITHC and the IC sectors where the difference turns out to be substantial. ITHC and IC grew at a lower rate in the post 1995 period. No significant improvements were recorded in overall growth.

The stabilisation, and occasional decline in the average growth rates of sectors across the two policy regimes thwarts our expectations. This could be because most of the sectors had high growth rates during the first period and are therefore unable to increase it any further. It could also be because the increase in growth is slow, or because liberalisation could make industries more competitive (in terms of exports), but need not automatically put them on a higher growth path. (Narayanan, 2001). More details and explanations of the findings will be presented further on.

In the neoclassical growth accounting framework, the growth of output is the sum total of the growth of labour, growth of capital accumulation and the growth of productivity. So let us see what happens to these growth components. What is the impact of trade on production factors (labour and capital accumulation) and on productivity?

4.3. Dynamics of production factors: labour and capital accumulation

Table 3 reports the group means of employment growth across the two policy regimes. From the W values given in this table, the difference in employment growth is not significant across the two periods for all sectors except the IMCCV and the ID sectors growing at a lower rate after 1995.

Table 3: Annual average growth of employment of manufacturing sectors (%)

Sectors	Period 1	Period 2	W-Wilcoxon	Pvalue
IAA	0.034	0.04	- 1.15	0.24
IMCCV	0.057	0.034	3.36	0.0008
IME	0.057	0.048	1.57	0.11
IC	0.028	0.029	- 0.315	0.75
ITHC	0.025	0.027	- 1.26	0.2
ID	0.044	0.03	2.9	0.0033
All	0.041	0.03	1.85	0.063

Table 4 reports the group means of capital growth across the two policy regimes. From the W values given in this table, the difference in capital accumulation growth is marginal over the two periods for all sectors except the IAA sector where capital grew at a faster rate in the post 1995 period and the ITHC sector where capital rose at a slower rate during that same period.

Table 4: Annual average growth of capital stock of manufacturing sectors (%)

Sectors	Period 1	Period 2	W-Wilcoxon	Pvalue
IAA	0.0012	0.022	- 2.41	0.015
IMCCV	- 0.017	- 0.012	- 0.5	0.59
IME	0.0059	0.0019	0.63	0.52
IC	- 0.023	- 0.011	- 2.1	0.035
ITHC	0.051	0.022	2.3	0.02
ID	0.012	0.023	- 1.15	0.24
All	0.0049	0.0075	- 1.2	0.22

4.4. Total factor productivity

In order to calculate the total factor productivity (TFP), we have used a two factor, homogeneous of degree one, Cobb-Douglas production function:

$$y_{it} = A_{it} L_{it}^{1-\alpha} K_{it}^{\alpha} \quad (1)$$

y represents added value, K the capital stock and L labour, A represents TFP. The critical technology parameter, the share of capital in output (α), is econometrically estimated and the usual assumption of identical technology across sectors is relaxed. We use different production function estimates for each sector. Productivity was estimated using the following equation:

$$TFP_{it} = \frac{Y_{it}}{L_{it}^{(1-\alpha)} K_{it}^{\alpha}} \quad (2)$$

This means that we follow the neoclassical growth accounting framework and use the Solow residuals from the following production function regression as the measure of TFP³.

$$\log y_{it} = cte + (1 - \alpha) \log L_{it} + \alpha \log K_{it} + \text{error} \quad (3)$$

Or equivalently:

$$\log \frac{y_{it}}{L_{it}} = cte + \alpha \log \frac{K_{it}}{L_{it}} + \text{error} \quad (4)$$

We estimate equation (4) separately for the different sectors. Table 5 reports the estimated α for the different sectors. We found significant differences in the share of capital across sectors (in the estimated α). This implies that applying the same share (the same α) to all sectors to compute TFP may be misleading. The estimated coefficients are presented in table 5. These estimated factors shares were used to construct yearly estimates of TFP by sector according to equation (2).

**Table 5: Estimation results of equation (4):
estimated share of capital in output**

	α
IAA	0.79
IMCCV	0.54
IME	0.52
IC	0.60
ITHC	0.70
ID	0.66

Graph 1 shows the evolution of TFP in the six Tunisian manufacturing sectors over the 1987-2003 period. TFP grew over this period, but visibly the growth rate was not faster in the post 1995 period. Moreover, at the end of the considered period, TFP decreased in the ITHC and in the IAA sectors and it stagnated in the IMD and IC sectors.

