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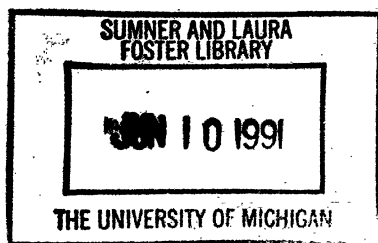
Income Distribution and Labor Market Effects of Austrian pre- and post-Tokyo Round Tariff Protection

by

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Income distribution and labor market effects of Austrian pre- and post-Tokyo-round tariff protection

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This paper argues that focusing on short-run income distribution effects of tariffs within a specific factors model provides a much better rationale for the calculation of effective rates of protection than does the traditional focus on long-run resource reallocation. It shows how factor price and labor market effects can be calculated from effective rates of protection, if factor specificity is introduced. Along these lines, the paper also presents some empirical results for Austrian pre- and post-Tokyo-round tariff protection.

1. Introduction

Traditionally, effective rates of protection have been viewed as indicators of resource-allocation effects of tariffs. This paper argues that focusing on short-run income distribution effects of a given protective structure provides a much better rationale for the calculation of effective rates of protection than does the traditional focus on long-run reallocation.

Income distribution effects have repeatedly been argued to be of crucial importance for the formation of trade policy,¹ but, somewhat surprisingly, they have not played a prominent role in empirical trade policy analysis.² The present paper follows up on suggestions by Jones (1975) and Ethier (1977) in that it links effective rates of protection to income distribution in a

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¹Mussa (1974), for instance, has argued that a 'primary effect and important objective of commercial policy is frequently to protect or enhance the incomes of specially favored groups' (p. 1191).

²They have, however, played an important role in political economy models of protection. See, for instance, Pincus (1975) and Mayer (1984).

model with sector-specific capital. As will be shown, this model also allows the calculation of various labor market effects of tariffs.

As an illustration, the second part of the paper presents some empirical work on the Austrian economy. There is a severe shortage of detailed information on the economic effects of Austrian tariff protection. Basically, the literature and policy discussions have concentrated on the level and industry-structure of nominal tariff rates.³ No attempt has been made to investigate the consequences of the structure of Austria's tariff protection. This paper undertakes such an analysis for pre- and post-Tokyo-round tariffs. The results presented include the effects of tariffs on rental rates of sector-specific capital, the wage rate, and sectoral employment.

Section 2 will briefly review the limitations of the traditional interpretation of effective rates of protection. Section 3 will then show how effective rates of protection can be linked to changes in income distribution in a specific factors model. Section 4 will briefly discuss problems arising from non-traded goods and imperfect substitution between imports and domestic goods. Section 5 will present the data used, and Section 6 will present the main empirical results.

2. Effective protection and resource allocation

An economy importing intermediate goods will experience a dual effect of the introduction or removal of a system of tariffs. In addition to increasing the degree of import competition, the removal of such a tariff system will also have the opposite effect of lowering the domestic price of imported intermediate goods.

The theory of effective protection⁴ proposes a simple formula that allows one, under certain assumptions, to calculate the net effect of changes in the tariff system on sectoral per-unit value added. The rationale behind this approach was that under fixed input-output coefficients these changes in per-unit value added (called effective rates of protection) would indicate the direction of gross output changes in a way completely analogous to the way that nominal prices and tariffs indicate the direction of output changes in a simpler model without intermediate products [see Ethier (1971 and 1972)]. Thus, it was hoped that calculating effective rates of protection would provide indicators of 'the direction of resource-allocation effects of a protective structure' [Corden (1966, p. 227)].

But a theoretical discussion carried out in the early seventies,⁵ has

³See the comprehensive survey by Breuss (1983), and Breuss and Stankovsky (1988).

⁴This theory has been pioneered more than twenty years ago by Balassa (1965), Corden (1966) and Johnson (1965).

⁵See Corden (1971a), Jones (1971a), Bruno (1973), Khang (1973), and Bhagwati and Srinivasan (1973).

revealed that this claim could not be maintained in a general equilibrium model with substitution between produced and primary inputs, unless production functions are separable with respect to produced and primary inputs. Without separability, value added ceases to have a natural unit, and the analogy between nominal tariff rates and effective rates of protection breaks down. With separable production functions, however, effective rates of protection can be viewed as prices of the respective value added products,⁶ and they will indicate resource reallocation to the production of these sectoral value added products. But they will do so in a very limited sense. As with nominal prices in the case without intermediate inputs, all one can say from a generalized neoclassical model of production with many goods is that changes in the value added prices (effective rates of protection) and changes in the value added products will be positively correlated.⁷ Thus, it must be concluded that effective rates of protection as such offer only very limited information on the reallocation effect of a given change in the tariff system, and some writers have even argued that they are not worth the effort of their calculation [see Bhagwati and Srinivasan (1973, p. 279–280)].

