ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2008

working paper series

THE POLITICAL ECONOMY OF TRADE POLICY IN TUNISIA

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Working Paper No. 438

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September 2008

I wish to acknowledge my intellectual debt to Professor Mohamed El Hedi Lahouel. In preparing this paper, I gratefully benefited from his helpful comments. Responsibility for any errors is mine.

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Abstract

Our paper proposes to establish the political economy determinants of cross-industry distribution of protection in Tunisia in the post-independence period. Instead of the lobbying hypothesis, we assume that the government was seeking legitimacy and to that end, chose import substitution as industrial strategy in order to promote industries with learning potentials but still with a likely concern for tariff proceeds as well as for the rent generation. Following Esfahani (2005)[1], we include in the latter motive the need for the government to alleviate risk for groups that have imperfect access to the credit market. The estimation of a simple model for a cross section of 35 Tunisian manufacturing industries in 1997 shows that the industrial distribution of nominal protection in 1997 tended to reflect the *special-interests pressures* emanating from big, capitalistic firms, supplying consumer goods in the import-substitution sectors. However, the workers' interests and the government ad hoc growth objectives seem to matter, as well.

ملخص

تقترح هذه الورقة وضع محددات الاقتصاد السياسي الخاصة بحماية الدول لمختلف الصناعات في تونس في مرحلة ما بعد الاستقلال . فبدلاً من فرضية أن هناك مجموعات دفعت الدولة إلى إقرار قوانين الحماية، نفترض أن الحكومة كانت تسعى إلى تحقيق الشرعية ومن أجل هذا الهدف لجأت إلى إيجاد استراتيجية صناعية لإيجاد البديل المحلي وذلك لدعم الصناعة وتطوير قدرات العاملين فيها مع وضع عائدات الجمارك في الاعتبار وكذا قيمة الإيجارات. فبعد الأصفهاني (2005) أضفنا إلى الدافع الأخير حاجة الدولة لتخفيف عبء المخاطرة عن المجموعات التي لا تستطيع دخول سوق الائتمان. وتشير التقديرات المأخوذة من عينة من مختلف الصناعات التونسية عام 1997 إلى أن توزيع الصناعات المحمية حماية اسمية عام 1997 تعكس ضغوط المصالح الخاصة النابعة من الشركات الرأسمالية الكبيرة والتي تبيع السلع الاستهلاكية بدلاً من استيرادها من الخارج إلا ن مصالح العمال وأهداف النمو التي تريد الحكومة تحقيقها في ذلك الوقت كذلك على ما يبدو ذات تأثير.

[1] Esfahani H. (2005), "Searching for the (dark) forces behind protection", Oxford Economic Papers 2005.

Introduction

Despite its small domestic market, Tunisia adopted import substitution as industrial policy in the early sixties. Ten years later, although protection had proven to be inefficient in maturing the so-called infant industries, trade distortions were more pervasive than in earlier periods. Needed policy reforms continued to be deferred until the mid-eighties.

A serious payment crisis in the first half of the eighties prompted decision makers to implement a vast program of trade liberalization. The persistence of protection suggests that vested industrial interests, including those of state-owned enterprises, are resisting trade reforms (though such a conjecture may be implausible in that it is unlikely that any interests played any role in trade policy formation in the early sixties). Alternatively, we tend to conjecture that it is infant industry promotion (and the protection that usually accompanies it) that gives birth to industrial interests rather than the opposite. By securing rents to some industries–predominantly those with high state ownership–and strengthening that policy for a long time, trade protection helped vest the interests involved in such a way that later on, demand for protection and resistance to reform could be supposed to originate from the same industrial interest groups.

In part 1, this study proposes to establish the political economy determinants of cross-industry distribution of protection in Tunisia in the post-independence period. To account for this, we develop a political economy model that departs from western-democracies-focused models in two aspects. First, it introduces in the government objective function an industrial policy concern for growth-potential industries. Second, it departs from the lobby-driven trade policy models to focus on a more general concern with industrial rent creation and tariff revenue generation.[2] In part 2, we estimate a simple version of this model for a cross section of thirty-five Tunisian manufacturing industries for the year 1997.

Recent developments in endogenous protection theory (Grossman and Helpman, 1994) state that organized interest groups influence trade policy choices so as to generate a rent in favor of the specific factors their members are endowed with. The government responds to the protection demand in exchange for the financial contributions that accrue from the interest groups. The contributions are part of the policy-induced rents and may be spent by the government it in conformity with its particular objectives.

What emerges from this framework is that the equilibrium rate of protection is decreasing in both the import demand price-elasticity and the import penetration rate, and that the industry's political organization of the industries acts interactively with these determinants. Hence, higher import elasticities imply higher deadweight losses that dissuade the government from increasing protection. On the other hand, higher import penetration rates imply smaller shares of domestic output in demand and hence lower industrial rents to provide to firms.

The application of such models to developing countries like Tunisia raises the issue of relevance of the contributions motive or, more generally, the idea that lobbying is the *sole* determinant of protection. Indeed, it is implausible to assume that any interest games[3] in the early sixties could have determined the inward-looking trade policy orientation. The reason is twofold. On the one hand, organized interests in that period had too weak collective action characteristics to be influential. On the other hand, the new government was essentially concerned about its legitimacy and about economic development. Favoring some industrial interest groups at the expense of others was an unlikely priority.

[2] In this respect, we follow Esfahani and Mahmoud (1999) and Esfahani and Leaphart (2000).

[3] In terms of the endogenous protection theory.

Alternatively to the lobbying hypothesis, we assume that the government chose import substitution as industrial strategy in order to promote industries with learning potential but without neglecting the importance of tariff proceeds or the interest of the decision makers in generating industrial rents and redistributing them in line with political and economic ends.

First, we think that the government's concern with growth originated in its search for the political and economic legitimacy that would secure its longevity. Second, tariff revenue is important in that it could sustain a costly or defective fiscal system. These proceeds could fund economic programs directly or indirectly related to individual politicians' objectives. Finally, rent creation and distribution may obey a variety of more or less "benevolent" motives. Esfahani and Leaphart (2000) cite the need to insure small firms or sectors against market risks in case of insurance market failure. We can also factor in the government's equity concern, without disregarding the politicians' search of rent extraction in order to get rich.

The industrial rent generated through import substitution policy will, however, create and reinforce new interests until protection demand becomes the main drive behind the persistence of protection, despite evidence of the inefficiency of the initial policy choice. However, the rise of these industrial interests does not mean that the influence process takes the form of classic lobbying. Because of the peculiar conditions of the Tunisian economy, which we will explain below, the influence mechanisms underlying trade policy formation remain mainly unobservable, but they may be linked to industrial features of firms and sectors.

Our study is organized as follows: in section 1, we explain the characteristics of the main interest groups shortly after Independence, the political and economic initial conditions that motivated the orientation of industrial and trade policy, as well as the dynamics that gave birth to the new interest groups and helped develop the present channels of influence. In section 2, we present an intertemporal model of trade policy determination that takes into account the aspects enumerated above. Section 3 provides an econometric analysis of the structure of protection in Tunisia, in terms of political economy. We summarize the main results and the conclusions in section 4.

1. Historical background on vested interests and protection

After independence in 1956, the economic activity in Tunisia was dominated by traditional subsistence agriculture. Manufacturing was in decline, due to lack of innovation as well as dearth of import competition, which was favored by a customs union with France dating back to 1904.

In such a context, only French producers could be expected to advocate free trade or protection, for they had a stake in the main export and import substitution units, in both agriculture and manufacture. However, nationalization, which was the dominant policy in most developing countries, had urged the former settlers to return to France. The ruling party then faced two major organized interest groups: the business association (UTICA)[4] and the trade union (UGTT).[5]

The close collaboration between the business association and the leading party during the independence struggle resulted in the former being strongly submissive to the ruling party's leadership after independence. This political background prevented the UTICA from developing, let alone imposing, an independent view of its own interest. It is even possible

[4] Union Tunisienne pour l'Industrie, le Commerce et l'Artisanat.

[5] Union Générale Tunisienne du Travail.

that the party in power deliberately favored the union's umbrella character[6] in order to handicap the defense of its members' interests (Grissa, 1991; Nugent, 1991).

This encouraged entrepreneurs to develop *alternative influence mechanisms*, which still differ from lobbying activity in developed countries. Three main factors helped develop this situation: the small size of the economy, the high activity concentration in some sectors, and finally the encompassing character of the business association.

Thus, due to the small size of the Tunisian economy, large firms with specific industrial characteristics such as state ownership, high employment levels, large output shares, and significant debt, tend to have enough political influence to *directly communicate* their concerns to the state rather than rely on the intermediation of UTICA. These firms' attitude is justified by the weak collective action potential of their organization. Indeed, with its encompassing character, the organization members' interests turn out to be competitive rather than "additive" (Bellin, 1993). This lack of interest differentiation within the UTICA's constituency, coupled with its submission to the ruling party, make collective action difficult for it to undertake and contributes to the negative perception its membership had about it (Bellin, 1993: 206-12).

On the other side, thanks to its popularity and its leaders' charisma, the trade union attempted to coalesce with the dominant party and advocated a state-led development strategy. However, by the late sixties, the failure of the collectivist policy inspired by the trade union, and the large popular discontent this policy caused, helped the ruling party definitely discredit its main challenger. However, the political importance of the trade union's large membership probably led the ruling party to maintain the coalition–mainly by appointing the union's elite to positions in the government or in state-owned enterprises.