TFP change for the manufacturing sub-sectors is also reported in table 6 for the two periods, before and after liberalization. The growth rates vary greatly both over the two periods and across sectors. The overall impression is

³ The literature to date is inconclusive on the best method to estimate TFP growth. As no ideal measure of TFP exists, The estimation of TFP confronts researchers with problems concerning biases; we need to keep these biases in mind when interpreting the results (Anthony Enisan Akinlo, 2005, "impact of macroeconomic factors on TFP in Sub-Saharan African countries", Research Paper n° 2005/39 WIDER).

that TFP growth was lower during the second period than during the first period. From the W values, there is an important difference in the average annual growth of TFP, which decelerated in the second sub period. The average growth rate of productivity decreased over the two sub periods 1987-1995 and 1996-2003 from 5.7% to 2.2% in the manufacturing sector. For instance, it fell from 3.9% to 1.5% in the textile industry.

Graph 1: Evolution of TFP in the six Tunisian manufacturing sectors over the 1987-2003 period

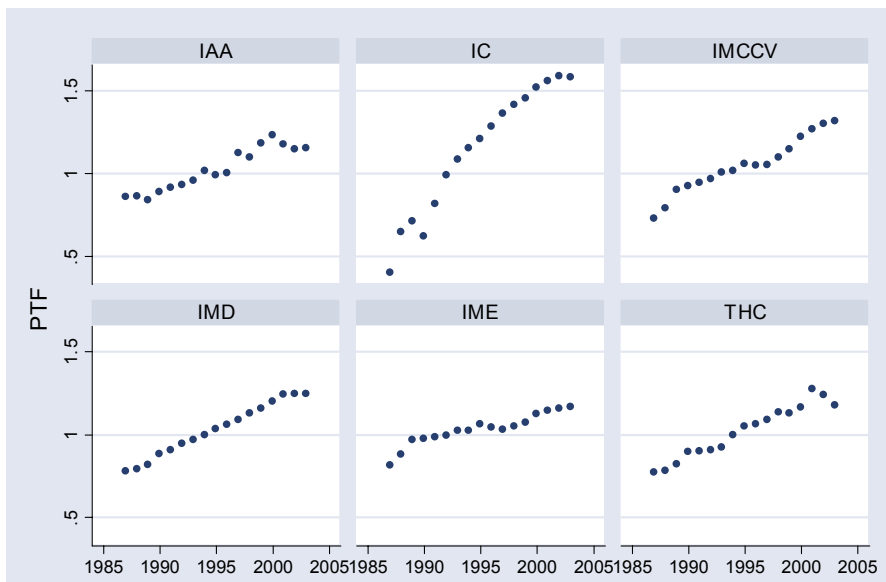


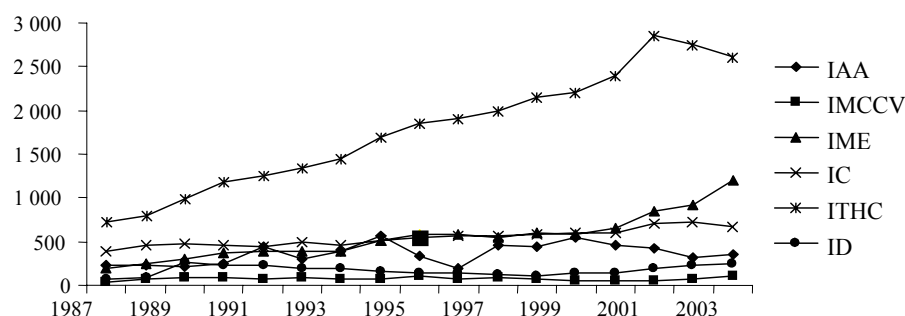
Table 6: Annual average growth of PTF of manufacturing sectors (%):

Sectors	Period 1 (1987-1995)	Period 2 (1996-2003)	Wilcoxon (pvalue)
All	5.7	2.2	
IAA	1.8	2	0.0008
IMCCV	4.8	2.7	0.0011
IME	3.4	1.1	0.0015
IC	13.9	3.3	0.0005
ITHC	3.9	1.5	0.0005
ID	3.6	2.3	0.0005

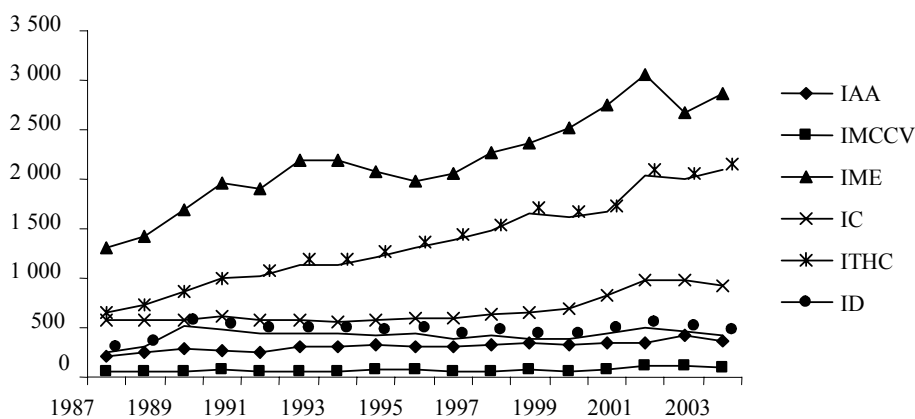
4.5. The impacts of liberalization on exports and imports

This paragraph tests empirically whether trade liberalisation in Tunisia has enhanced exports and imports growth.

