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1. Introduction

Economists have repeatedly pointed to the high costs associated with trade restrictions. The question who ultimately bears the burden of these restrictions, however, was given only little attention until recently. Rates of protection, as measured by conventional domestic-to-border price ratios point to consumers of the protected commodities as the only affected group. This is not surprising because in this framework protection has the joint effect of a production subsidy combined with an excise tax. However, as is well known from the public finance literature [e.g. Harberger (1962)], this does not mean that consumers have to bear this tax in the end and alone.

Several studies describe the various mechanisms by which policies to promote and protect import-competing manufacturing activities discriminate against other activities [e.g. World Bank (1986), Part II; Valdés (1986)]. Quantitative results suggest that it is mainly the agricultural sector, particularly the export-oriented subsector which suffers from inward-looking industrialization[1]. Moreover, the effects from non-agricultural (indirect) policies seem to dominate the effects from agriculture-specific (direct) policies in many developing countries [Schiff (1988); Krueger/ Schiff/Valdés (1988)]. As a result, many direct interventions to help certain commodities or producers can only be viewed as reactions to indirect policies originating elsewhere in the economy, and attempt to compensate for the overall macroeconomic stance.

The purpose of this paper is: (1) to measure the impact of industrial import protection on the level and structure of incentives for total exports, total agricultural exports and individual agricultural export commodities in the Zimbabwean economy; and (2) to compare these results with those obtained for two other agriculture-based developing countries, namely Peru and Malaysia. In these three countries, the agricultural export sectors have developed very differently and the question arises whether the differential performance is due to a different incidence effect of non-agricultural import protection on agricultural exports or to different levels of nominal protection in manufacturing and agriculture.

In order to analyze the incidence of protection, a simple general equilibrium model developed by Dornbusch (1974) and successfully used in other quantitative studies [e.g. García (1981) on Colombia; Oyejide (1986) on Nigeria; Tshibaka (1986) on Zaire; Greenaway/Milner (1986) on Mauritius; Bautista (1987) on the Philippines; Mlambo (1989) on Zimbabwe] is applied.[2] It will be shown that a fairly high share of industrial protection may be shifted to producers of agricultural exportables as an implicit tax in all three countries. This result conforms with findings of other studies on the subject. However, direct government interventions in agriculture and manufacturing differ considerably across the three countries and the question arises whether indirect policies are strong enough to change the general pattern of protection.

The remainder of the paper is organized as follows. Section 2 introduces the theoretical model used and explains the shifting principle. In Section 3 estimates of the incidence parameters are presented and discussed. Subsequently, the estimates of the incidence parameters are combined with information on nominal protection rates for manufacturing and agricultural exportables to produce true subsidy rates in Section 4. Finally, in Section 5, major results are summarized and conclusions are drawn.

2. The Incidence of Protection: Theoretical Considerations

Following Dornbusch (1974) we consider a simple general equilibrium model for a small open economy which produces and consumes three types of final goods: exportables (X), importables (M), and nontraded goods (N). Since the economy is assumed to be a price taker on international markets, the domestic prices of both tradeables are determined by world market prices, the nominal exchange rate and trade taxes and subsidies. By contrast, the prices of home goods are determined by domestic supply and demand. However, the prices of home goods are influenced by trade policy, if home goods and traded goods are substitutable in production and/or consumption. In this case, trade policy not only fully determines the domestic relative price of tradeables but also changes the relative prices between tradeables and home goods and therefore the real incomes of agents in each sector, that is, the incidence across sectors. How the incidence is distributed across sectors, depends essentially on the degree of substitutability. This can be illustrated more clearly in a diagram going back to Dornbusch (1974):

In Figure 1 the relative prices of exportables and importables to home goods (P_M/P_N; P_X/P_N) are drawn on the vertical and horizontal axis. The two rays through the origin represent the relative price between importables and exportables in the free-trade (OT) and tariff-ridden (OT') situation respectively. The three H-schedules correspond to three substitutability assumptions:

H': Importables and home goods are perfect substitutes, whereas exportables and home goods are not substitutable;

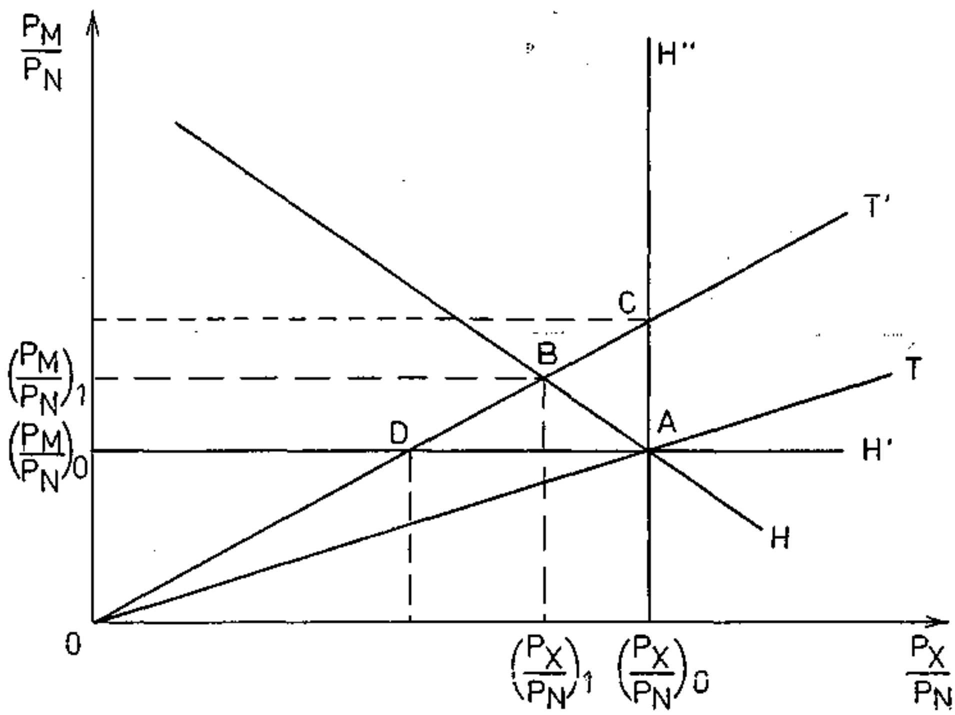
H'': Exportables and home goods are perfect substitutes, whereas importables and home goods are not substitutable;

H: Importables and home goods and exportables and home goods are imperfect substitutes.