3. Effective protection and income distribution

Given the importance, both to economic policy makers and to those affected by protection, of short-run income distribution effects, it appears natural to ask whether effective rates of protection might be more useful in shedding some light on income distributional considerations. Jones (1975) has proposed a formal model with sector-specific capital, which points to a close link between effective rates of protection and income distribution. In the same spirit, Ethier (1977, p. 243) and Hartigan (1985, pp. 53–54) have argued that assuming factor specificity and focusing on income distribution offers a much more convincing rationale for the calculation of effective rates of protection than does the traditional focus on resource reallocation.⁸

Thus, assume that n commodities are produced with n produced inputs, sector-specific capital, and completely mobile labor. If all commodities are domestically produced, there are n ($i=1..n$) price equations, which can be differentiated to yield

$$\theta_{ik}\hat{r}_i + \theta_{il}\hat{w} = \hat{p}_i - \sum_j \theta_{ji}\hat{p}_j, \quad (1)$$

⁶In addition to the literature mentioned in the previous footnote, see Corden (1969), Corden (1971b), and Ethier (1977).

⁷This is what has been referred to as the 'generalized production-substitution law' by Ruffin (1971, p. 102). For a correlation formulation, see Deardorff (1980).

⁸An income distribution focus similar to the one in this paper can also be found in de Melo and Robinson (1980), and Abraham, Deardorff and Stern (1988).

where r_i and w are rental rates for (sector-specific) capital and (mobile) labor, θ_{ik} and θ_{il} are associated distributive shares, and carets indicate relative changes. Eq. (1) makes use of the unit cost minimization condition that the price-weighted sum of all changes in input-output coefficients must be zero. Notice that there are really $n+1$ factors, which allows the arbitrary imposition of (small) changes in all n commodity prices without hitting corner solutions.⁹ It should also be pointed out that r_i is a residual; sectoral capital income constitutes economic rent.¹⁰ This is perfectly consistent with the assumption of a uniform profit rate. These would be achieved by appropriate adjustments of share prices in the stock market [see Dervis, de Melo and Robinson (1982, p. 171)].

There can be little doubt that capital is sector-specific in the short-run, but the treatment of labor as being perfectly mobile with a flexible nominal wage rate may seem less satisfactory. However, the assumption of complete labor mobility and instantaneous wage adjustment need not be taken literally. As Neary (1982, p. 44) has pointed out, a somewhat more satisfactory view would be that the labor market, while not necessarily adjusting instantaneously to the new equilibrium, does so before capital reallocation begins.¹¹ A 'very short-run' view might even suggest that the nominal wage rate does not change at all. Accordingly, the following analysis will also consider the case of a fixed nominal wage.

To relate factor price changes to effective rates of protection, the above equation can be divided by $(1 - \sum_j \theta_{ji})$ to get

$$\phi_{ki}\hat{r}_i + \phi_{li}\hat{w} = \frac{\hat{p}_i - \sum_j \theta_{ji}\hat{p}_j}{1 - \sum_j \theta_{ji}}, \quad (2)$$

where ϕ_{ki} and ϕ_{li} now denote the respective factor shares in value added. If production functions are separable, the right hand side of eq. (2) is what Corden and others have called the price of the value added product, or the effective price.¹² To the extent, then, that effective rates of protection can be taken as approximations of effective price changes, eq. (2) above shows how they can be linked to short-run income distribution effects.¹³

⁹This is an aspect emphasized by Travis (1968, p. 449) and Anderson (1970, p. 722). For this reason, almost all the general equilibrium treatments of effective protection have assumed there to be at least as many factors as there are commodities, without alluding to factor specificity.

¹⁰For this reason, it is preferable to call eq. (1) a price equation rather than a zero profit condition.

¹¹Neary (1982) actually focuses on a more general case. Rather than imposing a sequential time pattern of reallocation, he analyses the dynamics that arises if capital and labor are allowed to move simultaneously, but non-instantaneously.

¹²See Corden (1971a, p. 75), Bhagwati and Srinivasan (1973, p. 269), and Ethier (1977, p. 241).

¹³An equation similar to (2) above has already been derived by Anderson (1970). However, unlike the specific factors model, he does not use the mobile factor market clearing condition to explicitly solve for factor price changes.

Given there are $n+1$ factors, n equations of the form (2) will not suffice to determine the factor price effects of a given structure of protection. But for a production equilibrium, factor price changes not only have to satisfy the differentiated price equations, they also have to allow full employment of the mobile factor. Now, capital specificity implies

$$\hat{y}_i = -\hat{k}_i, \quad (3)$$

where y_i and k_i are sectoral outputs and specific capital input-output coefficients. Moreover, differentiating the full employment condition for given labor endowment yields

$$\sum_i \lambda_i (\hat{l}_i + \hat{y}_i) = 0, \quad (4)$$

where λ_i is sector i 's employment share, and l_i is the sectoral input-output coefficient for labor. Assuming separable production functions one can use the familiar definition of the elasticity of capital-labor substitution, σ_i , to get

$$\sum_i \lambda_i \sigma_i (\hat{w} - \hat{r}_i) = 0, \quad (5)$$

If all effective price changes are given (see below), this equation plus the n differentiated price equations form an $n+1$ linear equation system with $n+1$ unknowns (n changes of rental rates for specific capital plus the wage rate change). The analytical solution of this system is discussed in detail in Jones (1975).