Graph 2: Exports by industry



Graph 3: Imports by industry



With a more open economic environment, growth through geographical diversification would have been a strategy favoured by industries. An increased role for exports in the post liberalisation period is expected. Graphs 2 and 3 show respectively the evolution of exports and imports between 1987 and 2003 by industry. The overall impression is that exports and imports growth was not higher during the second period than during the first period, except for the IME sector. Moreover, exportations fell in the ITHC sector at the end of the considered period, from 2001 onwards.

Table 7 reports group means of exports growth across the two policy regimes. From the *W* values, there is a marginal difference in exports growth

across the two periods for all sectors except the ITHC exports growing at a lower rate in the post 1995 period.

Table 7: Annual average growth of exports of manufacturing sectors

Sectors	Period 1	Period 2	W-Wilcoxon	Pvalue
IAA	0.1	0.1	0.52	0.59
IMCCV	0.18	0.053	0.63	0.52
IME	0.15	0.1	0.84	0.40
IC	0.043	0.03	0.52	0.59
ITHC	0.12	0.045	2.30	0.02
ID	0.21	0.093	- 1.05	0.29

Table 8 reports group means of imports growth across the two policy regimes. The difference in imports growth is not significant across the two periods for any sector except the IC importing at a faster rate after 1995.

Table 8: Annual average growth of imports of manufacturing sectors

Sectors	Period 1	Period 2	W-Wilcoxon	Pvalue
IAA	0.053	0.024	0.52	0.59
IMCCV	0.062	0.047	0.84	0.40
IME	0.057	0.049	0.105	0.97
IC	0.0044	0.060	- 1.78	0.074
ITHC	0.092	0.062	1.26	0.20
ID	0.091	0.0004	0.73	0.46

To sum up, the descriptive analysis suggests that no significant improvements were recorded in the overall performance. No significant improvements were recorded in the overall growth despite the relative stabilisation in labour growth and some increase in capital accumulation. The main reason is the substantial decrease in the average annual rate of TFP. No significant improvements were recorded in exports and imports growth either.

A possible explanation is that the liberalization reforms were in their first active stage in the observed period. We have to note that the liberalization program remained in its initial stages of application on final goods over the considered period. Trade reforms particularly concerned equipment and inputs until the end of 90's. We also have to bear in mind that during the second period (1991-1995), the effective rates of protection increased except for some products. This increase could be explained by the fact that input protection was greatly lowered as compared to output protection. Tunisia has adopted a gradual liberalization program. The tariff protection of the domestic market has changed slightly in the course of last 10 years. Furthermore, Import procedures and customs clearance procedures remained slow and technical inspections remained complex and lengthy until 2001. Many quantitative import restrictions are also imposed. This constitutes one of the main factors responsible for stagnation in imports (Marouani and Lahouel, 2003). This is mainly due to the government's concern with maintaining social stability and preparing companies for competition. Since 2001, Tunisian customs has been carrying out reforms to

simplify import procedures. Therefore, any short-term stagnation in performance may be purely temporary.

Furthermore, in order to identify the impact of trade reform, we must take into account adjustment delays and transitional costs. Benefiting from trade liberalization as expected by theory requires that factors and resources be mobile and reallocated from import competing sectors to exporting sectors. The sluggish adjustment in growth and exports conforms to the imperfections in the Tunisian factors markets. Regulations and limits upon factor mobility in Tunisia in the considered period are likely to impede adjustment and dilute the benefits of trade reform. That's why the growth and exports paths remain unaffected, in the short run, and firms adjust to greater competition through other changes such as reduction in profit margins. To take into account the existence of adjustment delays, we will use a dynamic adjustment process in the econometric modelling in the next section.

The results of this descriptive analysis have yet to be confirmed using econometric modelling. To check the role of other factors, a regression analysis has been completed before going further into the interpretations of the findings.

5. ECONOMETRIC MODELS AND RESULTS

This section outlines simple models of growth, productivity growth and employment determination which incorporate the effects of trade, taking into account the effects of exogenous shocks and the delay of adjustment. A pooled sample of industries is used in this econometric analysis because the number of observations by industry is too small to conduct estimations separately for each different industry. About 17 observations (years) by industry are available but not for all the variables. Moreover, two years are lost in constructing lags and taking first differences for estimations. We also have to use lags of variables as instruments to correct the endogeneity problem. The dynamic nature of the models and techniques used needs more observations, that's why we preferred to use the pooled sample of industries. We use fixed effects models to check biases caused by unobserved sector characteristics or cross section specific effects correlated with performance outcomes that are fixed over time.