For each case the corresponding H-schedule represents alternative price ratios for tradeables and home goods which clear the home-goods market. It is also the locus of price combinations for which trade equilibrium is attained. Points below and to the left of the H-lines are points of excess supply and trade deficits, points above and to the right indicate excess demand and trade balance surplus. The schedule H'(H'') represents equilibria where $P_M/P_N(P_X/P_N)$ remains unaltered and $P_X/P_N(P_M/P_N)$ decreases (increases) when a tariff is introduced. The intermediate case is represented by equilibria along H.

Figure 1

The Effects of Trade Taxes on Relative Prices



For this latter case, assume that a tariff is introduced. Beginning with an equilibrium at point A, the imposition of the tariff initially raises the domestic relative prices of importables in terms of both exportables and home goods by the amount of the tariff. The economy moves to point C in Figure 1. However, the shift in relative prices provides incentives to increase the domestic production of import substitutes. As a result, resources are diverted from home goods and exportables. At the same time, the change in relative prices induces consumers to shift their demand away from importables to home goods and exportables. In the sector producing home goods, the resulting excess demand places upward pressure on prices until they reach a new home-goods market equilibrium. These adjustments lead to a new equilibrium position for the economy at point B, where:

- the domestic price of importables relative to the price of exportables has increased by the full amount of the tariff because the country cannot influence its foreign terms of trade;

- the domestic price of importables relative to the price of home goods has increased, but by less than the full amount of the tariff because the nominal price of home goods has also risen somewhat;

- the domestic price of exportables has fallen relative to both the price of home goods and that of importables.

Thus, only a certain proportion of protection is an advantage to producers of import substitutes, while the remainder is shifted on to exporters as an implicit tax. This means that the "true" tariff [$\Delta(P_M/P_H)$] is positive but falls short of the nominal tariff while the "true" subsidy [$\Delta(P_X/P_N)$] to exporters is negative.[3]

If other substitutional relationships exist, then the incidence results will differ from the above. If importables and home goods are perfect substitutes, the domestic prices of these goods cannot differ (law of one price). In this situation the import sector is no longer granted any true protection while the whole burden is shifted onto producers of exportables. In Figure 1, the new equilibrium would be at point D. If importables and home goods are, at the other extreme, not substitutable, then the price of home goods remains unchanged. This situation is represented by point C. The tariff now provides the full amount of protection to the import sector while the burden of protection is equally shared by exporters and producers of nontradeables.

One could imagine a lot of substitutional relationships that differ from the two extreme cases, but all of them must lie between points C and D. To evaluate the incidence of protection is, therefore, up or our empirical analysis.

3. Empirical Results for Zimbabwe, Malaysia and Peru

Against the background of the theoretical considerations above, the incidence parameters for Zimbabwe were estimated. Since the incidence parameter is defined as the elasticity of the price ratio between nontradeables and exportables (P_N/P_X) with respect to the price ratio between importables and exportables (P_M/P_X), this gives us the following basic test equation.

$$\ln(P_N/P_X)_t = \text{constant} + \Omega \ln (P_M/P_X)_t + u_t \qquad (1)$$

As shown by García (1981), this equation may be disaggregated as necessary to take account of several exportable and importable subsectors. The information required to estimate omega is price movements of importables, exportables and non-tradeables. Ideally, one would rely on producer prices.

In estimating the global and disaggregated forms of the incidence parameter, an important modification is required before equation (1) can be used. Estimations based on time-series data would violate the assumption of constant real income and of a balanced external account. Hence, income (Y) as measured by real GDP and the trade balance (BOT) have to be included as additional variables in the regression equations. There are then two basic equations to be estimated.

$$\ln(P_N/P_X)_t = \text{constant} + \Omega \ln(P_M/P_X)_t + \alpha\, BOT_t + \beta \ln Y_t + u_t \qquad (2)$$

and

$$\ln(P_N/P_{XA})_t = \text{constant} + \Omega_1 \ln(P_M/P_{XA})_t + \Omega_2 \ln(P_{XNA}/P_{XA})_t$$

$$+ \alpha\, BOT_t + \beta \ln Y_t + u_t \qquad (3)$$

where P_{XA} is either the price index for individual agricultural export commodities or an export-share-weighted price index for all agricultural exportables recognized and P_{XNA} is an export-share-weighted price index for all other exportables not included in P_{XA}.

The regression equations were estimated on the basis of annual data for 1966-87. Initially, ordinary least squares (OLS) techniques were used. For all equations estimated there was, however, evidence of positive autocorrelation. In each case, therefore, the model was re-estimated using the Cochrane/Orcutt iterative procedure.

In addition to total exports, estimates are produced for Zimbabwe's major agricultural export goods, i.e. maize, coffee, cotton, tobacco and beef as well as for all five agricultural export categories taken together. Yearly information on unit import and unit export values in Zimbabwean dollar from the Central Statistical Office (CSO) and on producer prices for individual agricultural export commodities from Rukovo (1990) together with information on export revenues according to the standard international trade classification (SITC) from CSO were used to construct price indices for individual export commodities, total agricultural exportables and other exportables. For each of the export categories, four variables are used as proxies for home goods: the building material price index (P_{N1}), the component of domestic workers' wages in the consumer price index (CPI) (P_{N2}), the food component of CPI (P_{N3}) and the composite CPI for higher and lower income urban families (P_{N4}). Moreover, the export price index for total agricultural exports and other exports was calculated with different weights, explanatory variables were taken out and the dynamic structure of the relationship was explored by estimating a distributed lag model. Sources and data for all the variables used as well as the weighting scheme applied are given in Wiebelt (1990), Appendices 1-3.