Given that the interest groups' collective action was weakened by these features, we think the choice of import substitution by the late sixties was not influenced by interest groups, but was chiefly the result of particular initial conditions. The most important of those are the departure of French entrepreneurs, the lack of response from domestic entrepreneurs, and the intellectual climate prevailing in the post-war period.

These conditions were to be faced by a government whose major concern was to establish its economic and political legitimacy bases. To reach this legitimacy, we believe its trade and industrial policy choice was motivated by the establishment of growth-enhancing activities. This does not exclude the motive of maximizing tariff proceeds, or that of generating rent. Rent redistribution was a means for the government to achieve social goals such as urban unemployment re-absorption, and support to low-wage industries or those located in poor regions. Tariff receipts, on the other hand, are obviously useful in an economy where alternative means of taxation are limited.

This framework is more appropriate for the rationale of protection policy in a developing country such as Tunisia. The emphasis on financial contributions by interest groups is not relevant because this feature is probably minor and in any case unobservable.

2. Modeling the political economy of protection with a role for import substitution:

The model we present is meant to integrate in the political economy of trade policy, the infant industry argument which justified the import substitution policy. Protection for this purpose is usually initiated by governments in order to get industrialization started. However, vested interests develop, and later on it becomes difficult to remove this protection.

[6] Since the mid-sixties, the union encompassed handicrafts, commerce, and services.

The basic model

We assume a two-period horizon, present (P) and future (F), to take into account any external dynamic effects that may arise in some sectors. The government is assumed to offer trade protection in the present period, and to commit to liberalizing trade in the future.

The economy produces (n+1) homogenous final goods x_i (i = 0,…, n), the domestic prices of which are p_i in the present. World prices P_i^* are assumed to be exogenous and constant over time. Good x_0 is non tradable and chosen as numéraire such that $p_0 = P_0^* = 1$. All other prices are therefore expressed in terms of the non-tradable good. Any divergence in the present between domestic and world prices is due to the trade protection that the government may grant in the first period. If a good is importable, trade intervention may take the form of a specific tariff t_i ($t_i > 0$) or a specific import subsidy ($t_i < 0$). If the good is exportable, it may be taxed ($t_i < 0$) or subsidized ($t_i > 0$). In the second period (F), domestic prices will be brought back to their world levels following liberalization.

Agents in this economy are utility-maximizing households, profit-maximizing firms, and the government. The number of consumers is given and normalized to one. They demand goods i (i = 0, …, n) and supply labor and sector-specific factors. Labor endowment is assumed to be the same for all households and equal to one unit in total. Each sector-specific factor is similarly available in a given quantity normalized to one, which is evenly distributed among households. Equations (1) through (3) in Annex A describe respectively all the features of households' preferences, budget constraint, demand functions, and surplus. All the equations (1 to 29) of this model are in Annex A, to which we will refer whenever we consider it unnecessary to insert the equation in the text.

The numéraire, x_0, is produced with labor only requiring one unit of the latter per unit of output. The production function is, therefore, $x_0 = L_0$. The labor market is assumed to be competitive. Workers are supposed to be equally qualified to work in any sector. Technology in the numéraire sector implies that the nominal wage is equal to one. Total labor supply is assumed to be large enough to allow a positive supply of good x_0, in the competitive equilibrium.

Perfect competition is also assumed for each of the other sectors. Each sector uses labor and one unit of the specific factor. This unit is assumed to be evenly distributed among the sector's firms. To produce good i, each firm makes use of labor and its share of the specific factor with a constant-returns-to-scale technology.

The assumptions of constant-returns-to-scale and identical firms make each sector operate as though it were a unique large firm using a unit of the specific factor and the total labor used by the sector. The production function can thus be expressed in terms of output per unit of the specific factor.[7] Thus, for any sector i, technology in the present period can be expressed in the reduced form as:

$$(4)\quad x_i^P = \overline{A}[l_i]^{\alpha}$$

where x_i^p is the quantity of output per unit of specific factor obtained when sector i uses l_i units of labor per unit of the specific factor. $\overline{A} > 0$ is the exogenous productivity factor of sector i applying to the first period (P) and α is the labor elasticity of output i ($0 < \alpha < 1$).

Introducing infant industry and dynamic gains:

In the second period (F), technology is assumed to embody *dynamic external effects* resulting from the expansion of the sector in the first period. The idea is to capture any external effects

[7] The specification of the number of firms per sector is therefore irrelevant.

(such as learning effects) that may be generated by the development of the industry as a whole.

This way, we capture two elements that characterize infant industries: time and externalities (Mill, 1848). The assumption of liberalization in the second period means that the government expects the industry to mature after one period.

In the presence of externalities, policy makers are supposed to target their intervention on the source of externality in order to reach the social optimum. In our case this implies, in decreasing order of optimality, either improving the capital market to facilitate the private financing of labor training, or providing an output subsidy to firms (Corden, 1974: 260-2). Making use of tariff protection instead of those direct measures means that policy makers cannot avail themselves of the latter option.

To model the dynamic external effect, let us note $A^F(x^p_i)$ sector i's future productivity factor. It is *endogenous* to sector i but *exogenous* to individual firms in such a way that market competition is not altered.

Chipman (1970) names such a situation *parametric* external economies of scale. This means that each firm considers its technology as homogenous of degree one and interprets any observed deviation from it as the result of exogenous disturbances. The production function in the second period is therefore:

(5) $x_i^F = A^F[\quad l_i\ ]^{\alpha} \qquad \text{with} \qquad A^F = A^F(x_i^P)$

where x_i^F and l_i are respectively the levels of future output and labor per unit of specific factor. Given that at both periods the level of specific factor is fixed to one, total sectoral output and total sectoral output per unit of specific factor are identical. It is the reason why A^F is expressed as a function of present output per unit of specific factor. In order to rule out the case of additional production in the future (F) without additional quantities of input,[8] we add the assumptions in (6) (Annex A). They imply that higher present production exerts positive but decreasing effects on future levels of productivity. One could specify A^F as:

(7) $A^F = A^F(x_i^P) = (x_i^P)^{\varepsilon_i} \quad \text{with} \quad 0 < \varepsilon_i < 1$

where ε_i is the elasticity of future productivity with respect to present output. When a sector has no dynamic external effect ($\varepsilon_i = 0$), its future productivity is equal to the present one ($A^F = \overline{A}$). The condition on ε_i in (7) ensures that A^F is increasing in x_i^P and concave.

Given constant-returns-to-scale, the output value is exhausted through factor remuneration at marginal productivity. In addition, the existence of a specific factor means that its return (profit) is residual once labor has been remunerated. If we note π_i^P, the present profit per unit of specific factor in sector i defined in equation (8) (Annex A), then the supply (equation 9, Annex A) and profit (equation 10, Annex A) functions come easily.

At this level, we can introduce one of the trade protection motives, namely the fact that firms have industrial characteristics that limit their access to the credit market, in which case each unit of profit has for the firm a marginal value τ_i greater than 1. This premium on profit τ_i is higher, the more the firm's characteristics block its access to credit. Such characteristics may be small size, an unskilled labor force, and low capital intensity.

Firms' behavior in the future is similar to that in the present, since they keep considering their productivity factor variations as exogenous. Consequently, equations (11) and (12) (Annex A) express, respectively, the future supply and profit functions. Tariff dismantling in the future makes supply and profit functions of p_i^*.

[8] Cf. Bhagwati, Panagarya and Srinivasan (1998), p.164.

We define $M_i(p_i) = d_i(p_i) - x_i^p(p_i)$ as the total present import demand if i is importable. When i is exportable, $M_i(p_i)$ is negative and its absolute value is the export supply. If we assume that net tariff revenue is redistributed to households, then the social marginal value of that revenue will be equal to the private value. However, this overlooks the difference in cost between the collection of revenue through tariffs, and alternative means of taxation. In less advanced countries, inefficiencies in fiscal systems make import taxation the cheapest way of collecting receipts.

Assuming that the next best alternative to trade taxation involves a marginal cost of θ monetary units, each additional government revenue collected through tariffs has to be weighted by its marginal value (1+θ).[9] Following Esfahani (2005), we assume that the government uses the tax proceeds to finance a fixed quantity v of a public good. In addition, we assume that the public good provision is considered by the government only in the present.

The present aggregate welfare W^P, in terms of consumers' surplus, appears as the sum of the consumers' surplus s(p), their total wages (equal to one), the present profit of all sectors ($\tau_i\ \pi_i^P$) as valued in terms of consumers' surplus, the social value of net total tariff receipts, and the total net benefit from the public good.

$$(13)\ W^P = s(p) + 1 + \sum_{i=1}^{n} \tau_i\, \pi_i^p(p_i) + (1+\theta)\sum_{i=1}^{n} t_i M_i(p_i) + (v - 1 - \theta)T$$

In the second period (F) aggregate welfare function, tariff receipts vanish since the government liberalizes trade. The last term in equation 13 vanishes as well, assuming that the public good is no longer produced. Consequently, the second period aggregate welfare reduces to the sum of consumers' surplus, total wages and total future profits. Letting second period aggregate welfare be W^F, it follows that:

$$(14)\ W^F = s(p^*) + 1 + \sum_{i=1}^{n} \tau_i\, \pi_i^F(p^*),\quad p^* = (p_1^*, \ldots, p_n^*)$$

The government is concerned about aggregate welfare, net fiscal revenue, and industrial rents generated through trade policy. Aggregate welfare is important to the government in that it assures a minimum social cohesion which eases the exercise of power whatever the democratic nature of the regime is. However, industrial rents and net fiscal receipts are more valuable to the government. The use it may make of fiscal revenue and the control it may exert on rent distribution may be of great political and economic interest.