Instead of using eq. (5), one can also focus on the 'very short-run' by setting $\hat{w}=0$. In this case, capital owners may calculate the relative change in their income simply by dividing the relative changes in the value added prices by their share in value added.

Once relative factor price changes are known, it is relatively easy to calculate the short-run labor market effects [see also Dervis, de Melo, and Robinson (1982, p. 205)]. Assuming wage flexibility, the value added product changes as follows:¹⁴

$$\hat{v}_i = \phi_{ii} \sigma_i (\hat{r}_i - \hat{w}). \quad (6)$$

But with capital being specific in the short-run, $\hat{v}_i = \phi_{ii} \hat{L}_i$, where L_i is the

¹⁴If the value added product, v_i , is produced under separable production functions with minimal cost, then $\phi_{ik} k_i + \phi_{il} l_i = 0$ for all i , where k_i and l_i are specific capital and mobile labor input coefficients of the production function $v_i(f_i)$. Moreover, with given amounts of specific capital in every sector, $\hat{v}_i = -\hat{k}_i$. These two expressions, together with the definition of σ_i , yield eq. (6).

total labor input in good i production, receiving a wage rate equal to the marginal value product. Hence

$$\hat{L}_i = \sigma_i (\hat{r}_i - \hat{w}). \quad (7)$$

Thus, depending on whether a sector's specific capital rental increases more or less, proportionally, than the nominal wage rate, value added production and labor employment will increase or decrease in that sector.¹⁵

Eq. (7) can, furthermore, be used to characterize labor market disequilibrium for $\hat{w}=0$, that is for the 'very short-run'. In this case, of course, \hat{r}_i also has to be calculated under the assumption of a rigid nominal wage, i.e., setting $\hat{w}=0$ instead of imposing the factor market clearing condition (4). Sectors with decreasing value added prices will also experience falling rental rates to specific capital, and they will want to cut down on their employment, in order to get labor's marginal value added product in line with the given wage rate. On the other hand, sectors with an increased effective price will be frustrated in their efforts to increase employment. Calculating these labor market effects appears very useful for commercial policy since it will reveal the industry breakdown of the momentary excess demand for labor that will eventually lead to a change in the wage rate as represented by the solution of eqs. (2) and (5).

4. From tariff changes to price changes

The above model does not include any specification of the demand side of the economy. It is a pure production model, in which all commodity price changes are treated as exogenous. They are assumed to be determined by a given change in commercial policy. In the base case of the following empirical analysis, they have been set equal to the changes in the respective tariff rates. This implies that imported goods are perfect substitutes for goods produced at home and, furthermore, that the home country is too small to influence world prices.

The small country assumption seems reasonable for the present case, but assuming perfect substitutability is certainly less satisfactory. If substitutability is, in fact, imperfect, domestic prices will to some extent be autonomous from import prices, and the degree of this autonomy will vary from sector to sector. For instance, if a sector has a heavy export orientation and its firms are price takers on world markets, then a tariff on competing imports will not allow them to raise prices. On the other hand, they will be affected by

¹⁵It is this property of Jones' model that Corden (1985, pp. 143-145) has recently invoked to rehabilitate effective rates of protection also as indicators of resource reallocation.

tariff induced increases in imported input prices.¹⁶ Against this background, alternative calculations have been carried out assuming complete autonomy of domestic prices, i.e., assuming that tariff changes, as such, do not lead to any changes in prices for domestic goods. To save space, however, the presentation of results below will be restricted to the case of perfect substitutability. Other results can be obtained upon request.

An analogous assumption was also employed regarding non-traded goods prices. This is what has become known as the Balassa method in the effective protection literature. Given the focus on short-run income distribution effects, this seemed to be preferable to the alternative assumption of a full pass through of all tariff induced cost effects on non-traded goods prices (Corden method).¹⁷

5. The data

The results to be presented have been obtained using the Austrian input-output table for 1976.¹⁸ This table has a 48 sector classification, of which 37 are sectors producing traded goods (including agriculture), henceforth called the merchandise sectors. Of the services sectors, 5 reveal a substantial amount of (tariff-) free trade, and the rest are non-tradable sectors, including the public sector. The presentations below will always first list the merchandise sectors, followed by the tradable services sectors, and then conclude with the non-tradable sectors. They will not however, include the public sector, since its input structure is not disclosed by the input-output table.

Pre-Tokyo-round tariff rates were calculated from a vector of tariff revenues¹⁹ and a vector of sectoral imports, both pertaining to 1976 and corresponding to the input-output classification. This implies that imports

¹⁶See de Melo and Robinson (1981, pp. 170-173) for a formal analysis substantiating this point. Ideally, the present model should be extended to include a detailed specification of imported - home goods substitution, such as the one suggested by de Melo and Robinson. Unfortunately, this was beyond present data availability.