The results of estimating the shift parameter are presented in Tables 1 and 2. The former gives details for estimates using a basic model where the building material price index (P_{N1}) approximates price movements for home goods whilst the latter presents

Table 1: Estimates of the Incidence Parameter Ω for Total Exports, Total Agricultural Exports and Individual Agricultural Exports in Zimbabwe, 1966-1987[a]

Independent Variables/ Test Statistics	Dependent Variables						
	Total Exports	Total Agricultural Exports	Individual Agricultural Exports				
	$\ln(P_{N1}/P_X)$	$\ln(P_{N1}/P_{XA})$	Maize	Coffee	Cotton	Tobacco	Beef
Constant	1.1720 (0.44)	2.1089 (0.92)	-2.4387 (-1.96)	1.1224 (0.40)	1.9645 (0.77)	1.8961 (0.79)	2.4351 (1.16)
$\ln(P_N/P_X)$	0.7598 (5.46)						
$\ln(P_N/P_{XA})$		0.6451 (5.28)	0.6525 (5.12)	0.7588 (4.95)	0.6471 (4.54)	0.6755 (5.34)	0.4315 (2.88)
$\ln(P_{XNA}/P_{XA})$		0.0669 (0.95)	-0.1103 (-0.65)	0.2372 (1.66)	0.1049 (0.81)	0.1263 (1.38)	0.1191 (1.05)
BOT	$-0.1254 \cdot 10^{-3}$ (-0.72)	$-0.6764 \cdot 10^{-4}$ (-0.45)	$0.2975 \cdot 10^{-4}$ (0.20)	$-0.1271 \cdot 10^{-3}$ (-0.67)	$-0.2166 \cdot 10^{-3}$ (-1.28)	$-0.4293 \cdot 10^{-4}$ (-0.27)	$0.1897 \cdot 10^{-4}$ (0.13)
ln Y	-0.0518 (-0.19)	-0.1527 (-0.65)	0.3174 (2.11)	-0.0476 (-0.16)	-0.1194 (-0.47)	-0.1329 (-0.54)	-0.2192 (-0.98)
Rho	0.9558 (14.90)	0.9583 (15.37)	0.7908 (5.92)	0.9551 (14.77)	0.9626 (16.29)	0.9570 (15.11)	0.9481 (13.70)
$\bar{R}^2$	0.58	0.80	0.67	0.93	0.69	0.90	0.51
F	10.17	21.48	11.13	66.56	12.32	46.85	6.28
DW	1.59	1.79	1.82	1.59	1.81	1.73	1.78

[a] Values in parentheses are t-values, Rho is the regression coefficient of the Cochrane/Orcutt procedure, $\bar{R}^2$ is the corrected coefficient of determination, F the F-value and DW the Durbin-Watson-statistic.

Source: Own computations. P_{N1}, P_N and P_X are taken from Wiebelt (1990), Appendix 1. P_{XA} is constructed as a weighted export price index for the five individual export commodities where the respective earnings in 1980 are used as weights. Analogous, P_{XNA} is an export price index for all other exports not included in P_{XA}.

omega estimates for alternative model specifications. The dependent variable for each equation is listed in the top line of the tables and the estimated coefficients for each independent variable (or model) is found by looking at the corresponding cell under the relevant line heading.

The statistical characteristics for all regression results are quite good. The estimated Durbin-Watson statistics mean that the null hypothesis of no positive autocorrelation cannot be rejected. The overall explanatory power of all models is satisfactory, the F-statistics are significant at the 1 percent confidence level in all cases, and the estimates of the incidence parameter are significantly greater than zero at conventional levels in all but three models.

From the results obtained for the value of Ω, it can be concluded that a major proportion of the incidence of commercial policy interventions designed to protect the importables may be shifted to the export sector in the form of an implicit export tax. As an example, the estimate of Ω in the basic model (Table 1) suggests that the share of incidence borne by the exportable sector is 76 percent. In general, this implies that Zimbabwe's home goods and importables are fairly close substitutes in both consumption and production whereas the relationship between home goods and exportables is weak. It also reflects that Zimbabwe's exportables are fairly inelastic in supply. Hence, they tend to absorb a large proportion of the tariff incidence in the form of reduced rents to the fixed factors of production.

The estimated value of the incidence parameter for total agricultural exports (0.65) is lower than for total exports (0.75). This implies that a one percent tariff will decrease the relative price of total exports by 0.75 percent, but the relative price of agricultural (non-agricultural) exports will fall marginally less (more) than total exports. Obviously, technological and demand characteristics are such that there is less substitutability between non-agricultural exportables and home goods than between agricultural exportables and home goods.[4] This pattern of incidence contrasts with empirical evidence for other developing countries where traditional agricultural exportables exhibit a larger degree of incidence than non-traditional industrial exports [e.g. in the Ivory Coast; see Greenaway (1989)]. It accords well with a priori theorizing since these other exports are mainly natural resource-based.

Within the agricultural export sector estimates of the incidence parameter in the basic model vary between 0.43 for beef and 0.76 for coffee with those for maize, cotton and tobacco lying between these two extremes. The results for beef contrast with the findings of Mlambo (1989) and can be explained by differences in the data base used. Whereas Mlambo used export price indices [Mlambo (1989), p. 255, Table 6, footnote] we relied on producer prices, since these are the prices which determine producers' decisions. As clearly shown by Rukovo (1990), nominal protection is high for beef. This explains the large discrepancy between Mlambo's estimate of 0.88 and our estimate of 0.43. Obviously, beef producers (mostly large scale commercial farmers) are aware of the eroding effect of increasing home-goods prices and successfully lobbied for higher nominal subsidies to compensate for disprotection by commercial policy.