The intertemporal objective function of the government in terms of consumer surplus is expressed as follows:

(15)

$$G = \left[1 + s(p) + (1+\theta)\sum_{i=1}^{n} t_i M_i(p_i) + \sum_{i=1}^{n} \tau_i \pi_i^p(p_i) + (vT - (1+\theta)T)\right] + \frac{1}{1+r}\left[1 + s(p^*) + \sum_{i=1}^{n} \tau_i\, \pi_i^F(p_i^*)\right]$$

In (15), r is the appropriate discount rate. Maximizing G with respect to the specific tariff t_i yields the necessary condition (16) (Annex A). Using the three terms in (17) and noting $e_{Mi/pi}$ the import demand price elasticity of good i [$e_{Mi/pi} = -(\partial M_i/\partial p_i)(p_i/M_i)$], the first-order condition (16) may be re-written (equation 18) and manipulated appropriately, to yield:

[9] Esfahani (2005) models the social marginal cost of trade taxes by assuming there is a public good the government has to supply in a given quantity T, that can be financed by a costly tax. If each unit of the public good costs 1 monetary unit and generates a utility v for each individual, and each monetary unit has a collection cost of θ, then the social net benefit derived from that good is (vT-(1+θ)T).

(19) $\theta(M_i - \frac{t_i}{p_i} M_i\, e_{M_1/p_1}) + (\tau_i - 1)x_i^p - \frac{t_i}{p_i} M_i e_{M_1/p_1} + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})\varepsilon_i x_i^F \frac{P_i^*}{p_i} = 0$

The first term of (19) measures the marginal increase in tariff receipts not redistributed by the government. The second term represents a marginal political benefit. The third term which is negative represents the marginal net social loss caused by the increase of t_i. Finally, the fourth term (positive) represents the future additional discounted profit yielded by the learning effect. The presence of the present domestic price p_i in the denominator of this fourth term means that the latter is decreasing in t_i. This means that when the protection accelerates, the profit in the future period increases at a diminishing rate caused by the same pattern in the evolution of the learning effect.

If we replace the domestic present price p_i in (18) by $p_i = P_i^* + t_i$, we get equation (20) (Annex A), the solution of which, in t_i/P_i^* gives the equilibrium rate of protection:

(21) $\frac{t_i}{p_i^*} = \frac{\theta M_i + (\tau_i - 1)x_i^p + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})x_i^F \varepsilon_i}{(\theta+1)\, M_i e_{M_i/p} - (\theta M_i + (\tau_i - 1)x_i^p)}$

The resulting equilibrium rate in (21) displays the same determinants as those in the trade policy literature i.e. the output (x_i^p) and the import (M_i) levels and the import price elasticity ($e_{M/p}$). It comprises an additional term in ε_i which accounts for the presence of the learning effect.

In order to express the protection rate in terms of the import penetration ratio (M_i/d_i noted m_i), we divide both the numerator and the denominator of (21) by the demand in the first period d_i. We obtain (21'), in which we can replace the ratio x_i^F/d_i by

$\frac{x_i^F}{d_i} = (1 - m_i)(x_i^F / x_i^p)$ and the ratio x_i^p/d_i by $\frac{x_i^p}{d_i} = 1 - m_i$.

If we further denote g_i the rate of growth of sector i output between the two periods, then the ratio x_i^F/x_i^p can be replaced by $(1+g_i)$. With these notations, the equilibrium protection rate in (21') can be expressed as follows:

(22) $\frac{t_i}{p_i^*} = \frac{(\tau_i - 1) + (\theta - \tau_i + 1)m_i + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})(1+g_i)(1-m_i)\varepsilon_i}{(\theta+1)\, m_i e_{M_i/p} - (\theta - \tau_i + 1)m_i - (\tau_i - 1)}$

Two straightforward results emerge from our equilibrium rate. First, as in all trade policy models, all things being equal, the protection rate is unambiguously decreasing in the import price elasticity. A more elastic import demand implies a higher deadweight loss and a larger reduction in the tax base, both of which discourage the increase in the protection rate. Second, when an imported good i has no domestic equivalent ($X_i^p = X_i^F = 0$), it is given a positive tariff rate such that:

(23) $\frac{t_i}{P_i^*} = \frac{\theta}{(\theta+1)e_{d/pi} - \theta}$

This explains the empirical observation of high protection rates granted to imported goods that have no domestic equivalents. Models focusing on lobbying and assuming redistribution of tariff revenue ($\theta = 0$), do not account for such a feature. Furthermore, the protection rate in (23) is *increasing* in θ. The more costly are the fiscal receipts outside trade, the more protected are the goods with no domestic equivalent. The demand price-elasticity in the

denominator of (23) shows that the government is, however, restrained by the consumption deadweight loss its decision implies.

In the following sections we will interpret the equation (22) with reference to the effects of the learning potential and import penetration, consecutively.

[b]Protection and the learning potential:

Let us assume that the government is driven by the revenue motive in addition to that of promoting learning ($\tau_i = 1$). The equilibrium protection rate that emerges is:

$$(24)\quad \frac{t_i}{p_i^*} = \frac{\theta M_i + \frac{1}{1+r}\left(\frac{\alpha}{1-\alpha}\right) x_i^F \varepsilon_i}{(\theta+1)\, M_i e_{M_i/p} - \theta M_i}$$

It follows that protection continues to increase in learning potential in the presence of the revenue motive. While promoting learning in the relevant sectors, the government benefits from the 'by-product' of this promotion which are tariff receipts.

Let us consider the general case where the decision maker aims at creating industrial rent, raising tax revenue, and promoting learning at the same time. Compared to the latter case, the additional rent motive should strengthen the motive for learning promotion in that for the same learning potential, sectors with higher output in the first period are favored more. Indeed, with higher output in the first period, they are more attractive in terms of rent creation in both periods.

This confirms the intuition that, in all cases, protection is increasing in the learning potential. This means that if the government granted protection only according to the firms' interest as perceived by them, the equilibrium rate would be smaller. Instead of which, the government takes into account the interdependence of both periods' rents, and sets the rate of protection that maximizes the present value of their sum.

Protection and import penetration:

While in the political economy model, the relationship between protection and import penetration is conditioned by the political organization of the industry, the present section will show that this relationship might be conditioned by *the value of the import elasticity* when the government is driven by a desire to promote learning.

Let us assume that the import elasticity is exogenous, the derivative of t_i/p_i^* with respect to the import penetration ratio m_i is given by the equation (25) (Annex A). The sign of this derivative depends on that of the numerator. Given the complexity of the latter equation, we study its sign under various simple assumptions before we deal with the general case. The most trivial case ($\theta = 0$, $\varepsilon_i = 0$, $\tau_i = 1$) needs no comment, given that when all the motives are absent, free trade prevails. In the following paragraphs we will deal with the remaining cases, in turn.

Let us start with the case that most trade policy models have dealt with. The government is interested in the tax revenue and the industrial rent ($\theta > 0$, $\varepsilon_i = 0$, $\tau_i > 1$). This gives the equation (26) (Annex A) which is negative. It implies that for all sectors in which domestic supply is too small relative to total demand (large import penetration), the increase in the rate of protection brings an additional rent that is too small compared to the increase in the deadweight loss and the reduction in the tax base. This result is comparable to those of Grossman and Helpman (1994), Esfahani and Leaphart (2000), Maggi and Rodriguez-Clare (2000) and Esfahani (2005).

When the government aims at learning promotion but does not care about tax revenue ($\theta = 0$, $\tau_i \geq 1$, $0 \leq \varepsilon_i < 1$), the equation (25) becomes clearly negative (equation 27, Annex A) whatever

the values of τ_i and ε_i. At equal growth rates, external effects and import elasticities, the sectors with higher penetration ratios will have lower protection rates. Given that tariff revenue is of no interest to the government, it has no incentive to increase protection. In addition, in the sectors where domestic supply is too low compared to total demand, rent creation is deterred. The presence of the learning effects leads to further lowering of the protection to sectors with higher import penetration, because the low domestic output in the first period reduces equally the possibilities of future rent as well. The learning promotion in this case, is simply an additional motive that acts in the same way and with the same mechanisms as the rent creation motive.