5.1. The impact of trade liberalization on growth

The link between trade liberalisation and growth in output is verified by using a production function framework. We begin by assuming that an industry-specific production function can be described by a Cobb-Douglas form as

$$y_{it} = A_{it}^{\gamma} K_{it}^{\alpha} L_{it}^{\beta} \quad (5)$$

Where y indicates the output, K and L are respectively capital and labour inputs. Capital stock is supposed to be fixed. α and β are parameters to be estimated representing factor share coefficients. The subscripts i and t refer to the i^{th} sector and the t^{th} time period. γ allows for factors affecting and changing the efficiency of the production process (Milner and Wright, 1998). The factors

considered here are related to trade liberalization. These factors vary over time and across industries in the following manner:

$$A_{it} = \exp\left(\sum_t \gamma_t D_t\right) tpe_{it}^\delta \quad (6)$$

where tpe is the effective protection rate. D_t is a dummy variable having a value of one for the t^{th} time period and zero otherwise and where γ_t are parameters to be estimated. The dummy variable D_t is introduced to model exogenous shocks. This time dummy model allows for the time effects to switch from positive to negative and back to positive effects.

However, to take into account the fact that firms facing a change in their environment, particularly trade reforms, do not necessarily adjust their output level immediately to the new business conditions, we introduce the dynamic. To take into account the fact that the effects of liberalisation are not instantaneous and in order to separate the short term and the long term effects of trade liberalisation, we estimated a dynamic model. This will enable us to examine whether a firm's response to trade shocks is related to the speed with which it adjusts to changes in desired production levels.

Specifying the production function in log linear form, the following equation may be stated:

$$\ln y_{it} = cte + \lambda \ln y_{it-1} + (1 - \lambda)\alpha \ln K_{it} + (1 - \lambda)\beta \ln L_{it} + \delta \ln tpe_{it} + \sum_t \gamma_t D_t + u_i + v_{it} \quad (7)$$

u_i captures the heterogeneity between sectors.

v_{it} captures all other shocks to sector productivity, and we suppose this error to be serially uncorrelated. Absence of serial correlation is assisted by the inclusion of dynamics in the form of a lagged dependent variable.

Specifying the first difference of this equation, a growth rate form equation is derived. Since the lagged dependent variable is correlated with the transformed disturbance term (first difference of v_{it}), it needs to be instrumented in order to obtain consistent estimates. The GMM techniques enable us to tackle the endogeneity problems.

We estimate the dynamic model specified in equation (7) which allows for specific effects to control time-invariant sector unobservable characteristics by the generalised method of moment (GMM) as suggested by Blundell and Bond (1998), without assuming any distribution for the error terms, taking into consideration the dynamic form and the presence of variables that are invariants over time. An estimation of the dynamic error component model is considered using an alternative to the standard first-differenced GMM estimator of Arellano and Bond (1991). It is a system GMM estimator deduced from a system of equations in first differences and in levels. This estimator is defined

under extra moment restrictions that are available under quite reasonable conditions relating to the properties of the initial condition process. Exploiting these extra moment restrictions offers efficiency gains relative to the Arellano and Bond (1991) estimator and permits the identification of the effects of time invariant variables.

We also used a dummy variable to test for the impact of liberalization. The dummy was set to zero up to 1995, and to unity after 1995, for post-reform years. This dummy variable is perhaps more likely than the tpe measure to capture the impact of liberalisation. This dummy captures the effect of reforms not captured by tpe, especially the effects of deregulation, expansion and exit of firms, privatization characterising the new open environment.

Table 9: System GMM Estimates (system of first differenced and level equations) for all sectors (dependent $\ln y$)

Coefficients	With tpe		With dummy period	
Ln y(- 1): lag of log va	0.586 (0.1)	t=5.85	0.489 (0.13)	t=3.71
Ln L: log labour	0.474 (0.163)	t=2.9	0.607 (0.2)	t=2.93
Ln K: log capital stock	0.19 (0.087)	t=2.29	0.246 (0.074)	t=3.32
Ln tpe: log effective protection rate	0.00043 (0.023)	t=0.02	-----	
Dummy period	-----		0.00073 (0.023)	t=0.03
Sector effects	Yes		Yes	
M1: 1 st order serial correlation	- 1,00	(p=0.31)	- 1.04	(p=0.29)
M2: 2 nd order serial correlation	- 2.12	(p=0.034)	- 1.64	(p=0.1)
Sargan instrumental validity test (degrees of freedom are in parentheses)	56.2 (49)	(p=0.223)	44.26 (44)	(p=0.46)
No. of observations	84		96	
No. of sectors	6		6	

Note: Standard errors are in parentheses. All regressions include time dummies. The Sargan test is the over-identification test distributed as a chi-square. The M1 and M2 tests are respectively tests of first-order and second-order serial correlation, which are distributed as standard normal. These are described in more detail in the appendix. P is the p-value.