Modifying the basic model as indicated in Table 2 has only a minor effect on the regression results. As can be seen, the incidence parameters are fairly stable across different model specifications. They are generally high and range from 0.66 to 0.83 for total exports; they are equally concentrated for total agricultural exports, varying from 0.53 to 0.70. There is no clear pattern with regard to food exports (maize, coffee and beef) and cash crops (cotton and tobacco). The range of Ω for coffee exports is between 0.65 and 0.84. The incidence is much lower for beef (0.29 to 0.47), while that for maize, cotton and tobacco is nearly the same lying between 0.57 and 0.76.

Table 2: Sensitivity Analysis on the Incidence Parameter Ω, Zimbabwe 1966-1987[a]

Model[b]	Point Estimates of the Incidence Parameter						
	Total Exports	Total Agricultural Exports	Individual Agricultural Exports				
			Maize	Coffee	Cotton	Tobacco	Beef
Model 1: Basic model	0.7598 (5.46)	0.6451 (5.28)	0.6525 (5.12)	0.7588 (4.95)	0.6471 (4.54)	0.6755 (5.34)	0.4315 (2.88)
Model 2: Alternative home good price indices							
a) P_{N2}: Wages	0.6581 (2.72)	0.5305 (2.45)	0.5681 (2.36)	0.6541 (2.46)	0.6036 (2.22)	0.5486 (2.41)	0.3190 (1.09)
b) P_{N3}: Food	0.8164 (5.19)	0.6999 (4.88)	0.7596 (5.03)	0.8374 (4.83)	0.6840 (4.47)	0.7287 (4.88)	0.3902 (3.10)
c) P_{N4}: CPI	0.7617 (4.42)	0.6315 (4.00)	0.7110 (4.24)	0.7571 (4.01)	0.5860 (3.88)	0.6670 (4.01)	0.2899 (2.33)
Model 3: Smaller model (no BOT and no Y variable)	0.6605 (1.71)	0.6320 (5.85)	0.6742 (6.28)	0.7446 (5.14)	0.6243 (4.44)	0.6644 (6.16)	0.4691 (3.60)
Model 4: Different specification of P_{XNA} and P_{XA}							
a) weights of 1978		0.6325 (5.40)	0.6526 (5.12)	0.7590 (4.95)	0.6473 (4.54)	0.6788 (5.40)	0.4336 (2.90)
b) weights of 1985		0.6817 (5.94)	0.6525 (5.12)	0.7593 (4.94)	0.6481 (4.54)	0.6874 (5.57)	0.4317 (2.88)
Model 5: Different specification of the income variable (lagged one period)	0.7619 (5.27)	0.6583 (5.19)	0.6805 (6.02)	0.7553 (4.81)	0.6570 (4.32)	0.6822 (5.30)	0.3770 (2.08)
Model 6: Introduction of a lagged endogenous variable	0.8342 (5.18)	0.6399 (4.86)	0.6351 (4.60)	0.7548 (4.54)	0.3563 (3.75)	0.6637 (4.89)	0.0832 (0.69)

[a] Values in parentheses are t-values. - [b] The basic model (Model 1) is the model shown in Table 1. All models, except Model 6 were corrected for autocorrelation with the Cochrane/Orcutt iteration procedure.

Source: Own computations based on data presented in Wiebelt (1990), Appendix 1.

The modifications of the basic model stress the robustness of the estimates of Ω. The general conclusion is that the incidence of commercial policy in Zimbabwe is high. This has important implications for the level and structure of incentives.

Similar results have been obtained for Peru and Malaysia. From Table 3, it can be seen that the incidence parameters are fairly stable across different model specifications n both countries. They are generally high and range between 0.42 and 0.92 for total exports. For individual agricultural exports, they are in all specifications higher than 0.55 and lie around 1 in various models. Given the results of the sensitivity analysis, it seems save to conclude that total exports and major agricultural export goods bear the major burden of import protection in all three countries. They are significantly more heavily taxed than the nontradeable sector. Import protection drives up nontradeable prices whereas the prices of exportables remain basically unaffected. Similar incidence parameters do not mean, however, that the taxation of the agricultural export sectors is of a similar magnitude in all three countries. The nominal protection rates for manufacturing and the agricultural export crops matter, too.

4. True Protection of Imports and Exports

As shown by Greenaway/Milner (1987) and Greenaway (1989), estimates of the shift parameter can be combined with information on nominal import tariffs and nominal export subsidies to calculate "true tariff rates" and "true subsidy rates", i.e. the extent to which the prices of importables and exportables rise or fall relative to the numeraire, non-tradeables. Thus, the true tariff rate t* is defined as:

$$t^* = \Delta \frac{P_M}{P_N} = \frac{1+t}{1+d} - 1 = \frac{t-d}{1+d} \qquad (4)$$

and the true subsidy rate s* is analogously given by:

Table 3: Inter-country Comparison of Estimates of the Incidence Parameter

Range of the Incidence Parameter	Country		
	Zimbabwe 1966-87	Malaysia 1960-85	Peru 1970-85
Total Exports	0.66-0.82	0.78	0.72-0.92
Total Agricultural Exports	0.53-0.70		
Individual Agricultural Exports			
- Maize	0.57-0.76		
- Coffee	0.65-0.84		0.55-1.07
- Cotton	0.59-0.68		0.64-1.05
- Tobacco	0.55-0.73		
- Beef	0.29-0.47		
- Fishmeal			0.57-1.01
- Rubber		0.68-0.86	
- Palm Oil		0.91-1.03	
- Cocoa		0.75-1.12	

Source: Compiled from Wiebelt (1990), Table 2 for Zimbabwe and Herrmann/Sulaiman/Wiebelt (1989), Tables 3 and 5 for Malaysia and Peru.

$$s^* = \Delta \frac{P_X}{P_N} = \frac{1+s}{1+d} - 1 = \frac{s-d}{1+d} \qquad (5)$$

where $d = \hat{P}_N = \Omega \hat{P}_M + (1-\Omega)\ \hat{P}_X$

$$d = \Omega t + (1-\Omega) s \qquad (6)$$

In equations (4) to (6), d is the proportional change in the home-goods price and t and s refer to the nominal tariff rate and nominal subsidy rate respectively. A hat (ˆ) denotes a proportional change in a variable.