In the case where the government is only driven by fiscal revenue and learning promotion ($\theta>0$, $\tau_i=1$, $0<\varepsilon_i<1$), grouping the remaining terms gives equation (28) (Annex A) which sign depends upon that of the term in square brackets $[\theta-(1+\theta)\varepsilon_{Mi}]$, which for a given value of θ, depends on the elasticity of the import demand. *It is the first instance where the value of the import elasticity is relevant.*

To explain the reason why the import demand elasticity is relevant, let us point out that two effects are at work when import penetration increases. First, when import penetration increases, the receipts motive favors the increase in the protection rate. Second, a higher import penetration level deters rent generation both in the first and in the second periods. However, the deadweight loss and the reduction in the tax base mitigate the first effect, the more elastic is the import demand. This is the reason why the sign of (28) depends upon the import elasticity. Two cases emerge:

i. The case where $0\langle e_{M_i/p_i}\langle\frac{\theta}{1+\theta}\langle 1$, implies that $\frac{\partial(t_i/P_i^*)}{\partial m_i}\rangle 0$. This implies that when the import demand is *strongly inelastic* ($e_{M/p}$ close to 0), the revenue motive (first effect) is not mitigated by the increase in the deadweight loss or the reduction in the tax base, given that the import demand is too rigid. This causes the protection rate to *increase* with import penetration.

ii. In contrast, the case where $e_{M_i/p_i}\rangle\frac{\theta}{1+\theta}$, implies that $\frac{\partial(t_i/P_i^*)}{\partial m_i}\langle 0$. This means that for a given value of θ, the import demand may be either elastic ($\frac{\theta}{1+\theta}<1<e_{M_i/p_i}$), or inelastic ($\frac{\theta}{1+\theta}<e_{M_i/p_i}<1$). We can, however, affirm that sectors with elastic import demand will have rates of protection that are decreasing in the import penetration ratios. Indeed, for these sectors the deadweight loss and the tax base reduction are too large to be offset by the increase in the first or second periods' rents.

In the general case where the government is driven by the three motives at the same time ($\theta>0$, $\tau_i>1$, $0<\varepsilon_i<1$), we can rewrite the equation (27) in a way that gives (29) (Annex A) .The second term of the numerator being negative, it is obvious that the sign of (29) depends upon that of the equation in square brackets $[\theta-(\theta+1)e_{M_i/p}]$ which exists only due to the externality:

a. If $e_{M_i/p_i}\rangle\frac{\theta}{1+\theta}$, *then* $\frac{\partial(t_i/P_i^*)}{\partial m_i}\langle 0$. This case is identical to *ii.* above). The import demand may be either inelastic (but $e_{M/p}$ is close to 1), or elastic. Consequently, for the sectors with high import penetration, the deadweight loss and the tax base reduction will be too large

compared to the small additional present and future expected rents. The revenue motive is outweighed by the rent creation and learning promotion motives.

b. In contrast, if $0\langle e_{M_i/p_i}\langle\frac{\theta}{1+\theta}\langle 1$, *then the derivative* $\frac{\partial(t_i/P_i^*)}{\partial m_i}$ has an *ambiguous* sign.

Thus, when the government is motivated by the revenue, the rent and the learning promotion *at the same time*, it becomes unclear if the sectors with *strongly inelastic* import demand will have an increasing or decreasing protection rate as the import penetration increases. In such sectors, the government has an incentive to increase protection (revenue motive and low deadweight loss) but is discouraged to do so because there is little to gain in terms of rent creation either in the first period or in the second.

The latter result *b*. contrasts with the case *i*. ($\theta>0$, $\tau_i=1$, $0<\varepsilon_i<1$ and $e_{M/p}$ close to 0) and with the first case ($\theta>0$, $\tau_i>1$, $\varepsilon_i=0$) where the derivatives were respectively positive and negative.

In case *i.,* import demand rigidity gave the revenue motive enough strength to outweigh the rent motive for the first period, which encouraged protection. In the case *i.* the rent creation motive in the first period was too weak to get the government bear the social burden of the increased protection. The ambiguity in *b*. comes from the presence of the externality, which creates an *additional (anti-protection) effect* that diverts the government from protecting highly penetrated sectors in spite of their ability to bring revenue at a low social cost ($e_{M/p}$ close to 0).

To conclude our theoretical analysis, we can say that like the mainstream models, ours shows a negative relationship between import elasticity and protection, and a positive relationship between protection and learning potential. However, for the relationship between protection and import penetration, our model shows it is not always negative and *import elasticities do matter,* in two instances. First, when the decision maker is driven by the revenue motive and the promotion of learning, the relationship between trade protection and import penetration is *conditioned by the elasticity of the import demand*. Specifically, when the latter is *strongly inelastic*, trade protection *increases* with import penetration. Revenue seeking outweighs the learning motive and causes protection to increase. Second, when the government is driven by all three motives at the same time, import demand *rigidity* causes the relationship between trade protection and import penetration to be *ambiguous*

Using the framework developed above, we explore in the following section the main political economy factors that shaped trade policy in Tunisia in 1997. As the present empirical exploration is a first attempt, we try to keep things simple by focusing on a form of model (21) that allows the determination of the decision makers' motivation with the smallest degree of technical complexity. To this end, we will estimate model (21) on the assumption that the government is interested in rent generation ($\theta=0$, $\varepsilon_i=0$) and possibly in growth.

3. Explaining the structure of protection in Tunisia: econometric analysis

When the government is only interested in rent generation, model (21) becomes:

$$\frac{t_i}{p_i^*}=\frac{(\tau_i-1)x_i^p}{M_i e_{M_i/p}-(\tau_i-1)x_i^p)}$$

In order to have on the right-hand side a form which is simpler to estimate [Esfahani and Leaphart (2000)], we invert the equation and manipulate it to get the following model to be estimated:

$$\text{(A)}\quad \frac{t_i}{p_i}=\frac{1}{1+\frac{P_i^*}{t_i}}=\frac{(\tau_i-1)x_i{}^p}{M_i e_{M_i/p}}=(\tau_i-1)\frac{z_i}{e_{M_i/p}}$$

The dependent variable becomes the protection rate divided by the domestic price level and the output-import ratio is what is usually denoted z, in empirical literature.

The choice of variables:

The left-hand-side variables.

The choice of protection measures in Tunisia is quite limited. Despite the fact that quantitative barriers have long been a pervasive and powerful restriction to trade flows, and their determination likely conforms to the political influence game, non-tariff barrier measures are scarce in Tunisia.

We are naturally left with tariff rates for which only two measures are regularly calculated; the Nominal Rate of Protection and the Effective Rate of Protection, both of which are based on legal tariff rates rather than the actual ones. This means that the various existing exemptions are not taken into account. The availability of data on actual tariff receipts could have been the appropriate measure of actual protection rates. Yet, the latter data are only available at the aggregate level. It is the reason why we will alternatively use the NRP and the ERP as dependant variables.

The estimation of equation A raises the issue of introducing import elasticity (in absolute value) on the left-hand side or leaving it on the right-hand side. Given that our elasticities have been estimated (Naccache, 2006), they are certainly imprecise because of the estimation technique or noisy data. Indeed, disaggregate elasticities tend to have large standard errors, and data quality declines with disaggregation (Goldberg and Maggi, 1999).

Keeping the dependent variable $e_{M/P^*}(t_i/p_i)$ [10] helps adding the measurement error in elasticity to that of the dependent variable which avoids biasing the estimates,[11] preserves the estimates' consistency,[12] and deals with the potential endogeneity of the elasticity in a safe way.[13]

On the other hand, keeping the elasticity on the right-hand side imposes dealing with the measurement error either by purging it[14] or by using the appropriate instruments.[15]

The disaggregated import elasticities are an important input for the estimation of trade policy models. Their unavailability or the need to update them implies an additional effort which is disproportionate to the expected additional precision (Esfahani and Mahmoud, 1999).[16] For the purpose of the present work, we estimated the disaggregate import demand elasticities for the thirty-five manufacturing industries of the Tunisian nomenclature (Naccache, 2006).[17] The figures in Annex C represent *long-run* elasticities because our estimation of the partial adjustment model remained vain.[18]

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[10] Solution adopted by Goldberg and Maggi (1999), Eicher and Osang (2002), Esfahani and Leaphart (2000), McCalman (2004) and Esfahani (2005)

[11] Their precision may decrease, however (Goldberg and Maggi, 1999).

[12] McCalman (2004), p.86.

[13] Esfahani (2005), footnote 12.

[14] Gawande and Bandyopadhyay (2000) and Bradford (2006)

[15] Mitra et al. (2002)

[16] Applied trade policy models still use the elasticities estimated by Shiells et al. (1986) for the USA and for other countries where such studies are unavailable, elasticities are given ad hoc values [Michalek et al. (2006) and Hong (2005)]

[17] Referring to the imperfect substitution model, import demand equations are estimated between 1983 and 2004, using instrumental variables.

[18] The estimated adjustment coefficient was systematically superior to 1 and insignificant.

In our present study, we use $e_{M/P*}$ (t_i/p_i) as the dependent variable, while considering the specification of $e_{M/P*}$ on the right-hand side, as well.

The explanatory variable

The equation to be estimated is the following:

(A) $\frac{t_i}{p_i} e_{M_i/p} = (\tau_i - 1) z_i = -z_i + \tau_i z_i$

It raises the issues of the endogeneity the variable z (inverse of import penetration) and τ (the value for the government of industrial rent in terms of consumers' surplus) to the protection rate.

Empirical literature on both endogenous protection and specialization considers z as correlated with factor shares. This correlation accounts for the way trade flows conform to the comparative advantage of an economy. Thus, if a country is relatively labor-endowed, its imports should be capital-intensive. As a consequence, an increase in z should be followed by a decrease in the labor share in output. Harrigan *et al*. (2000) found empirical evidence[19] that factor endowments do determine the countries' specialization.