Table 9 reports the estimation results of the dynamic growth function defined by equation (7) and estimated by the system generalized method of moment (GMM). The first column reports the results with tpe as a measure of trade reform, the second reports the results with the dummy variable. The test of

the hypothesis $\lambda = 1$ ⁴ that there is no difference between target and actual output, or that the adjustment costs are null, rejects it at the 5 percent level of significance in the two columns. This hypothesis is not appropriate for the data at hand. The speed of output adjustment is of 0.4, which means that firms adjust only 40 percent of their deviations from optimality in one year. This sluggish adjustment conforms to the imperfections in the Tunisian factor markets.

The validity of the instrument set is checked using a Sargan test. This is asymptotically distributed as chi-squared under the null. The instruments used in the first differenced GMM or in the system GMM are not rejected by the Sargan test of over-identifying. Tests of no serial correlation in the v_{it} (M_1 and M_2) provide evidence to suggest that this assumption of serially uncorrelated errors is appropriate in the dynamic model as is shown in the different columns.

As for the protection variable, we obtain a positive but insignificant coefficient on the variable that captures protection (tpe). The results suggest that output growth is not responsive to changes in protection levels, indicating that trade reform by itself has not contributed to changes in manufacturing growth. The dummy variable is not significant either, as there is no marked difference in output growth between the two periods. This confirms the results of the descriptive analysis.

5.2. The impact of trade liberalization on employment growth

Increased openness to imports has negative employment consequences in the industry through a substitution effect, i.e imports replacing domestic production. On a symmetrical basis, exports should benefit domestic employment. The total effect is ambiguous as underlined above.

A simple econometric framework is used to test the relationship between the degree of international exposure and employment growth empirically.

A sector's demand for labour is derived from the inversion of the production function specified in equation (5), assuming that y and K are fixed. Demand for labour would therefore depend on output, stock of capital, together with the effective protection rate and time dummies.

The standard trade theory does not generally emphasize the costs associated with reallocating the factors of production. The reason is that the adjustment process is assumed to be transitory and the benefits of trade are assumed to outweigh the adjustment costs by far. This might well not be the case in reality. However, to take into account the fact that when firms face a change in their environment, particularly trade reforms, they do not necessarily immediately adjust their level of employment to the new business conditions due to the existence of adjustment costs, namely hiring and firing costs. A simple way of capturing these effects empirically is to include the lagged

⁴ For testing this hypothesis, a Student test of significance of the coefficient associated to the lagged variable, that is $(1 - \lambda)$, is sufficient.

dependent variable in accordance with a partial adjustment process for output,⁵ as the following indicates:

$$\ln L_{it} = \lambda \ln L_{it-1} + (1-\lambda)\beta_1 \ln y_{it} + (1-\lambda)\beta_2 \ln K_{it} + \gamma \ln tpe_{it} + u_i + v_{it} \quad (8)$$

In specifying the first difference form, the dependent variable measures the rate of change of labour.

With the last specification, we will investigate empirically how changes in trade effects measured by the effective protection rate, added to output effects, influence labour demand. The rationale for this trade term is that an increase in the openness of the economy (that is a decrease in tpe) boosted competition on the domestic market. Greater exposure of production to international competition may induce greater efficiency and reduce labour demand as evidence of a disciplinary effect. Greater efficiency may also increase output with the same factor levels, without cutting employment. As a result of this, we might expect a positive coefficient on the variable tpe associated to the efficiency effects in equation 6. Thus, trade liberalisation may not only affect the distribution between importable and exportable sectors as the Heckscher-Ohlin model predicts; it may also affect the efficiency with which firms use factors. Consequently the net effects of trade liberalisation on labour depends upon the balance of structural (reallocation effects), technological, and efficiency effects. Our estimation results may be viewed as an attempt to shed more light on these debates.

We use the GMM suggested by Blundell and Bond (1998) as above.

Table 10 reports the estimation results which are associated to the total labour and shows that the coefficient on the lagged dependent variable stands at 0.93 and is very significant. The speed of adjustment is 0.07, which means that firms adjust only 7 percent of their deviations from the optimality in one year. This confirms the fact that labour takes time to reach its optimal level, which is consistent with the existence of substantial employment protection in Tunisia. This sluggish adjustment reflects the imperfections in the Tunisian labour market. This justifies the fact that, in order to identify the impact of trade reform on labour, we must take into account the adjustment delays of labour.

As regards this employment equation, we obtain fairly reasonable estimates. The coefficient on the output variable is positive and significant. The coefficient on capital is insignificant.