From equation (6) it follows that the proportional increase in the price of home goods following trade restrictions is composed of two elements: that part of the increase shifted on from the rise in the price of importables due to the tariff (Ωt) and that part of the increase shifted on from the rise in the domestic price of exportables due to the subsidy [$(1-\Omega)s$]. Since our primary interest is on the effects of tariffs on manufacturing at given export subsidies, we will assume $\hat{P}_X$ to be zero. Thus equation (6) reduces to

$$d = \Omega t. \tag{7}$$

Clearly, if importables and home goods are perfect substitutes ($\Omega=1$) then $d=t$ and $t^*=0$ whereas the sign (and value) of s^* is ambiguous depending on $s \gtrless t$. In this case importables enjoy no true protection relative to home goods. Exports are truly discriminated against if nominal tariffs exceed nominal subsidies. If on the other extreme, importables cannot replace home goods in production and consumption ($\Omega=0$), then $d=0$ and $s^*=s$. It may be noted parenthetically that importables may be truly disprotected despite nominal protection. This is the case, if the increase in the home-goods price resulting from export subsidies exceeds nominal tariffs on importables. Such repercussions, which are induced by export promotion policies, have been discussed in a preliminary study on Zimbabwe [Wiebelt (1990)] but are not the focus of this paper.

Rukovo (1990) provides details on nominal taxes and subsidies for three Zimbabwean agricultural exportables (maize, beef and cotton) and Herrmann et al. (1990) and Aziz (1990a) compiled similar information on the most important agricultural exportables in Peru and Malaysia. It is interesting to combine this information with average tariff rates for total manufacturing as computed by Erzan et al. (1989) to generate estimates of true protection for the three countries. The actual procedure for estimating true tariff and subsidy rates is to use unweighted averages of the shift parameters reported in Table 3 to estimate d from equation (7) and then substitute this into equations (4) and (5) to get t* and s*. The results of this exercise together with the nominal tariff and subsidy rates as well as the shift parameters used are reported in Tables 4 and 5.

According to the figures in Table 4 nominal subsidy rates on exports in Zimbabwe[5] varied between -59% and 123% for maize, between -69% and 238% for beef and between -33% and 31% for cotton in the period 1981/82 to 1986/87. The true subsidy rates on exports range from -70.1% to 225.6% depending on the value of the shift parameter and the value of nominal duties or subsidies on exportables. Other things equal, s* will increase as Ω falls [equations (5) and (6)]. To give an example, if both, maize and beef are nominally subsidized by 18% in 1981/82 this would lead to a higher true subsidy for beef (13.7%) than for maize (10.6%). This follows immediately from the dampening effect of a smaller omega on the nontradeables price.

Where agricultural exports are nominally subsidized, they are also truly subisidized. In other words, disprotection from a 10% import tariff on manufactures is insufficient to offset protection granted by nominal export subsidies. Where agricultural exports are nominally taxed, true discrimination is higher than nominal discrimination. The case where the implicit tax is at a maximum is that which pertains to maize. This follows immediately from the relative high shift parameter, which means that nontradeables prices for maize producers rise to a greater extent. In this case, protection brought about by export subsidies is diminished strongly by nominal protection of manufacturing imports.

From Table 4, it can be seen that the true tariff on manufactures is much lower than the nominal tariff. This follows because importables and home goods are close substitutes. In this case, a large proportion of the tariff burden is shifted on to exporters. However, it also means that home-goods prices increase drastically thereby undermining true protection. This may provide one explanation of the tendency for protection of importables to increase over time. If true protection is less than nominal

Table 4: Estimates of True Tariffs and True Subsidies for Zimbabwe, 1981/82-1986/87[a] (percent)

Tariff/ Subsidies	Shift Parameter (Ω)	Year 1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
Nominal Tariff on Manufacturing (t)[b]		10	10	10	10	10	10
Nominal Subsidy (s)[c]							
- Maize		18	84	59	-59	36	123
- Beef		106	177	238	158	41	-69
- Cotton		-11	31	-2	-33	-17	23
True Tariff (t*)	0.74	2.4	2.4	2.4	2.4	2.4	2.4
True Subsidy (s*)							
- Maize	0.67	10.6	72.5	49.0	-61.6	27.5	109.0
- Beef	0.38	98.5	166.9	225.6	148.6	35.8	-70.1
- Cotton	0.64	-16.4	23.1	-7.9	-37.0	-22.0	15.6

[a] True tariffs and true subsidies are calculated on the basis of an unweighted average incidence parameter calculated from the extreme values given in Table 3. - [b] The nominal tariff rate is an unweighted average tariff rate for total manufactures as calculated by Erzan et al. (1989). - [c] Unweighted nominal subsidy rates are taken from Rukovo (1990). They are based on export parity prices by accounting for internal marketing and transport margins. Information on nominal protection rates for coffee and tobacco was not available.

Source: Own computations based on Erzan et al. (1989), Rukovo (1990) and the results given in Table 3.

protection this provides a motive for pressing for further protection.