Empirical studies mainly use capital and labor shares as instruments for z. Other disaggregated categories of factor shares (various labor qualifications, categories of land, and natural resources) have also been used, when available.[20]

For our study, we use instruments for z with the shares of capital (kshare) and labor (lshare) in the value added. The fact that these two variables are calculated at the industry level might conceal the disparities in factor shares between firms. That is why we use, the average shares per firm noted mkshare and mlshare instead of kshare and lshare.

We explain the value of industrial rent for the government in terms of consumers' surplus, τ, by the average firm size, the capital-intensity, the concentration rate, the share of exports in output, and a dummy variable which indicates if an industry mostly supplies consumer goods.[21]

Average firm size and capital-intensity

Both variables are important in applied studies. They reflect an industry's weight and its importance to the decision maker. The effects of these variables are viewed as a result of the pressure groups' influence on politicians.

However, there exists some disagreement on the interpretation of the way these variables affect the rent valuation and therefore trade protection. A bigger firm size and higher capital-intensity might be interpreted as evidence of the presence of barriers to entry that eliminate the need for protection. This is the explanation given to the negative effect of average size and capital-intensity on trade protection in the USA.[22]

Alternatively, the *negative* effect might reflect the need of the government to protect vulnerable firms (small size and/or little capital) against the foreign market risks when credit and insurance markets are imperfect. This view finds support in Turkey, where the government seemed to use protection as a risk-mitigating policy towards small and less

[19] For a panel of 28 countries and 23 years.

[20] The data base of Trefler (1993).

[21] The choice of these variables is subject more to the limits of the survey that was available to us than to our needs in industrial characteristics.

[22] Trefler (1993)

capitalistic firms but away from industries where public sector presence was greater; probably because redistribution is easier through budgetary means.[23]

This kind of mechanism might be invalid in Tunisia. Indeed, we think that protection tended to be higher in industries dominated by state-owned enterprises as a result of the joint demand of powerful bureaucrats and strong labor unions. Protection guarantees both sides long lasting power, employment, and rent.

Yet the average firm size might *increase* the value of industrial rent for the government. When large average size acts as a barrier to entry, lobbying might intensify, since rent is preserved from erosion and hence more valuable for both the industrialists and the politicians (Esfahani, 2005).

We measure firm size in terms of value added or, alternatively, employment. We also calculate these measures for state-owned enterprises in each industry. In the absence of data on the capital stock, we use the capital share in the value added as a proxy for capital-intensity.

Given that the various measures of firm size are likely to be affected by protection (endogenous) they need to be instrumented. On the other hand, factor shares are considered unaffected by protection (exogenous).

The concentration rate is often used to reflect the ability of firms to overcome the free-riding problem and engage in collective action. The presence of a few dominant firms in an industry enhances their ability to lobby, and protection would be higher in such industries.[24] If, however, the politicians are interested in wider political support, they might favour rent in less concentrated industries.[25]

To measure concentration, we use the 4-firm concentration rate and the 2-firm concentration rate in terms of sales and production as well as the 4-firm concentration ratio in terms of employment. The use of the latter ratio is motivated by the intuition that in Tunisia, the concentration of workers and the likely presence of strong labor unions might affect the value of industrial rent in the eyes of the politicians. Concentration rations are thought to be exogenous to protection.

The market orientation

This (exogenous) variable is measured by the share of exports in sales. Export-orientation is thought to lower the value of industrial rent for the government. This could be explained by weaker lobbying caused by the absence of import competition (Trefler, 1993). On the other hand, the government may show reluctance to protect exporting firms as that could cause other firms to ask for other forms of support, generating budget deficit (Esfahani and Leaphart, 2000).

The consumer-goods dummy is an exogenous variable intended to account for the fact that in most economies, consumer goods industries are offered higher protection than intermediate goods industries. Indeed, protecting the latter is costly for the government in that it hurts downstream industries, while the protection of final goods industries is less costly because supported by numerous and unorganized consumers.

[23] Esfahani and Leaphart (2000).

[24] Evidence for this interpretation is found by Trefler (1993)

[25] Evidence is found by Caves (1976).

The data base

We use the data of the annual survey *Enquête annuelle sur les entreprises industrielles*[26] published by the Institut National de la Statistique (INS), for the year 1997. Annex B1 lists the thirty-five manufacturing activities we deal with. The industry and sector distribution of the 1,573 manufacturing firms in the sample are briefly described in Annex B2. Annexes B3–B5 give the definitions of the variables calculated from the survey, their summary statistics, and their correlations, respectively. When the distinction between public and private firms is made, we consider public each firm with a state ownership share above 10 percent. The data on output and disaggregate imports (in local currency) is taken from INS.[27] The rates of nominal and effective protection are taken from the Institut d'Economie Quantitative (1999). In Annex C, we give details on the import elasticities. They are all negative, but eight out of thirty-five are insignificant. The variable g, proxying the growth targets of the government, is taken from the *VIII*^{ème} *Plan de dévelopment économique et social: 1997–2001, volume II: Contenu sectoriel*, p. 54. These rates, actually, refer to large sectors. We assumed the rates uniform across the industries of each large sector. Finally, to construct the consumer-goods dummy we referred to the 1996 input-output table (INS).[28]

The estimation method

The model to be estimated is (A) to which we added a constant.

$$\frac{t_i}{p_i} e_{M_i/p} = -z_i + \tau_i z_i + c = -z_i + a_1 v_{1i} z_i + \ldots + a_k v_{ki} z_i + c$$

It is nonlinear with respect to the endogenous variable z and to the determinants (v_j) of τ_i, some of which are endogenous as well. We expect the coefficient of the linear term in z to be negative, the coefficient of the interactive term where v_j is the consumer-goods dummy to be positive, and a negative coefficient for the interactive term where v_j is the export orientation variable. The signs of the remaining coefficients will tell us whether the protection distribution in 1997 conformed to special-interest pressures or to the government's need to handle, through trade policy, the market inadequacies faced by vulnerable agents. In the first case, the coefficients corresponding to firm size, concentration, and capital-intensity would be all positive. In the second case, the coefficients corresponding to firm size and capital-intensity would be negative, and that of concentration might be negative if we consider concentration of workers.

Our equation being nonlinear in the endogenous explanatory variables, we follow Kelejian (1971) and estimate it with 2SLS (the two-stage least squares method) using the appropriate instruments. We choose factor shares as instruments for z. For firm size, we interact the concentration ratio with the capital share. For the remaining terms interacting with z, we choose to interact the capital share with the consumer-goods dummy and the export share. We also squared (capital share and average capital share per firm) and interacted some exogenous variables (consumer-dummy, export share, factor shares). We report with each estimated equation the p-values of the Durbin-Wu-Hausman test of exogeneity and of the Sargan test of overidentifying restrictions.[29] Estimations were run with STATA 9.

[26] Provided on demand by the INS.

[27] At the level of disaggregation required by our study, data are provided by the INS, on request.

[28] The disaggregated input-output tables are not published. They are provided on request by the INS.

[29] R^2 are not reported. The explanatory variable being correlated with the error term, the variance of the dependent variable can no more be decomposed in the usual way which gives its meaning to R^2. Hence R^2 "has no natural interpretation" (Wooldridge, 2000: 471).

The estimation results

In Table 1, we present our estimation results using as determinants of τ, the consumer-goods dummy, the average firm size, the concentration ratio (in terms of employment), the capital-intensity and the market orientation. The value added per worker in the public sector is used only in equation 3.

Before we begin our interpretation, two technical remarks are necessary. First, we selected this set of measures in particular because it displays levels of significance of the coefficients which are at least partially acceptable, and at the same time, a set of coefficient signs that gives a coherent interpretation.[30] Second, a couple of observations emerge from our estimations: it is the Nominal Rate of Protection (TPN in the tables) which causes fewer statistical problems in the estimation and produces more economically consistent interpretation. The second observation is that integrating import elasticity to the NRP makes it lose these two advantages.

The column (1) of Table 1 presents the most satisfactory specification when the dependent variable is the NRP. It indicates that in 1997, higher nominal protection was given to the manufacturing industries where firms were bigger, more capital-intensive, more domestic-market-oriented, with a higher concentration of workers, and producers of consumer goods. Though insignificant, the coefficients of the concentration ratio and the export share showed certain stability to specification and to instrumentation. It is worth noting that among three measures of concentration, that related to employment presents more stability of its sign and best improves the p-values of the other coefficients.

As a consequence, the industrial distribution of nominal protection in 1997 tended to reflect the special-interest pressures emanating from big, capitalistic firms, supplying consumer goods in the import substitution sectors. However, this conclusion may be slightly qualified. The fact that the concentration ratio in workers behaves better than the others and affects protection positively (though insignificantly) could mean that the interests of workers were not excluded from the tradeoffs of the government.

Let us remark that the introduction of variables related to labor remuneration did not improve the results, nor did the distinction between public and private firms. However, we cannot have a clear-cut conclusion on this topic because data on wage remuneration in Tunisia are scarce et do not permit a valid treatment of the question.