¹⁷A complete specification of demand for and production of non-traded goods would allow an endogenous determination of their price changes from a given change in tariffs. Again, this was beyond present data availability. For a more detailed characterization of the Balassa and Corden methods of treating non-traded goods prices in the calculation of effective rates of protection, see Kohler (1989). Results obtained employing the Corden method can be obtained upon request.

¹⁸This is the most recent table available for Austria. Thanks are due to Josef Richter at the Federal Chamber of Commerce in Vienna for having made all the data available in machine readable form.

¹⁹Tariff revenues include some minor commodity taxes that are collected together with tariffs. Some of these are uniform across all sectors and hence do not distort the results. Others, however, are sector specific, but still of comparatively minor importance. Unfortunately, tariff revenues vetted from these taxes have not been available. Upon consulting the statistics department of the Chamber of Commerce, it was, however, possible to identify those sectors which are likely to show upward-biased tariff revenues. These are agriculture, petroleum, other foodstuff, and beverages.

are used as weights to obtain tariff averages. Using import weights for tariff averaging is quite common in empirical trade policy research, but it has long been recognized to most probably involve a downward bias in the averages obtained.²⁰

Post-Tokyo-round tariff averages were calculated using the above mentioned pre-Tokyo-round rates and the tariff cutting formula agreed upon in the Tokyo-round tariff negotiations. A detailed description of this procedure and its justification as well as possible problems can be found in the appendix.

For the specific factors model application, wage value added and non-wage value added data as well as employment figures have been used, all of which were available directly in the required industry breakdown in the present data set. The same holds true for labor's and capital's shares in value added.²¹

As is common practice in empirical trade policy research, literature estimates of primary factor substitution elasticities have been used in the calculations to be presented below. Two sets of runs were done corresponding to 'high' and 'low' elasticity values.²² The difference in results was marginal and to save space only those obtained for 'low' elasticity values will be presented. Other results can be obtained upon request.

6. Results

The above data have been used to calculate two sets of effective rates of protection, one for pre-Tokyo-round tariffs and one for post-Tokyo-round tariffs.²³ And these effective rates were then used to solve the specific factors model for relative changes in factor rewards and employment, as shown in section 3. To save space, the effective rates will not be presented here; they can be obtained upon request.

What is perhaps worth mentioning is that the results reveal the well

²⁰This is most easily understood by considering a prohibitive tariff, which would receive a zero weight. However, employing an aggregation scheme different from the one implicit in the use of tariff revenues would require going down to the line item level of the tariff nomenclature, usually comprising several thousand items. Not only would this be computationally burdensome, but it is also highly unlikely that anything other than imports would be available for weighting purposes on that level.

²¹Capital's share in value added is gross of depreciation. This should be borne in mind when interpreting the results presented below as incentives to long-run capital reallocation along the lines suggested by Neary (1982).

²²Elasticity estimates were taken from Deardorff and Stern (1986, pp. 42-43), Mansur and Whalley (1984, p. 105), and Harrison (1986, p. 106). The values presented by Deardorff and Stern tend to be higher, on average, than those reported by Harrison. A technical appendix on problems of concordance and how they were resolved can be obtained upon request.

²³In all these calculations, the intermediate input shares (θ_{ji}) have been adjusted for the price effects of protection, as suggested by the theory of effective protection. See, for instance, Corden (1966, p. 234) and Corden (1971b, p. 37).

known phenomenon of tariff escalation: On average, effective rates of protection calculated under the usual assumption that home goods are perfect substitutes for imported goods are higher (output-weighted average: 5.9 percent before and 3.6 percent after the Tokyo-round) than nominal tariffs (4 percent before and 2.6 percent after the Tokyo-round). At the same time their dispersion is also higher than that of nominal tariffs, indicating that the tariff induced production distortions are higher than what one might have thought upon a mere inspection of nominal rates. It might also be of some interest to note that there is no correlation between effective rates and either the labor share in sectoral value added or the share of sectoral employment in total labor. But an explicit solution of the specific factors model will no doubt shed much more light on possible adjustment problems that labor might face in the case of liberalization.

Tables 1 and 2 present the results obtained by solving the specific factors model for relative changes in factor rewards and employment, using pre- and post-Tokyo-round effective rates of protection as effective price changes. Both tables assume that domestic and imported goods within every sector are perfect substitutes.²⁴ With their signs reversed, these results can be interpreted as the effects of a unilateral removal of the respective tariff systems on rental rates of specific capital, sectoral employment and the wage rate.

Column 1 of both tables gives the values for the primary factor substitution elasticities used in the computations. Column 2 contains sectoral percentage changes in rental rates of capital under the assumption of a flexible nominal wage rate, whereas column 3 assumes a fixed nominal wage. Column 4 gives the percentage changes in employment under the assumption of a flexible nominal wage rate, whereas column 5 contains the sectoral breakdown of excess demand for labor that will eventually bring about the wage rate change mentioned at the bottom of each table.