From the results given in Table 4 one can conclude that the prevailing average tariff rate for total manufacturing has only a minor impact on agricultural incentives. Low nominal import protection together with similar incidence parameters for the three agricultural exports means that the level and structure of protection in the agricultural export sector is not affected profoundly by import tariffs. Furthermore, nominal tariffs and subsidies on agricultural exportables are very high. However, it may be expected that other macroeconomic measures like the foreign exchange allocation system provide strong disincentives to agricultural exports in Zimbabwe.

Turning to an analysis of the protection structure in Malaysia and Peru, the picture changes drastically (Table 5):

1. With the exception of cocoa in Malaysia, both countries directly tax their main export crops. The magnitude of the tax, however, is much higher in Peru than in Malaysia. In Peru, farmgate prices for coffee and cotton are on average 63% and 70% below border prices.[6] By contrast, direct taxation of agricultural exportables in Malaysia is fairly moderate, ranging from 16% for rubber[7] to 4% for palm oil. Moreover, export taxation for Malaysia's main export crops decreased during the period of investigation, whereas it remained nearly constant at high levels in Peru.[8]

2. In Malaysia, the average nominal protection rate for manufacturing is about 16% in the period 1980 to 1985. With average incidence parameters of 0.77, 0.97 and 0.94 for rubber, oil palm and cocoa respectively, the corresponding true tariff rates average 25%, 17% and 13%. Except for rubber in the period 1980-1983, indirect discrimination exceeds direct discrimination brought about by export taxes. As can be seen from Table 5, even in years where the apparent intent (as judged by low or zero direct taxation) was not to discriminate against agricultural exportables, the negative impact of indirect protection was large enough to lead to strong overall taxation. In spite of zero direct taxation for cocoa, the true tax rate was 13%. Similarly, palm oil carried a tax burden of 15% in 1983 to 1985, instead of explicit taxes of only 2%.

3. Import tariffs averaged about 41% in Peru between 1980 and 1985. Given the average incidence parameters of 0.81 for coffee and 0..85 for cotton, the prices of nontradeables for these sectors following from the average import tariff increase by 33% and 35% respectively. Thus, manufacturing protection places an additional heavy burden on export crops. The true tax rates falling on coffee and cotton producers

Table 5: Estimates of True Tariffs and True Subsidies for Malaysia and Peru (1980-85) (percent)

Tariffs/ Subsidies	Shift Parameter (Ω)	Year					
		1980	1981	1982	1983	1984	1985
				Malaysia			
Nominal Tariff on Manufacturing (t)		16	16	16	16	16	16
Nominal Subsidy (s)							
- Estate Rubber		-29	-21	-12	-14	-7	-8
- Smallholder Rubber		-30	-22	-13	-15	-8	-8
- Palm Oil		-7	-6	-3	-2	-2	-2
- Cocoa		0	0	0	0	0	0
True Tariff (t*)	0.78	3.5	3.5	3.5	3.5	3.5	3.5
True Subsidy (s*)							
- Estate Rubber	0.77	-36.8	-30.0	-21.7	-23.4	-17.2	-18.1
- Smallholder Rubber	0.77	-37.7	-30.6	-22.5	-24.3	-18.1	-18.1
- Palm Oil	0.97	-19.5	-18.6	-16.0	-15.2	-15.2	-15.2
- Cocoa	0.94	-13.1	-13.1	-13.1	-13.1	-13.1	-13.1
				Peru			
Nominal Tariff on Manufacturing (t)		41	41	41	41	41	41
Nominal Subsidy (s)							
- Coffee		-58	-64	-75	-70	-56	-53
- Cotton		-74	-73	-70	-72	-52	-76
True Tariff (t*)	0.82	5.5	5.5	5.5	5.5	5.5	5.5
True Subsidy (s*)							
- Coffee	0.81	-68.5	-73.0	-81.2	-77.5	-67.0	-64.7
- Cotton	0.85	-80.7	-80.0	-77.8	-79.2	-64.4	-82.2

Source: Own computations based on Herrmann et al. (1990), Aziz (1990a), Erzan et al. (1989) and the results given in Table 3.

average 72% and 77% when the implicit tax component is accounted for. Of the total tax rates for coffee and cotton, around 13% and 9% can be traced back to indirect discrimination via protection of manufactured products.

Summing up, the results show that direct and indirect policies are important in all three countries. Government intervention in producer prices has generally been favourable to agricultural production in Zimbabwe. However, import tariffs are largely shifted on to producers of exportables, either because home goods and importables are fairly close substitutes or because agricultural exportables are fairly inelastic in supply. As a result, true subsidy rates are much lower than nominal rates. In Malaysia and Peru, agricultural exports are discriminated against by both direct and indirect policies. In Malaysia, implicit taxation via import protection exceeds explicit taxation by sector-specific measures. The degree of taxation is highest in Peru due to a higher nominal protection rate for the manufacturing sector and high nominal discrimination against agricultural export crops. Together with high import tariffs for manufactures, the high incidence parameters in Peru lead to high indirect taxes on Peru's main agricultural exportables.

5. Summary and Conclusions

It was the objective of this paper to elaborate the implications of import protection in the non-agricultural sector for agricultural exports in a comparative study of Zimbabwe, Malaysia and Peru. To estimate the effect on prices of a system of tariffs and subsidies on imports and exports, a simple general equilibrium model incorporating importables, exportables and home goods was used and different protection measures were calculated and compared. The major results that emerge from our analysis can be summarized as follows:

1. The empirical results obtained for Zimbabwe, Malaysia and Peru confirm experiences gained in other studies on the subject. In particular, they underline the importance of macroeconomic repercussions of commercial policy for the agricultural sector. The estimates of the incidence parameters indicate that the degree of shifting the burden of commercial policies onto exporters is high in all three countries. The point estimates of Sjaastad's omega are highly significant and range

for all export categories (except beef in Zimbabwe) and in all model specifications above 0.5, in some cases even above 0.9. This implies that the impact of a tariff on imports falls almost entirely on producers of exportable agricultural products.