Columns (2) and (3) of Table 1 test the use of the elasticity on the left-hand side. The effects of size, consumer-goods dummy remain positive and that of capital-intensity is restored when an alternative measure (kshare instead of mkshare) is used. The significance of all coefficients deteriorates, however, and the Fisher test (not reported) indicates that joint significance is not assured. This problem seems to be the most persistent of all, when the elasticity is on the left-hand side.[31]

In Table 2, the elasticity is kept on the right-hand side. Column (5), in which the Effective Rate of Protection is the dependent variable, shows that the signs of the coefficients are the *same* as in (1), except for export orientation. But the levels of significance have all deteriorated. However, column (4) suffers less deterioration in the significance levels than (5). This confirms what has been noted above, namely that the statistical problems are less acute with NRP as the dependent variable.

[30] Several attempts have been made with other alternative measures like median firm size, employment per firm, output per firm, 4-firm concentration ratio in terms of sales or production, the share of exports in domestic sales. For the numerous combinations of these measures taken together, the model failed the Fisher test of joint significance, or presented insignificant coefficients.

[31] The problem of joint insignificance also occurs frequently when the dependent is the Effective Rate of Protection.

The previous estimations (equation 1, and to a lesser extent the others), which offer evidence that the protection structure in 1997 responded to special-interest group pressure with a slight qualification toward the labor union lobby, have led us to try to explore empirically another motive for the government, i.e. the promotion of growth. Let us note that this motive is distinct from promoting learning in certain industries. The latter derives from the (likely) existence of an external effect, while the growth promotion motive might be provoked by the exogenous (ad hoc) selection of an industry to promote, although its growth is not expected to give birth to an external effect. To proxy such a motive, we chose the variable g (defined above), which could indicate what the government's "priorities" were during a decade of development.

Table 3 reports the three specifications of Table 1, adding the interactive term in (1+g) each time. Column (6) indicates that, in 1997, nominal protection is higher for industries where firms are smaller, more capitalistic, export-oriented, concentrated in workers, supplying intermediate/capital goods, and for which the government assigns higher growth targets. Compared to the previous results, we face quite radically different evidence. This evidence is, however, weaker because of poor significance levels in column (6) compared to column (1).

The introduction of import elasticity in columns (7) and (8) shifts the results toward larger, less capitalistic, less concentrated, and less export-oriented firms in (7) and in (8) toward almost the same kind of industries as in column (1). Yet the poor significance levels in (7) and (8) and the unexpected positive coefficient of z in (7) leave us more comfortable with the specification (6). We remark that the results in this column are consistent with what the literature of development plans has been saying for the last twenty years about the "qualitative" priorities of development policy; namely the promotion of small, export-oriented enterprises and the encouragement of intermediate goods sectors.

4. Conclusions

In this study, we developed a model which explains the Tunisian trade policy, integrating the infant-industry argument in the political economy of trade policy. As an alternative to the lobbying hypothesis, we assumed that the government was seeking legitimacy and, to that end, chose import substitution as its industrial strategy to promote industries with learning potential but still with a likely concern for tariff proceeds as well as for the generation of industrial rents. In order to integrate the infant-industry argument, our model assumes that some sectors experience dynamic external effects which make trade protection appropriate to enhance learning in such sectors. The government is assumed to offer trade protection in the present period, and to commit to liberalizing trade in the second period. The government has thus, three motives for protection: collecting fiscal revenue, generating rent in the first period, and promoting learning.

Our theoretical analysis shows that like the mainstream models, the equilibrium protection rate displays a negative relationship with import elasticity and a positive relationship with learning potential.

However, as for the relationship between protection and import penetration, our model shows it is not always negative and *import elasticities do matter,* in two instances. First, when the decision maker is driven by the revenue motive and the promotion of learning, the relationship between trade protection and import penetration is *conditioned by the elasticity of the import demand*. Specifically, when the latter is *strongly inelastic*, trade protection *increases* with import penetration. Revenue seeking outweighs the learning motive and causes protection to increase. Second, when the government is driven by all three motives at the same time, import demand *rigidity* causes the relationship between trade protection and import penetration to be *ambiguous*.

Our empirical investigation led to the conclusions that the industrial distribution of nominal protection in 1997 tended to reflect the *special-interest pressures* emanating from big, capitalistic firms supplying consumer goods in the import substitution sectors. However, concern for workers' interests could not be dismissed.

The inclusion in the estimated model of a variable proxying concern about growth on the part of the government, leads to quite different evidence (but with weaker statistical properties) indicating that government's ad hoc growth targets for industries might matter in the determination of protection.

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Table 1: Trade policy model, year 1997: (p-value in italics below each estimated coefficient)

Equation	(1)	(2)	(3)
			Dependent
Variable	TPN	TPN*e [32]	TPN*e
constant	30.540	42.238	36.949
	0.000	*0.292*	*0.390*
z	-22.062	-46.135	-69.745
	0.000	*0.048*	*0.137*
Z*consdum	4.699	9.607	13.210
	0.000	*0.042*	*0.117*
Z*logvapf	3.072	7.603	10.661
	0.000	*0.035*	*0.116*
Z*tau4_l	0.989	-3.329	-4.813
	0.562	*0.660*	*0.839*
Z*mkshare	4.565		-1.972
	0.010		*0.813*
Z*kshare			3.993
			0.753
Z*xshare2	-0.254	-0.091	2.808
	0.811	*0.984*	*0.899*
Z*valpub			0.0001
			0.906
			Durbin-Wu-
Hausman test [33]	*0.040*	*0.021*	*0.012*
Sargan test	*0.340*	*0.891*	*0.922*

[32] e is taken in absolute value.

[33] For both tests, only the p-value is reported.

Table 2: Trade policy model, year 1997: (P-value in italics below each estimated coefficient)

Equation	(1)	(2)	(3)
Dependent Variable	TPN	TPN*e [34]	TPN*e
constant	30.540	42.238	36.949
	0.000	*0.292*	*0.390*
z	-22.062	-46.135	-69.745
	0.000	*0.048*	*0.137*
Z*consdum	4.699	9.607	13.210
	0.000	*0.042*	*0.117*
Z*logvapf	3.072	7.603	10.661
	0.000	*0.035*	*0.116*
Z*tau4_l	0.989	-3.329	-4.813
	0.562	*0.660*	*0.839*
Z*mkshare	4.565	-1.972	
	0.010	*0.813*	
Z*kshare			3.993
			0.753
Z*xshare2	-0.254	-0.091	2.808
	0.811	*0.984*	*0.899*
Z*valpub			0.0001
			0.906
Durbin-Wu-Hausman test [35]	*0.040*	*0.021*	*0.012*
Sargan test	*0.340*	*0.891*	*0.922*

[34] e is taken in absolute value.

[35] For both tests, only the p-value is reported.

Table 3: Extended trade policy model, year 1997: (P-value in italics below each estimated coefficient)

Equation	(6)	(7)	(8)
Dependent Variable	TPN	TPN*e	TPN*e
constant	27.653	49.579	40.141
	0.002	*0.298*	*0.305*
z	-668.500	885.957	-478.954
	0.246	*0.745*	*0.836*
Z*consdum	-11.843	32.853	2.465
	0.420	*0.630*	*0.963*
Z*logvapf	-0.128	11.628	8.774
	0.965	*0.349*	*0.276*
Z*tau4_l	2.567	-5.548	0.412
	0.267	*0.591*	*0.983*
Z*mkshare	5.746	-3.525	
	0.008	*0.722*	
Z*kshare			6.583
			0.654
Z*xshare2	3.808	-6.074	1.583
	0.314	*0.738*	*0.939*
Z*valpub			-0.00008
			0.930
Z*(1+g)	630.210	-905.276	397.172
	0.261	*0.733*	*0.858*
Durbin-Wu-Hausman test[36]	*0.012*	*0.020*	*0.019*
Sargan test	*0.610*	*0.808*	*0.906*

[36] For both tests, only the p-value is reported.

Annex A. Equations of the model

(1) Max $u(x_0,x_1,...,x_n)=x_0+\sum_{i=1}^{n}u_i(x_i)$ under the expenditure constraint: $E_h = x_0 + \sum_{i=1}^{n} x_i\ p_i$.

(2) $d_i(p_i)=\left[u_i^{'}(x_i)\right]^{-1}$, i = 1,..., n. : demand function of good i.

$d_0 = E_h - \sum_{i=1}^{n} p_i d_i\ (p_i)$: demand function of the numéraire

(3) $V_h\ (p,E_h) = E_h + \sum_{i=1}^{n} u_i\left[d_i\ (p_i)\right] - \sum_{i=1}^{n} p_i d_i(p_i) = E_h + s(p)$: indirect utility function

$s(p) = \sum_{i=1}^{n} u_i\left[d_i\ (p_i)\right] - \sum_{i=1}^{n} p_i d_i(p_i) = \sum_{i=1}^{n} s_i\ (p_i)$: consumer surplus

(4) $x_i^P = \overline{A}[l_i\ ]^{\alpha}$

(5) $x_i^F = A^F[\ \ l_i\ ]^{\alpha}$ with $A^F = A^F(x_i^P)$

(6) $\frac{dA^F}{dx_i^P}>0$ et $\frac{d^2A^F}{d(x_i^P)^2}<0$

(7) $A^F = A^F(x_i^P) = (x_i^P)^{\varepsilon_i}$ with $0 < \varepsilon_i < 1$.