As regards the protection variable, the results suggest that employment growth is not responsive to changes in protection levels, indicating that trade

⁵ The output is adjusted to its optimal level y^* as $\left(\frac{y_{it}^*}{y_{it-1}}\right) = \left(\frac{y_{it}}{y_{it-1}}\right)^\lambda$.

reform by itself and at this stage of the liberalization program has not contributed to employment changes.

Table 10: System GMM Estimates (system of first differenced and level equations) for all sectors (dependent: ln L)

Coefficients	With tpe	With dummy period
Ln labour(- 1): lag of log L	.9397674 (.0111247) t = 84.48	.9573642 (.0109582) t = 87.37
Ln Y: log va	.0323084 (.00868) t = 3.72	.023315 (.0082382) t = 2.83
Ln K: log capital stock	-.0039101 (.0093413) t = - 0.42	-.0150415 (.0308747) t = - 0.49
Ln tpe: log effective protection rate	-.0046475 (.002868) t = - 1.62	-----
Dummy period	-----	-.0030539 (.0030157) t = - 1.01
Sector effects	Yes	Yes
M1: 1 st order serial correlation	z = - 1.05 Pr > z = 0.292	z = - 1.53 Pr > z = 0.127
M2: 2 nd order serial correlation	z = - 0.51 Pr > z = 0.607	z = - 0.54 Pr > z = 0.589
Sargan instrumental validity test (degrees of freedom are in parentheses)	chi2(74) = 76.29 Prob > chi2 = 0.405	chi2(80) = 82.54 Prob > chi2 = 0.401
No. of observations	84	96
No. of sectors	6	6

Note: Standard errors are in parentheses. All regressions include time dummies. The Sargan test is the over-identification test distributed as a chi-square. The M1 and M2 tests are respectively tests of first-order and second-order serial correlation, which are distributed as standard normal.

The dummy variable remains insignificant indicating that there is no major change in employment growth comparing pre- versus post liberalization periods.

5.3. The impact of trade liberalization on productivity growth

Following Paus and al. (2003), and to examine the effects of liberalization on productivity, we specify the following basic equation, where productivity growth depends on past productivity growth, trade openness and industry characteristics (u_i):

$$TFPg_{it} = \beta_0 + \beta_1 TFPg_{it-1} + \beta_2 tpe_{it-1} + u_i + v_{it} \quad (9)$$

We include past productivity growth as an independent variable. If there is a trend effect, with past productivity growth perhaps indicating the ability to innovate, the coefficient on this variable will be positive. On the other

hand, the coefficient may be negative if innovation by firms tends to be lumpy (Paus and al, 2003). We lag the tpe by one period, which implies that the level of commercial reform at time (t-1) influences the growth in productivity from (t-1) to t. The growth rate variables were computed as the difference in the natural log from t to t-1. Sectoral behaviour is also influenced by a host of other economic facts. These include macro economic factors like inflation and interest rates, general market conditions, investors' confidence, etc. We therefore include a sector specific effect (u_i). Furthermore, the objective here is to investigate the role of trade liberalization in TFP growth, hence the ability of the model to explain the variation is not of primary concern.

Table 11: System GMM Estimates (system of first differenced and level equations) for all sectors (dependent variable TFPg)

Coefficients	With tpe	With dummy period
TFP growth (- 1): lag	.0017057 (.1173607) t = 0.01	- .0015517 (.070283) t = - 0.02
Tpe (- 1): effective protection rate	.0005866 (.0002875) t=2.04	-----
Dummy period	-----	- .023777 (.0105535) t = - 2.25
Sector effects	Yes	Yes
M1: 1 st order serial correlation	z = - 6.50 Pr > z = 0.000	z = - 4.35 Pr > z = 0.000
M2: 2 nd order serial correlation	z = - 0.58 Pr > z = 0.562	z = - 0.65 Pr > z = 0.513
Sargan instrumental validity test (degrees of freedom are in parentheses)	chi2(45) = 58.46 Prob > chi2 = 0.086	chi2(13) = 15.10 Prob > chi2 = 0.301
No. of observations	78	90
No. of sectors	6	6

Table 11 shows estimates for the coefficients of specification (9) obtained by GMM. The coefficient of the trade variable provides support for the hypothesis that trade liberalization has a negative impact on productivity growth. Tpe is positively and significantly correlated with productivity.

The coefficient of the dummy variable period is negative and substantial, thus providing support for the fact that TFP growth decreases during the first stage of the implementation of the liberalization program. In fact all the sectors experienced declines in TFP growth during the second period. The results of statistical and econometrics tests are alike.