2. Similar incidence parameters do not mean, however, that the discrimination of the agricultural sectors is similar across the three countries. The nominal protection rates for the manufacturing sector and the agricultural export crops matter, too. Peru, the country with a poorly performing agricultural export sector, protected its manufacturing sector much more strongly than Zimbabwe and Malaysia and taxed its agricultural export crops more heavily than Malaysia. This implies that the true discrimination of agricultural export crops is clearly higher in Peru than in Malaysia and Zimbabwe.

3. Direct government intervention in agriculture in Zimbabwe has generally been favourable to maize and beef producers whereas cotton exports show no clear protection pattern. Moreover, average nominal tariffs on manufacturing has been rather low during the period of investigation. Together with similar incidence parameters for the three agricultural exportables this means that the structure of protection in the agricultural sector has not been affected profoundly by indirect protection. This result contrasts sharply with the findings for other LDCs and may be seen as a model for agricultural policy in other African countries.

The analysis suggests that the more successful performance of agricultural exports in Malaysia and Zimbabwe can be explained by the smaller degree of direct and indirect taxation due to lower negative or high positive protection coefficients rather than by lower incidence parameters. Given the high and similar incidence parameters in all three countries, policy makers have to focus on the modification of the relevant nominal protection rates if they want to improve the performance of their agricultural export sectors. Nominal protection rates of manufactured goods would have to fall and those for agricultural export crops would have to increase.

Notes

1 For the economies of Colombia, Uruguay, Argentina, Chile, Brazil, and Peru Clements and Sjastaad (1984) estimated that exporters in all these countries, and producers of import-competing foodstuffs in some of them, have paid at least half of the cost of industrialization programs. For Zimbabwe, the current exchange rate control system is estimated to result in a total net transfer out of agriculture on the order of half a billion dollars; an amount which by far exceeds the entire budget of the Ministry of Lands, Agriculture and Rural Resettlement [Masters (1989)].

2 Other concepts were also used to analyze the incidence of protection. In the World Bank's project on "The Political Economy of Agricultural Pricing Policies" the real-exchange-rate effects of general macroeconomic policies are calculated and the price effects of direct and indirect agricultural policies are compared. Descriptions and first results on the comparative study, which encompasses 18 detailed country studies are summarized in Krueger/ Schiff/Valdés (1988) and Schiff (1988). Published country studies include Avillez/ Finan/Josling (1988) on Portugal, Greene/Roe (1989) on the Dominican Republic, Jansen (1988) on Zambia, García/Llamas (1989) on Colombia, Dethier (1989) on Egypt, Jenkins/Lai (1989) on Malaysia, Tuluy/Salinger (1989) on Morocco, Siamwalla/Setboonsarng (1989) on Thailand and Moon/Kang (1989) on Korea. Other studies on the role of macroeconomic policies for agricultural incentives are based on computable general equilibrium models [e.g. Amranand/Grais (1984) for Thailand, Michel/Noel (1984) for the Ivory Coast and Wiebelt (1989) for Peninsular Malaysia].

3 A more detailed description and illustration of the shifting principle and the concept of true protection is provided by Greenaway/Milner (1987).

4 This presumption is confirmed by the results of the following regression for non-agricultural exportables:

$$\ln (P_{N1}/P_{XNA}) = \underset{(-0.85)}{-3.3834} + \underset{(4.66)}{0.7861} \ln (P_M/P_{XNA}) + \underset{(1.27)}{0.1883} \ln (P_{XA}/P_{XNA})$$

$$- \underset{(-0.52)}{0.7169 \cdot 10^{-3}} \, BOT + \underset{(0.41)}{0.2373} \ln Y$$

$$Rho = \underset{(-0.21)}{-0.1999}; \quad \bar{R}^2 = 0.73; \quad F = 14.83; \quad DW = 1.89$$

As indicated by the regression results the incidence parameter for non-agricultural exports is higher than the estimator for agricultural exports (Table 1). This implies that the substitutability between importables (exportables) and home goods is higher (lower) for non-agricultural exportables than in the case of agricultural exportables.

5 See Rukovo (1990) and Takavarasha (1990) for analyses of direct agricultural pricing policies in Zimbabwe.

6 Nominal protection rates for fishmeal were not available.

7 Differences in direct taxation of estate and smallholder rubber are attributable to research and replanting cesses which are actual transfer payments by smallholders to the future, and can be redeemed through adapting new technology and replanting.

8 See Herrmann (1989) and Jenkins/Lai (1989) for a description of the evolution of protection of export crops and food crops in Peru and Malaysia since the 1960s. Cocoa policy in Malaysia is described in Aziz (1990b).

Bibliography

Amranand, P., W. Grais (1984), Macroeconomic and Distributional Implications of Sectoral Policy Interventions: An Application to Thailand. World Bank Staff Working Papers, No. 627, Washington, D.C.

Avillez, F., T.J. Finan, T. Josling (1988), Trade, Exchange Rate, and Agricultural Pricing Policies in Portugal. The World Bank, Washington, D.C.

Aziz, A. (1990a), Agricultural Price Protection in Malaysia - The Influence of the Methodology and the Product Sample. Kuala Lumpur (mimeo).

Aziz, A. (1990b), Draft Report on Malaysian Cocoa Policy. Kuala Lumpur (mimeo).

Bautista, R.M. (1987), Production Incentives in Philippine Agriculture: Effects of Trade and Exchange Rate Policies. Research Report 59, International Food Policy Research Institute, Washington, D.C.

Clements, K.M., L.A. Sjastaad (1984), How Protection Taxes Exporters. Thames Essay No. 39, Trade Policy Research Centre, London.

Dethier, J.-J. (1989), Trade, Exchange Rate, and Agricultural Pricing Policies in Egypt. The World Bank, Washington, D.C.