Both the pre- and post-Tokyo-round tariff structure of the Austrian economy seems to have had a moderate nominal wage increasing effect. This is an interesting feature since, as mentioned above, a simple correlation analysis of effective rates might have led one to conclude that effective protection was not directed towards labor intensive sectors or sectors with a large employment share. However, since most nominal tariffs exceed the nominal wage increase, one is inclined to conclude that tariff protection causes a real wage loss.

By and large, specific capital in the sectors with negative effective protection is also shown to suffer a loss in its rental rate. It is interesting to note that even moderate nominal tariffs can have a sizable effect on specific

²⁴As mentioned above, the corresponding results for the assumption of unchanged prices for domestic goods can be obtained upon request.

Income- and employment effects (in percent) of Austrian pre-Tokyo-round tariff protection assuming perfect substitutability between home goods and imports.^a

Sector	Subst. el.	Change in capital rental		Change in employment						
		flex. wage	fixed wage	flex. wage	fixed wage					
		Value	R	Value	R					
<i>Merchandise sectors</i>										
01	Agric./Forest.	0.61	10.19	12	10.40	14	5.27	15	6.31	19
02	Mining	0.50	0.85	25	4.59	22	-0.33	25	2.29	23
03	Petroleum	0.50	1.60	24	1.93	25	0.04	24	0.97	26
04	Stones	0.83	8.15	15	10.34	15	5.50	14	8.56	15
05	Cement	1.54	-4.06	37	-2.76	38	-8.58	41	-4.25	42
06	Glass	1.27	9.37	14	11.77	13	9.96	11	14.91	12
07	Meat	0.79	-20.50	46	-18.14	46	-17.36	46	-14.31	46
08	Mills	0.79	-11.53	44	-9.76	43	-10.29	43	-7.70	43
09	Bakery	0.79	105.58	2	108.35	2	82.11	2	85.49	2
10	Sugar	0.79	-2.93	33	-0.38	31	-3.50	37	-0.30	32
11	Milk	0.79	61.14	3	63.39	3	47.05	3	50.02	4
12	Other foodst.	0.79	-0.30	28	1.69	26	-1.43	28	1.33	24
13	Beverages	0.66	175.78	1	177.35	1	114.49	1	116.52	1
14	Tobacco	0.85	0.64	26	0.75	28	-0.73	26	0.63	28
15	Textiles	0.91	14.54	10	18.71	10	11.91	10	17.10	10
16	Clothing	1.11	43.55	5	46.94	5	46.50	4	51.91	3
17	Leather/Footw.	0.94	21.08	7	24.32	7	18.40	6	22.86	6
18	Chemicals	0.83	5.58	19	7.75	21	3.37	18	6.41	17
19	Iron/Steel	1.14	9.66	13	14.60	11	9.31	12	16.66	11
20	Machinery	0.68	1.82	23	4.43	23	0.21	22	3.00	22
21	Ships/Locom.	0.34	2.03	22	3.62	24	0.18	23	1.25	25
22	Casting	1.14	5.33	21	8.32	20	4.36	17	9.49	14
23	Non-iron metals	0.81	-3.05	35	-0.51	33	-3.68	39	-0.41	34
24	Ir./Met. prod.	0.81	7.79	17	10.04	17	5.06	16	8.09	16
25	Precis. engin.	0.66	5.55	20	9.66	18	2.68	20	6.40	18
26	Electr. motors	0.52	29.03	6	34.51	6	14.34	9	17.98	9
27	Electr. wires	0.52	48.24	4	51.01	4	24.35	5	26.57	5
28	Oth. el. prod.	0.52	7.60	18	10.25	16	3.17	19	5.34	20
29	Radio/Telev.	0.52	-2.96	34	-0.77	35	-2.33	33	-0.40	33
30	Motor vehicles	0.34	7.80	16	9.43	19	2.16	21	3.24	21
31	Sawing	0.93	-23.38	47	-21.32	47	-23.02	47	-19.73	47
32	Lumber boards	0.85	-12.81	45	-10.16	44	-12.20	44	-8.66	44
33	Wood process.	0.83	10.92	11	13.63	12	7.85	13	11.37	13
34	Paper	0.91	18.59	9	21.54	9	15.51	8	19.56	8
35	Paper process.	0.91	19.24	8	21.65	8	16.10	7	19.66	7
36	Graphics	0.81	-2.41	32	0.85	27	-3.17	36	0.69	27
37	Electricity	0.36	-1.50	30	-0.68	34	-1.08	27	-0.24	31
<i>Traded services</i>										
38	Commerce	0.97	-1.72	31	-0.48	32	-3.13	35	-0.46	35
39	Transp./Commun.	0.97	-6.45	40	-1.32	36	-7.72	40	-1.28	39
40	Bank./Insur.	0.97	-1.12	29	-0.15	30	-2.55	34	-0.14	30
41	Hotels/Restaur.	0.97	-11.26	43	-10.28	45	-12.38	45	-9.97	45
42	Other services	0.97	-9.10	42	-3.14	40	-10.29	42	-3.04	41
<i>Non-traded services</i>										
43	Mot. veh. repairs	0.34	-8.69	41	-6.88	42	-3.51	38	-2.37	40
44	Constr.	0.32	-4.71	39	-2.19	37	-2.01	32	-0.71	36
45	Constr. access.	0.32	-4.59	38	-3.33	41	-1.98	31	-1.08	37
46	Gas/Water	0.36	-3.74	36	-3.08	39	-1.89	30	-1.11	38
47	Housing	0.97	-0.27	27	-0.14	29	-1.73	29	-0.13	29

^aRelative change in wage rate (if assumed to be flexible): 1.5 percent. R indicates Rank. Elasticities of primary factor substitution in the production of value added, taken from Deardorff and Stern (1986, pp. 42-43), Harrison (1986, p. 106), and Mansur and Whalley (1984, p. 105). See text for more details.