To put it in a nutshell, liberalization reforms were in their first active stage in the observed period, which entails considerable structural adjustment in manufacturing activities that had so far been sheltered from competition. So one possible explanation for the decline in productivity growth is that improvement in competitiveness and productivity was expected to occur as the liberalisation of the economy led to more efficient resource allocation. Our estimation results

confirm the fact that output and labour take time to reach their optimal levels which is consistent with the existence of substantial employment protection in Tunisia and reflects the imperfections in the Tunisian factors markets. Since the second-hand market in capital goods is not well developed in Tunisia, less efficient firms and sectors may not exit if they are cross subsidiary by affiliates in other sectors. The movement of capital and labour is further constrained by credit market imperfections. Various frictions inhibit factor mobility in the Tunisian industrial sector; these include several laws that prevent firms from firing workers and regulations that limit the establishment of new firms and the termination of old ones. Exit costs also include bankruptcy expenses or severance payments to employees. Entry costs also include licensing fees and irreversible purchases of capital goods. So the transfer of resources from less efficient to more efficient sectors may not take place in the short run and the benefits of liberalisation may be eroded at the first considered stage of liberalization. Institutional factors, like exit barriers, may slow down the long-term adjustment process (Sharma, 2000). In the short run, when labour, but not capital, could be reallocated, gains are estimated to be negligible. Increasing foreign competition leads to lower sales for Tunisian domestic firms in the first stage of the liberalization program. Some of these domestic firms are slow to adjust but stay in the market, that's why productivity growth declines in the short run. The fall in productivity growth in a more open context and with increased competition led to a decrease in competitiveness and to a stabilisation in Tunisian exportation growth. This indicates that liberalization alone does not guarantee superior performance. It is necessary to adopt structural reforms to facilitate the reallocation of resources to sectors enjoying comparative advantage and to curb transitional costs.

Another explanation for the decline in productivity growth is that Tunisia tends to specialize in products and industries that exhibit less linkage, spill over and potential for productivity than others. Unrestricted border trade with the European Community (EC) since 1995 has led Tunisia to continue to buy high technology goods from the EC at competitive prices at the expense of its own economic viability. Tunisian industries choose the quicker option of importing the parts and components rather than encouraging parallel technology transfers to component manufacturers. Low R&D activity in firms and a limited use of in-house efforts, either for adaptation of imported technology or for locating technology imports, could explain low R&D activity and the decline in productivity growth.

We tend to view this as evidence against trade-induced technical upgrading in Tunisia manufacturing. Tunisia has failed to capitalize upon several decades of foreign transfer of technology. The small scale of most manufacturers does not allow them to take advantage of superior technology that would provide a competitive market advantage.

Our results are somewhat in compliance with some authors' scepticism of trade-productivity growth nexus. Grossman and Helpman (1991) argue that trade could hurt productivity. Intensified competition due to trade could

discourage efforts for invention by lowering expected potentials profitability of a successful innovation. A country with abundant unskilled labour may be led by trade to specialize in traditional low technology manufacturing and international competition with a technologically advanced country can bring about a slowdown in innovation and productivity growth in a country with a disadvantage in research productivity (Sharma, 2000).

Trade liberalization alone is not enough to improve performance. The gains from trade liberalization come from changes in competition combined with other reforms such as institutions to address contracting issues, as well as effective legal and regulatory frameworks. Thus, how well the legal system protects investors is presumably a determinant of the success of trade liberalization program in improving performance. The government must establish the listing and other regulations that will convince potential investors that the market is a reputable place to invest and trade (Megginson and al, 2001). The development of institutions capable of improving the operations of the market is underway in Tunisia but it is slow.

Furthermore, our analysis would have to be reconducted over a longer period (after 2003), covering a more extensive period of the liberalization program, to evaluate the long-run impacts of trade liberalization, when all factors of production are reallocated.

6. CONCLUSION

This paper is an attempt to review what we know about the consequences of trade reform on industries' performance and employment. The analysis deals with different elements of conduct and performance in Tunisian manufacturing: growth, productivity growth, employment growth, exports growth, capital intensity in Tunisian manufacturing. The data used cover the first stage of active liberalization program. Although data for a short period after effective liberalization may not be sufficient to fully evaluate the long-run implications of reforms. The analysis of performance trends for the period should provide some insights.

The results of statistical and econometric tests are alike and suggest that reduction in tariffs and non tariffs levels conducted in this first phase of liberalization in Tunisia had no significant effects on both manufacturing growth and employment growth. The overall impact of liberalization has been limited. No significant improvements were recorded in the overall production growth, which appears to be due mainly to a decrease in productivity growth, nor in the exportation growth, which seems mainly to result from a stagnation in competitiveness.