Dornbusch, R. (1974), Tariffs and Non-traded Goods. "Journal of International Economics", Vol. 4, pp. 177-185.

Erzan, R., H. Kuwahara, S. Marchese, R. Vossenaar (1989), The Profile of Protection in Developing Countries. UNCTAD Review, Vol. 1, No. 1, Geneva, pp. 29-49.

García, G.J. (1981), The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Colombia: 1953-1978. International Food Policy Research Institute Report 24, Washington, D.C.

García, J.G., G.M. Llamas (1989), Trade, Exchange Rate, and Agricultural Pricing Policies in Colombia. The World Bank, Washington, D.C.

Greenaway, D. (1989), Commercial and Policy Conflict: An Evaluation of the Incidence of Protection in a Non-industrialized Economy. The Manchester School, Vol. 62, No. 2, pp. 125-141.

--, C. Milner (1986), Estimatiing the Shifting of Protection Across Sectors: An Application to Mauritius. "Industry and Development", No. 16, pp. 1-22.

--, C. Milner (1987), 'True Protection' Concepts and Their Role in Evaluating Trade Policies in LDCs. "The Journal of Development Studies", Vol. 23, No. 2, pp. 200-219.

Greene, D.D., T.L. Roe (1989), Trade, Exchange Rate, and Agricultural Pricing Policies in the Dominican Republic. The World Bank, Washington, D.C.

Harberger, A.C. (1962), The Incidence of the Corporation Income Tax. "Journal of Political Economy", Vol. 70, No. 3, pp. 215-240.

Herrmann, R. (1989), Wirkungen nationaler Agrarpolitiken auf den Agrarhandel der Entwicklungsländer und Möglichkeiten der Handelsliberalisierung. Kieler Arbeitspapiere Nr. 374, Kiel.

Herrmann, R., N. Sulaiman, M. Wiebelt (1990), How Non-agricultural Import Protection Taxes Agricultural Exports: A True-Protection Analysis for Peru and Malaysia. "Quarterly Journal of International Agriculture", Vol. 29, No. 1.

Jansen, D.J. (1988), Trade, Exchange Rate, and Agricultural Pricing Policies in Zambia. The World Bank, Washington, D.C.

Jenkins, G.P., A. Lai (1989), Trade, Exchange Rate, and Agricultural Pricing Policies in Malaysia. The World Bank, Washington, D.C.

Krueger, A.O., M. Schiff, A. Valdés (1988), Agricultural Incentives in Developing Countries: Measuring the Effect of Sectoral and Economywide Policies. "The World Bank Economic Review", Vol. 2, No. 3, pp. 255-271.

Masters, W. (1989), The Value of Foreign Exchange in Zimbabwe: Concepts and Estimates. "Working Paper AEE 2/90", Department of Agricultural Economics and Extension, Faculty of Agriculture, University of Zimbabwe, Harare.

Michel, G., M. Noel (1984), Short-term Responses to Trade and Incentive Policies in the Ivory Coast: Comparative Static Simulations in a Computable General Equilibrium Model. World Bank Staff Working Papers, No. 647, Washington, D.C.

Mlambo, K. (1989), Exchange Rate Overvaluation and Agricultural Performance in Zimbabwe: 1965-1985. In: Mudimu, G.D. and R.H. Bernsten (eds.), Household and National Food Security in Southern Africa. Proceedings of the Fourth Annual Conference on Food Security Research in Southern Africa, October 31-November 3, 1988, Harare, pp. 243-258.

Moon, P.-Y., B.-S. Kang (1989), Trade, Exchange Rate, and Agricultural Pricing Policies in the Republic of Korea. The World Bank, Washington, D.C.

Oyejide, T.A. (1986), The Effects of Trade and Exchange Rate Policies on Agriculture in Nigeria. International Food Policy Research Institute Research Report 55, Washington, D.C.

Rukovo, A. (1990), Structure and Development of Incentives for Agriculture in Zimbabwe. Harare (mimeo).

Schiff, M. (1988), Sector-specific and Economy-wide Policies and Agricultural Incentives in LDCs. Contributed Paper, XX International Conference of Agricultural Economists, 24-31 August, Buenos Aires.

Siamwalla, A., S. Setboonsarng (1988), Trade, Exchange Rate, and Agricultural Pricing Policies in Thailand. The World Bank, Washington, D.C.

Takavarasha, T. (1990), The Evaluation of National Policies Affecting Agricultural Trade, Pricing and Production in Malawi, Zambia and Zimbabwe. Paper prepared for the Policy Workshop on Trade in Agricultural Products Among the SADCC Countries, 27-28 February 1990, Harare, Zimbabwe.

Tshibaka, T.B. (1986), The Effects of Trade and Exchange Rate Policies on Agriculture in Zaire. International Food Policy Research Institute Research Report No. 56, Washington, D.C.

Tuluy, H., B.L. Salinger (1989), Trade, Exchange Rate, and Agricultural Pricing Policies in Morocco. The World Bank, Washington, D.C.

Valdés, A. (1986), Impact of Trade and Macroeconomic Policies on Agricultural Growth: The South American Experience. Reprint from: "Economic and Social Progress in Latin America, 1986 Report" (Inter-American Development Bank), International Food Policy Research Institute, Washington, D.C.

Wiebelt, M. (1989), How Does Industrial Protection Affect the Agricultural Sector? A Computable General Equilibrium Analysis for Peninsular Malaysia. Kiel Working Paper No. 380, Kiel.

Wiebelt, M. (1990), Some Preliminary Findings on the Sectoral Incidence of Protection in Zimbabwe. Kiel Working Paper No. 419, Kiel.

World Bank (1986), World Development Report 1986. Washington, D.C.

Zimbabwe, Central Statistical Office (CSO), Quarterly Digest of Statistics. Harare, various issues.