Income- and employment effects (in percent) of Austrian pre-Tokyo-round tariff protection assuming perfect substitutability between home goods and imports.*

Sector	Subst. el.	Change in capital rental				Change in employment			
		flex. wage		fixed wage		flex. wage		fixed wage	
		Value	R	Value	R	Value	R	Value	R
<i>Merchandise sectors</i>									
01 Agric./Forest.	0.61	7.12	15	7.26	19	3.71	18	4.41	20
02 Mining	0.50	1.91	25	4.42	22	0.45	24	2.21	25
03 Petroleum	0.50	1.67	26	1.90	27	0.33	26	0.95	28
04 Stones	0.83	7.29	14	8.76	14	5.20	14	7.25	15
05 Cement	1.54	-3.21	36	-2.34	39	-6.51	43	-3.61	43
06 Glass	1.27	8.11	13	9.71	13	8.99	12	12.31	12
07 Meat	0.79	-12.04	46	-10.46	46	-10.30	46	-8.25	46
08 Mills	0.79	-4.34	40	-3.15	42	-4.22	40	-2.49	42
09 Bakery	0.79	49.71	2	51.57	2	38.43	1	40.69	1
10 Sugar	0.79	1.22	27	2.93	26	0.16	27	2.31	24
11 Milk	0.79	37.00	3	38.51	3	28.40	4	30.38	4
12 Other foodst.	0.79	2.09	24	3.42	24	0.85	23	2.70	22
13 Beverages	0.66	52.78	1	53.83	1	34.01	2	35.37	2
14 Tobacco	0.85	0.78	28	0.85	29	-0.19	28	0.72	29
15 Textiles	0.91	12.63	10	15.42	10	10.62	10	14.09	11
16 Clothing	1.11	27.89	5	30.16	5	29.73	3	33.36	3
17 Leather/Footw.	0.94	16.62	7	18.79	7	14.67	6	17.67	6
18 Chemicals	0.83	5.69	20	7.15	21	3.87	17	5.91	17
19 Iron/Steel	1.14	9.38	12	12.69	11	9.55	11	14.47	8
20 Machinery	0.68	2.41	22	4.16	23	0.95	22	2.81	21
21 Ships/Locom.	0.34	2.28	23	3.34	25	0.44	25	1.15	27
22 Casting	1.14	5.25	21	7.25	20	4.84	15	8.28	14
23 Non-iron metals	0.81	-1.53	34	0.17	30	-2.05	37	0.14	30
24 Ir./Met. prod.	0.81	6.94	16	8.45	17	4.78	16	6.81	16
25 Precis. engin.	0.66	5.83	19	8.58	16	3.19	19	5.68	18
26 Electr. motors	0.52	23.56	6	27.23	6	11.75	9	14.19	9
27 Electr. wires	0.52	32.78	4	34.64	4	16.55	5	18.05	5
28 Oth. el. prod.	0.52	6.90	17	8.68	15	3.07	20	4.52	19
29 Radio/Telev.	0.52	-1.64	35	-0.17	33	-1.38	32	-0.09	31
30 Motor vehicles	0.34	6.61	18	7.70	18	1.93	21	2.65	23
31 Sawing	0.93	-14.70	47	-13.33	47	-14.53	47	-12.33	4
32 Lumber boards	0.85	-8.60	45	-6.83	45	-8.19	45	-5.82	45
33 Wood process.	0.83	9.51	11	11.32	12	7.09	13	9.44	13
34 Paper	0.91	14.81	8	16.78	8	12.53	7	15.24	7
35 Paper process.	0.91	13.95	9	15.57	9	11.75	8	14.13	10
36 Graphics	0.81	-0.43	30	1.75	28	-1.17	30	1.42	26
37 Electricity	0.36	-1.14	32	-0.59	35	-0.77	29	-0.21	34
<i>Traded services</i>									
38 Commerce	0.97	-1.23	33	-0.40	34	-2.17	38	-0.39	35
39 Transp./Commun.	0.97	-4.58	41	-1.15	36	-5.42	41	-1.11	39
40 Bank./Insur.	0.97	-0.78	31	-0.13	32	-1.73	36	-0.12	33
41 Hotels/Restaur.	0.97	-4.67	42	-4.01	43	-5.51	42	-3.89	44
42 Other services	0.97	-6.22	43	-2.23	38	-7.01	44	-2.16	41
<i>Non-traded services</i>									
43 Mot. veh. repairs	0.34	-6.92	44	-5.71	44	-2.73	39	-1.96	40
44 Constr.	0.32	-3.56	38	-1.88	37	-1.48	33	-0.61	36
45 Constr. access.	0.32	-3.67	39	-2.82	41	-1.52	34	-0.91	37
46 Gas/Water	0.36	-3.22	37	-2.78	40	-1.52	35	-1.00	38
47 Housing	0.97	-0.21	29	-0.12	31	-1.18	31	-0.11	32