Regulations and limits upon factors mobility in Tunisia in the considered period are the main factors that account for delaying adjustment and diluting the benefits of trade reform. In fact, the liberalization reforms were in their first active stage in the observed period, as Tunisia has adopted a gradual liberalization program. Import procedures, customs clearance procedures

remained slow and technical inspections complex and lengthy until 2001. This is mainly due to the government's concern with maintaining social stability and preparing companies for competition. Institutional factors, like exit and entry barriers, may also slow down the long-term adjustment process. For instance, the fact that the Tunisian government is concerned about social welfare suggests that it will be difficult to implement substantial labour market reforms. Therefore, any short run stagnation may be purely temporary. In the long run, gains in growth and exports from liberalization should be derived from the reallocation towards sectors in which Tunisia has a comparative advantage. Our analysis needs to be reconducted for a longer period (after 2003), covering an extended period of the liberalization program, to evaluate the long-term impacts of trade liberalization, when all factors are reallocated.

Low R&D activity in Tunisian firms, a limited use of in-house efforts, either for adaptation of imported technology or for locating technology imports could also explain the low R&D activity and the decline in productivity growth in Tunisian manufacturing. But it is noteworthy that productivity may not have deteriorated as much as it would have in the absence of trade reform and any short-term reduction in productivity growth may be purely temporary.

Thus, appropriate reforms appear to be essential if the potential benefits of liberalisation are to be fully achieved. In order to stimulate the economy, there was a need for further reforms aimed at liberalizing the trade, dismantling quantitative import restrictions and facilitating import procedures.

With a more open policy environment and increased competition, Tunisian industries must realise that to bridge the technological gap, they need to direct their efforts to building capabilities for technology generation, rather than depend on imports.

Policies could help palliate the transitional costs while taking care not to hinder the reallocation process. The policies that hinder the reallocation process or otherwise interfere with the flexibility of the factor markets may delay or even prevent a country from reaping the full benefits from trade (M. Melitz, 2003).

To make its trade integration work effectively for growth and industrial exports, Tunisia needs to make further progress in structural reforms, a strategic move to faster growth and exports by improving productivity and competitiveness. Other reforms such as setting up institutions to deal with contracting issues, as well as devising an effective legal and regulatory framework need to be quickly implemented in Tunisia.

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L'IMPACT DE LA LIBÉRALISATION COMMERCIALE SUR L'INDUSTRIE MANUFACTURIÈRE TUNISIENNE : STRUCTURE, PRODUCTIVITÉ ET EMPLOI

Résumé – L'objet de cet article est de comparer l'industrie manufacturière en Tunisie entre deux périodes caractérisées par des régimes commerciaux différents : le protectionnisme relatif (1987-1995) et la libéralisation (après 1995). L'analyse considère plusieurs aspects : la structure industrielle, la croissance de l'emploi, de la productivité totale des facteurs, des exportations, de l'intensité capitalistique...

Des tests non paramétriques sont utilisés pour effectuer les comparaisons entre les deux périodes considérées. Une modélisation économétrique permet d'analyser l'impact de la libéralisation commerciale sur les différents indicateurs de performance retenus.

Les résultats de l'analyse descriptive et ceux de l'analyse économétrique corroborent. Le démantèlement tarifaire n'a pas d'effet significatif sur la croissance dans le secteur manufacturier tunisien sur la période considérée. Cependant, nous relevons une baisse du rythme de croissance de la productivité totale des facteurs dans la seconde période, c'est-à-dire la période d'ouverture relative. Ces résultats s'expliquent principalement par l'existence de freins, de coûts d'ajustement élevés qui nuisent à la réallocation des facteurs de production et masquent les bénéfices de la libéralisation à court terme.

EL IMPACTO DE LA LIBERALIZACIÓN COMERCIAL EN LA INDUSTRIA MANUFACTURERA TUNECINA: ESTRUCTURA, PRODUCTIVIDAD Y EMPLEO

Resumen - *El objeto de este artículo es una comparación de la industria manufacturera en Túnez entre dos periodos caracterizados por regímenes comerciales diferentes: el proteccionismo relativo (1987-1995) y la liberalización (después de 1995). El análisis considera varios aspectos: la estructura industrial, el crecimiento del empleo, la evolución de la productividad total de los factores, de las exportaciones, de la intensidad capitalística...*

Se utilizan algunas pruebas no paramétricas para efectuar las comparaciones de resultado entre los dos periodos en cuestión. Una modelización econométrica permite analizar el impacto de la liberalización comercial en los distintos indicadores de resultado elegidos. Los resultados del análisis descriptivo y los del análisis econométrico corroboran. El desarme arancelario no tiene efecto significativo sobre el crecimiento en el sector manufacturero tunecino sobre el período en cuestión. Sin embargo, destacamos una reducción del ritmo de crecimiento de la productividad total de los factores en el segundo período, es decir, el período de apertura relativo. Estos resultados se explican principalmente por la existencia de frenos, de elevados costes de ajuste que perjudican a la reasignación de los factores de producción y encubren los beneficios de la liberalización a corto plazo.