(8) $\pi_i^p \equiv p_i\ x_i^P - l_i$

(9) $x_i^p(p_i)=(\overline{A})^{1/1-\alpha}\left[\alpha p_i\right]^{\alpha/1-\alpha}$

(10) $\pi_i^P=(1-\alpha)p_i\ x_i^p(p_i)$

(11) $x_i^F(p_i^*)=(A^F)^{1/1-\alpha}\left[\alpha p_i^*\right]^{\alpha/1-\alpha}$

(12) $\pi_i^F=(1-\alpha)p_i^* x_i^F(p_i^*)$

(13) $W^P = s(p) + 1 + \sum_{i=1}^{n} \tau_i\ \pi_i^p\ (p_i\ ) + (1+\theta)\sum_{i=1}^{n} t_i M_i\ (p_i\ ) + (\nu - 1 - \theta)T$

(14) $W^F = s(p^*) + 1 + \sum_{i=1}^{n} \tau_i\ \pi_i^F\ (p^*)$, $p^* = (p_1^*,\ldots, p_n^*)$

(15)

$$G = \left[1 + s(p) + (1+\theta)\sum_{i=1}^{n} t_i M_i\ (p_i\ ) + \sum_{i=1}^{n} \tau_i \pi_i^p\ (p_i\ ) + (\nu T - (1+\theta)T)\right] + \frac{1}{1+r}\left[1 + s(p^*) + \sum_{i=1}^{n} \tau_i\ \pi_i^F\ (p_i^*)\right]$$

(16) $$\frac{\partial G}{\partial t_i} = \frac{\partial s(p)}{\partial t_i} + (1+\theta)[M_i + t_i\ (\frac{\partial M_i}{\partial p_i}\frac{p_i}{M_i})\frac{M_i}{p_i}] + \tau_i\ \frac{\partial \pi_i^P}{\partial t_i} + \frac{\tau_i}{1+r}\left[(1-\alpha)P_i^*\ \frac{\partial x_i^F}{\partial t_i}\right] = 0$$

(17) $\frac{\partial s(p)}{\partial t_i} = -d_i$, $\frac{\partial \pi_i^P}{\partial t_i} = x_i^P$ and $\frac{\partial \pi_i^F}{\partial t_i} = \frac{\alpha}{1-\alpha}\frac{P_i^*}{p_i}\varepsilon_i\ x_i^F$

(18) $$\theta M_i + (\tau_i - 1)x_i^p - (1+\theta)\frac{t_i}{p_i} M_i e_{M_1/p_1} + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})\varepsilon_i x_i^F\ \frac{P_i^*}{p_i} = 0$$

(19) $\theta(M_i - \frac{t_i}{p_i} M_i\, e_{M_1/p_1}) + (\tau_i - 1)x_i^p - \frac{t_i}{p_i} M_i e_{M_1/p_1} + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})\varepsilon_i x_i^F \frac{P_i^*}{p_i} = 0$

(20) $\theta M_i + (\tau_i - 1)x_i^p - (1+\theta)\frac{(t_i / P_i^*)}{1+(t_i / P_i^*)} M_i e_{M_1/p_1} + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})\varepsilon_i x_i^F (\frac{1}{1+(t_i / P_i^*)}) = 0$

(21) $\frac{t_i}{p_i^*} = \frac{\theta M_i + (\tau_i - 1)x_i^p + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})x_i^F \varepsilon_i}{(\theta+1)\, M_i e_{M_i/p} - (\theta M_i + (\tau_i - 1)x_i^p)}$

(21') $\frac{t_i}{p_i^*} = \frac{\theta(M_i / d_i) + (\tau_i - 1)(x_i^p / d_i) + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})(x_i^F / d_i)\varepsilon_i}{(\theta+1)\,(M_i / d_i)e_{M_i/p} - \left(\theta(M_i / d_i) + (\tau_i - 1)(x_i^p / d_i)\right)}$

(22) $\frac{t_i}{p_i^*} = \frac{(\tau_i - 1) + (\theta - \tau_i + 1)m_i + \frac{\tau_i}{1+r}(\frac{\alpha}{1-\alpha})(1+g_i)(1-m_i)\varepsilon_i}{(\theta+1)\, m_i e_{M_i/p} - (\theta - \tau_i + 1)m_i - (\tau_i - 1)}$

(23) $\frac{t_i}{P_i^*} = \frac{\theta}{(\theta+1)e_{d/pi} - \theta}$

(24) $\frac{t_i}{p_i^*} = \frac{\theta M_i + \frac{1}{1+r}(\frac{\alpha}{1-\alpha})x_i^F \varepsilon_i}{(\theta+1)\, M_i e_{M_i/p} - \theta M_i}$

(25)

$$\frac{\partial(t_i / P_i^*)}{\partial m_i} = \frac{-(\theta+1)(\tau_i - 1)e_{M_i/p} - (1+\theta)\frac{\tau_i \varepsilon_i}{1+r}(\frac{\alpha}{1-\alpha})(1+g_i)e_{M_i/p} + \theta\frac{\tau_i \varepsilon_i}{1+r}(\frac{\alpha}{1-\alpha})(1+g_i)}{(\text{denominator})^2}$$

Under $\theta > 0$, $\varepsilon_i = 0$, $\tau_i > 1$,

(26) $\frac{\partial(t_i / P_i^*)}{\partial m_i} = \frac{-(\theta+1)(\tau_i - 1)e_{M_i/p}}{(\text{denominator})^2} < 0$

Under $\theta = 0$, $0 < \varepsilon_i < 1$, $\tau_i > 1$,

(27) $\frac{\partial(t_i / P_i^*)}{\partial m_i} = \frac{-(\tau_i - 1)e_{M_i/p} - \frac{\tau_i \varepsilon_i}{1+r}(\frac{\alpha}{1-\alpha})(1+g_i)e_{M_i/p}}{(\text{denominator})^2} < 0$

Under $\theta > 0$, $\tau_i = 1$ and $0 < \varepsilon_i < 1$, we have

(28) $\frac{\partial(t_i / P_i^*)}{\partial m_i} = (\frac{1}{(\text{denominator})^2})(\frac{\varepsilon_i}{1+r})(\frac{\alpha}{1-\alpha})(1+g_i)\left[\theta - (1+\theta)e_{Mi}\right]$

Under $\theta > 0$, $\tau i > 1$ and $1 > \varepsilon i > 0$, we have:

(29) $\frac{\partial(t_i / P_i^*)}{\partial m_i} = \frac{\frac{\tau_i \varepsilon_i}{1+r}(\frac{\alpha}{1-\alpha})(1+g_i)\left[\theta - (\theta+1)e_{M_i/p}\right] + (1-\tau_i)(1+\theta)e_{M_i/p_i}}{(\text{denominator})^2}$

Annex B1.: Classification of the Tunisian Manufacturing Industries (Nomenclature des Activités et des Produits, niveau 50)

Code	Industry
11	Meat
12	Dairy products
13	Processed grains
14	Edible oil
15	Canning ind.
16	Sugar, chocolate
17	Animal food, other prod.
18	Beverages
19	Tobacco
21	Stones, stone prod.
22	Cement and products in cement
23	China, pottery, earthenware
24	Glass prod.
31	Iron and steel basic industries
32	Fabricated metal prod.
33	Machinery, exc. electrical
34	Transp. equip. exc ships
35	Other transp. equip. and fixture
36	Electrical machinery
37	Electronical machinery
38	Home appliances
41	Chemical fertilizers
42	Basic chemical prod.
43	Paints, soaps, perfumery pod.
44	Pharmaceutical products
45	Rubber prod.
51	Textile fibres
52	Carpets
53	Manufacture of textiles
54	Apparel
55	Leather prod., footwear
61	Wood, cork, furniture
62	Paper, printing, publishing
63	Plastic
64	Miscellaneous

Source: Nomenclature des Activités et des Produits, INS, septembre 1986.

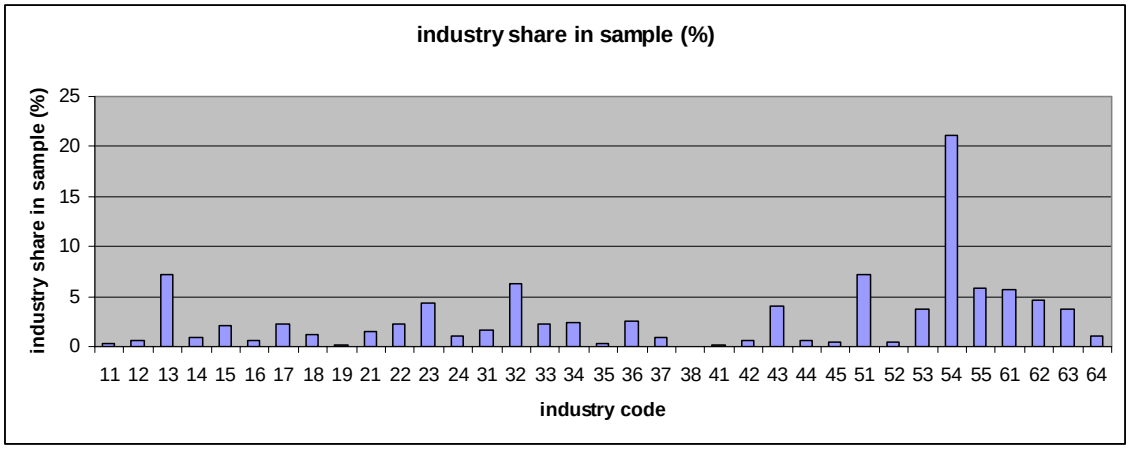
Annex B2.: Structure of the sample

Structure of the sample by large sector

Sector	food	glass, stone, cement products	electronics, electrics & machinery	chemicals	textiles, apparel & footwear	other manufactures
Share in sample	15,45%	9,1%	16,21%	5,84%	38,27%	15,13%

Source: Enquête annuelle sur les Entreprises Industrielles, 1997. INS. Calculations of the author.