*Relative change in wage rate (if assumed to be flexible): 1 percent. R indicates Rank. Elasticities of primary factor substitution in the production of value added, taken from Deardorff and Stern (1986, pp. 42-43), Harrison (1986, p. 106), and Mansur and Whalley (1984, p. 105). See text for more details.

capital rental. The sectors most favorably affected by protection are beverages, bakery, milk, electric wires, clothing, leather and footwear, paper, and paper processing. This result appears to be driven by comparatively high nominal tariff rates. Within this group the unweighted average nominal tariff rate is 12.5% compared to 4.4% for the overall average. Besides non-traded goods, the sectors adversely affected by protection are sawing, lumber boards, meat, mills, non-iron metals, and radio and television. Again, this is driven by nominal tariff rates, which average to 1.2% within this group. The rank order of sectors in terms of changes in rental rates of capital is more or less the same before and after the Tokyo-round.

Tables 1 and 2 also nicely reflect the common interest shared by labor and capital in every sector.²⁵ Even though the given tariff structure is revealed to most likely have a real wage reducing effect, one would not necessarily expect to find labor equally lobbying for liberalization across sectors. The reason for this can be found in the final columns of tables 1 and 2. They show the sectoral breakdown of excess labor demand that will eventually bring about the wage decrease. If there are adjustment costs that labor has to bear, one might expect that labor in sectors adversely affected by liberalization might join sector specific capital in its opposition to such liberalization. The reverse argument holds for sectors, in which capital is shown to be adversely affected by protection. Thus, by looking at the sectoral breakdown of excess labor demand rather than the wage rate effect alone, it is possible to explain why labor exhibits sector-specific lobbying behavior rather than taking a uniform position on protection issues.²⁶

7. Concluding remarks

It is generally accepted that knowing the short-run income distribution effects of protection is very important for a complete understanding of individual industries' attitudes towards trade policy issues. The present paper argued that effective rates of protection, traditionally viewed as indicators of long-run resource allocation, should be much more fruitfully seen as indicators of such short-run income distribution effects. It was shown how a specific factors model can be used with comparatively little data efforts to calculate factor price changes from effective rates of protection. The same model also allows the calculation of the sectoral breakdown of momentary excess labor demand attendant upon the introduction or removal of a tariff

²⁵See Magee (1978) for an empirical demonstration of the fact, running counter to the distribution properties of the Heckscher-Ohlin model, that capital and labor perceive themselves as sharing a common fate regarding protection issues.

²⁶Baldwin (1984, p. 63) has noted the difficulty that specific factors may encounter in trying to find support for protectionist lobbying efforts from the mobile factor, if the latter can expect to gain from protection. The argument above amounts to relaxing the assumption of complete mobility somewhat.

system. And these factor price and labor market effects can significantly add to the understanding of industry-specific lobbying behavior for or against protection.

The paper also presented an empirical illustration for the case of Austrian pre- and post-Tokyo round tariff protection. The results reported appear to be particularly important, given the very limited attempts undertaken so far to systematically investigate the economic effects of Austrian tariff protection.

Appendix

Extending the analysis to post-Tokyo-round tariffs

While pre-Tokyo-round tariff averages were readily available in the required industry break-down through tariff revenues and import data, comparable information was not available for Austrian post-Tokyo-round tariff rates. Instead, use was made of the Tokyo-round tariff cutting formula to calculate approximations to the post-Tokyo-round tariff rates.

One of the central features of the tariff negotiations of the Tokyo-round was to approach the issue in an across the board manner, trying to find agreement on an overall tariff-cutting formula, rather than trying to table item-by-item offers. This approach had already characterized the so-called Kennedy-round of tariff negotiations, whereas earlier rounds featured an item-by-item tabling.

The Tokyo-round negotiations placed much emphasis on 'tariff harmonization', finally leading to the so-called 'Swiss formula':

$$t_1 = \frac{14t_0}{14 + t_0}, \quad (1)$$

where t_1 and t_0 are pre- and post-Tokyo-round tariff rates, each expressed in percent.²⁷ The E.E.C. was allowed to employ the constant 176 instead of 14 in the above formula [see, for instance, Winham (1986, p. 201)].

The actual tariff cuts did not, of course, follow this formula in every single case. There were extensive negotiations on exceptions to the formula. However, the logic of multilateral tariff negotiations, essentially being that of reciprocity, i.e., an exchange of benefits between participating nations, implies that a small country will not find much scope of negotiating exceptions to an

²⁷This is important, since applying the formula to tariffs expressed in percentage figures divided by 100 would result in negligible tariff-cuts.

agreed upon formula. It simply does not have enough benefits to offer in terms of the amount of other countries' trade affected by its own proposed tariff-cuts.

On the other hand, the final tariff-cuts offered by a small country may depend on the outcome of negotiations between 'major players'. In the case of the Tokyo-round these major players were the U.S. and the E.E.C., who entered lengthy negotiations in which each of the players tried to secure from the other a maximum of tariff-cuts on products important to himself. Naturally, the cutting-formula that had been agreed upon prior to these negotiations acted as a constraint. The U.S., for instance, proposed the concept of 'no net exceptions', meaning that larger than formula cuts should balance out the exceptions sought [see Winham (1986, p. 204)]. Notice that such a concept implies an application of the formula on some higher level of aggregation, and in the process of negotiations, such aggregation was frequently performed on a 'duty collected basis' [see Winham (1986, p. 266)]. This is exactly the approach followed in the present paper.

Winham (1986, pp. 200–205, and pp. 256–268) gives a detailed account of these negotiations between the E.E.C. and the U.S., and from there it is clear where most exceptions to the formula were sought: textiles, chemicals, paper, steel, electronics, and trucks. In the end, virtually all the greater than formula cuts that had been offered for certain products at earlier stages, came off the table rather quickly, while the less than formula cuts for other products were left in place. The result was that the 'final tariff package on both sides was smaller than the formula would have produced' [see Winham (1986, p. 204)].

To the extent, then, that the Austrian offer followed that of the E.E.C., one would expect that using the tariff-cutting formula (15) to calculate post-Tokyo-round from pre-Tokyo-round tariffs leads to an overstatement of the tariff-cuts, particularly for the sectors just mentioned. But any application of the above formula to aggregates like the present 48 sectors will partially offset the bias just mentioned if, in fact, the formula has been used on some lower level of aggregation, say the line item level. This is because the formula is a concave function. The upward bias will be the higher the more dispersed the initial individual tariff rates within a given sector, and the more uniform the distribution of imports within that sector.

Thus we have two biases in opposite directions, and one can hope that the use of eq. (1) above to calculate post-Tokyo-round tariff averages will lead to a reasonable approximation of the post-Tokyo-round situation.

It should also be pointed out that this procedure will only give an approximate picture of the average post-Tokyo round tariff rates as they would have been without any change in the commodity and country mix of imports. Accordingly, the analysis will only capture 'pure' tariff effects, and it will leave out of consideration the effects of any changes in the commodity and/or country composition of imports. Such changes have, of course, in fact

taken place, both due to the tariff changes themselves and independently. But calculating the 'pure' tariff effects is nevertheless a useful exercise.

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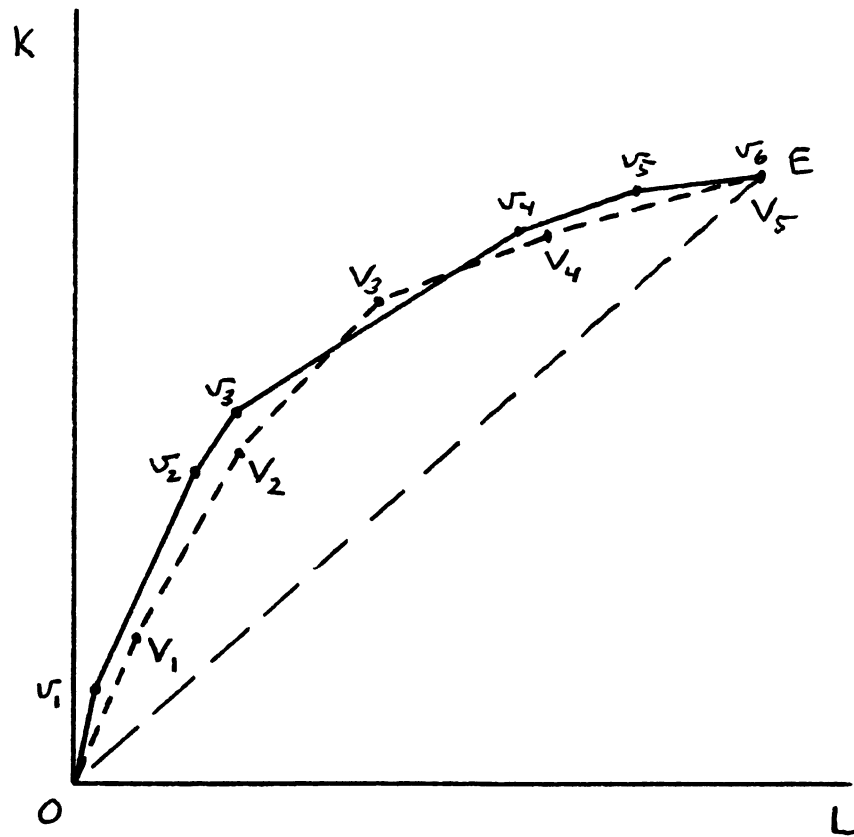


Figure 3