Structure of the sample by industry



Source: Enquête annuelle sur les Entreprises Industrielles, 1997. INS. Calculations of the author.

Annex B3.: Definition of the variables (in alphabetical order)

Variable	Definition
consdum	Dummy variable, set to one if more than 50% of the net resources (production + imports–exports) of the industry's good had a final use, in 1996. It is set to zero otherwise.
e	Import demand elasticity with respect to world price, estimated for the period 1983-2004.
g	The output growth rate assigned by the government to an industry in the Development Plans it designs each decade.
ksales	Share of the total operational surplus in the industry sales.
kshare	Share of the total operational surplus in total value added of the industry.
logvapf	Logarithm of the mean value added per firm.
lpubl	Share of State-Owned Enterprises (SOEs) employment in the industry total employment.
lshare	Share of labor cost in the industry value added.
mkshare	Average share of operational surplus in value added per firm.
tau4_l	Four-firm concentration ratio of labor.
tpe	Effective rate of protection.
tpn	Nominal rate of protection.
valpub	Average value added per worker in the SOEs.
valpubval	Average value added per worker in SOEs relative to industry average.
vapf/vapfm	Value added per firm relative to manufacturing value added per firm.
vapl	Value added per worker.
vapubva	Average value added per firm in the SOEs relative to industry average.
wpl(m)	Average wage per firm.
wpl/wplm	Average industry wage relative to manufacturing average.
xshare1	Share of exports in domestic sales.
xshare2	Share of exports in total sales (on domestic and foreign markets).
ypuby	Share of SOEs in industrial output.
z	Ratio of output to imports.

Annex B4. Summary statistics of 1997 variables used in the estimations

Variable/1997	Obs	Mean	Std. Dev.	Min[37]	Max
consdum	35	.5714286	.5020964	0	1
ksales	35	.0778003	.3599359	-1.947187	.3558
kshare	35	.3255199	.6896755	-3.322581	.7537428
lpubl	35	.1955579	.3011603	0	.9845245
lshare	35	.6467393	.6733103	.2456807	4.202471
wpl/wplm	35	1	.6409095	.1991748	3.769469
wpl(m)	35	4464.574	2001.151	1253.523	13055.94
mkshare	35	.4447837	.4084189	-.5410854	2.211405
mksales	35	.2404366	1.248402	-.4938665	7.343899
mlshare	35	.5204202	.3965809	-1.203684	1.496132
Nb of firms	35	44.94286	59.99752	1	331
tau4_l	35	.588025	.2877532	.065	1
tpe	35	201.0571	170.0624	-14	500
tpn	35	47.4	32.22549	17	165
valpub	35	4612.954	6825.554	-1707.026	24323.91
valpubval	35	.5613777	1.150487	-.3360448	6.321637
vapf	35	1949966	4038258	151794.5	2.35e+07
vapf/vapfm	35	1	2.070937	.0778447	12.05479
vapubva	35	1.665937	3.639074	-2.045428	18.24988
xshare2	35	.2763889	.2832269	0	.9155709
xshare1	35	1.039193	2.150487	0	10.84426
ypuby	35	.1785531	.2997232	0	.9770859
z	35	26.18384	68.82823	.1094611	349.8771
e	35	-1.089494	.835933	-4.430346	-.113673

[37] The negative minimum values of the variables ksales, kshare, mkshare, mksales and mlshare are caused by the highly negative (and probably erroneous) figures of operational surplus reported by some firms in the sample.

Annex B5. Correlation matrix of explanatory and explained variables

	e	ksales	kshare	logvapf	lpubl	mkshare	tau4_l	tpe	tpn	valpub	valpub..	vapf_~fm	vapl
e	1.0000												
ksales	0.0403	1.0000											
kshare	-0.0183	0.9503	1.0000										
logvapf	-0.0504	0.1651	0.1314	1.0000									
lpubl	-0.0351	-0.4168	-0.4277	0.5704	1.0000								
mkshare	0.1187	0.3498	0.1702	0.1991	0.0319	1.0000							
tau4_l	-0.1530	-0.2274	-0.2593	0.4882	0.5458	0.1431	1.0000						
tpe	-0.3558	0.1647	0.0647	-0.0456	-0.1331	0.4010	0.0553	1.0000					
tpn	-0.4268	0.0633	-0.0134	-0.2445	0.0072	0.3518	0.0250	0.4097	1.0000				
valpub	-0.1293	0.0009	0.0465	0.5571	0.6107	-0.0827	0.2916	-0.0481	0.0703	1.0000			
valpubval	-0.0737	-0.1311	-0.1152	0.3060	0.5308	-0.0949	0.2552	0.0460	-0.0613	0.6224	1.0000		
vapf_vapfm	-0.0153	0.1051	0.1206	0.7802	0.5540	0.1134	0.3928	-0.2014	-0.2268	0.5446	0.2178	1.0000	
vapl	-0.0871	0.2817	0.3125	0.6369	0.1143	0.0037	0.3523	0.1530	-0.1576	0.4698	0.1429	0.4835	1.0000
vapubva	0.0083	-0.1434	-0.1066	0.3412	0.5463	-0.0851	0.2626	0.0341	-0.1775	0.6318	0.9505	0.3350	0.1819
wpl_m_	-0.1360	-0.1434	-0.2064	0.4767	0.2012	-0.1187	0.4440	0.2736	-0.1460	0.2719	0.0833	0.2277	0.6808
wpl_wplm	-0.0933	-0.7004	-0.7407	0.2502	0.4535	-0.2586	0.4872	0.0820	-0.0831	0.2606	0.3376	0.0866	0.3253
xshare1	0.0358	0.1783	0.0935	0.1001	-0.1909	-0.0580	0.0193	0.1573	-0.1157	-0.1328	-0.1172	0.1182	0.1734
xshare2	0.0187	0.1788	0.1632	0.1051	-0.2280	-0.0498	-0.1113	0.0153	-0.2254	-0.0676	-0.1208	0.2226	0.0217
ypuby	-0.0025	-0.4270	-0.4206	0.5786	0.9612	-0.0350	0.5294	-0.1546	-0.1146	0.5955	0.5670	0.5715	0.0949
z	-0.0094	0.1092	0.1159	0.0520	0.0617	-0.0446	-0.0028	0.1281	0.0906	0.0014	-0.0543	-0.0228	0.1661

	vapubva	wpl_m_	wpl_wplm	xshare1	xshare2	ypuby	z
vapubva	1.0000						
wpl_m_	0.0832	1.0000					
wpl_wplm	0.3240	0.7141	1.0000				
xshare1	-0.1103	0.4188	0.1020	1.0000			
xshare2	-0.0725	0.0881	-0.1352	0.8038	1.0000		
ypuby	0.6000	0.1976	0.4361	-0.1664	-0.1841	1.0000	
z	-0.0854	0.2012	0.0090	0.3430	0.1296	0.1051	1.0000

Annex C: Estimated disaggregated import elasticities with respect to world price

Code	Industry	e	*p-value*
11	Meat	-3,384	*0,192*
12	Dairy products	-0,320	*0,558*
13	Processed grains	-1,706	*0,008*
14	Edible oil	-0,140	*0,804*
15	Canning ind.	-4,430	*0,0495*
16	Sugar, chocolate…	-0,495	*0,017*
17	Animal food, other prod.	-1,275	*0,025*
18	Beverages	-1,545	*0,0081*
19	Tobacco	-1,768	*0,106*
21	Stones, stone prod.	-0,805	*0,0393*
22	Cement and products in cement	-0,551	*0,1322*
23	China, pottery, earthenware	-0,605	*0,0515*
24	Glass prod.	-1,513	*0,000*
31	Iron and steel basic industries	-1,188	*0,0162*
32	Fabricated metal prod.	-0,906	*0,0128*
33	Machinery, exc. electrical	-0,779	*0,000*
34	Transp. equip. exc ships	-0,837	*0,0185*
35	Other transp. equip. and fixture	-1,259	*0,0152*
36	Electrical machinery	-0,865	*0,0053*
37	Electronical machinery	-1,027	*0,000*
38	Home appliances	-1,533	*0,011*
41	Chemical fertilizers	-1,373	*0,009*
42	Basic chemical prod.	-0,947	*0,000*
43	Paints, soaps, perfumery pod.	-0,996	*0,002*
44	Pharmaceutical products	-0,399	*0,0478*
45	Rubber prod.	-1,318	*0,0085*
51	Textile fibres	-0,660	*0,0194*
52	Carpets	-0,882	*0,0147*
53	Manufacture of textiles	-1,201	*0,0003*
54	Apparel	-0,135	*0,734*
55	Leather prod., footwear	-0,754	*0,0019*
61	Wood, cork, furniture	-0,783	*0,0085*
62	Paper, printing, publishing	-0,114	*0,5667*
63	Plastic	-0,729	*0,0026*
64	Miscellaneous	-0,948	*0,0332*

Source: Naccache (2006)