CREDIT Research Paper

No. 03/04

Export Response to Trade Liberalisation in the Presence of High Trade Costs: Evidence for a Landlocked African Economy

by

Chris Milner and Evious Zgovu

Centre for Research in Economic Development and International Trade, University of Nottingham

The Centre for Research in Economic Development and International Trade is based in the School of Economics at the University of Nottingham. It aims to promote research in all aspects of economic development and international trade on both a long term and a short term basis. To this end, CREDIT organises seminar series on Development Economics, acts as a point for collaborative research with other UK and overseas institutions and publishes research papers on topics central to its interests. A list of CREDIT Research Papers is given on the final page of this publication.

Authors who wish to submit a paper for publication should send their manuscript to the Editor of the CREDIT Research Papers, Professor M F Bleaney, at:

Centre for Research in Economic Development and International Trade,
School of Economics,
University of Nottingham,
University Park,
Nottingham, NG7 2RD,
UNITED KINGDOM

Telephone (0115) 951 5620
Fax: (0115) 951 4159

CREDIT Research Papers are distributed free of charge to members of the Centre. Enquiries concerning copies of individual Research Papers or CREDIT membership should be addressed to the CREDIT Secretary at the above address. Papers may also be downloaded from the School of Economics web site at:
www.nottingham.ac.uk/economics/research/credit

CREDIT Research Paper

No. 03/04

Export Response to Trade Liberalisation in the Presence of High Trade Costs: Evidence for a Landlocked African Economy

by

Chris Milner and Evious Zgovu

Centre for Research in Economic Development and International Trade, University of Nottingham

The Authors
Chris Milner is Professor and Evious Zgovu is Research Student, both in the School of Economics, University of Nottingham.

March 2003

Export Response to Trade Liberalisation in the presence of High Trade Costs: Evidence for a Landlocked African Economy

by
Chris Milner and Evious Zgovu

Abstract
The paper investigates the relative importance of trade policy and 'natural' sources of export taxation in Malawi, a landlocked African economy. These sources of export taxation are in turn used to explore how export supply would respond to trade liberalisation as opposed to measures which lower other international trade costs. The findings indicate that trade policy barriers are now only a limited source of 'true' export taxation and that trade policy reform needs to be complemented with reforms to reduce international trade, including transport, costs.

Outline

1. Introduction
2. Trade Barriers and Regime Changes in Malawi
3. Modelling Framework: Export Supply and 'True' Export Taxation
4. Measurement of True Export Taxation
5. Estimation of the Augmented Export Supply Function for Malawi
6. Export Supply Response to Lowering Trade Costs
7. Conclusions

1. INTRODUCTION

Despite significant liberalisation of trade policy across developing countries (see Dean, 1995; Oyejide, 1997) there are still a significant number of countries (especially in sub-Saharan Africa) where there has been a weak or sluggish export response. A number of explanations for this muted export and investment response have been offered. Some commentators emphasise problems of limited credibility and fear of policy reversals (e.g. Collier, 1997). Rodrik (1999) adds to this, a concern about the limited social and physical infrastructure of many African economies to cope with adjustments induced by trade reforms. There are also a number of recent studies that draw attention to the extent of the non-trade policy or natural barriers to trade, associated with for example a limited transport infrastructure or locational characteristics (Amjadi and Yeats, 1996; Milner, 1997; Milner, Morrissey and Rudaheranwa, 2000). These studies typically measure the relative importance of trade policy and natural barriers and therefore the impact of liberalisation on total levels of protection, but do not seek to identify or quantify the impact of natural barriers on export performance. This paper fills this gap for a specific, land-locked economy in Africa (Malawi), by modelling export supply so as to capture the relative impact of policy and natural barriers on export growth. True export protection measures that incorporate both policy and natural sources of taxation are constructed for the period 1970-1998. These measures of internal relative price changes are then introduced into an econometrically estimated export supply model for Malawi, alongside other influences (external real exchange rate and productive capacity). This innovation allows us to simulate the in- and out of sample impact of changes in natural and policy barriers on export supply. These simulations show that the contribution that trade liberalisation has made thus far to export growth is small, relative to what could be achieved by further liberalisation and/or lowering natural barriers. Indeed for non-traditional exports the elimination of natural barriers is predicted to induce a significantly larger export response than that resulting from import liberalisation.

The remainder of the paper is organised as follows. Section 2 reviews the characteristics of the trade policy regime in Malawi, providing some summary information on policy and natural barriers. Section 3 sets up the modelling framework, exploring how the relative price effects of these barriers can be represented within a 'true protection' theoretical framework and incorporated into the export supply function. Section 4 sets

out the empirical estimates of 'true' export taxation from policy and natural barriers. These true protection rates of exportables (alternatively viewed as internal real exchange rates) are introduced, alongside other factors, into export supply functions for Malawi in Section 5. The estimated functions for traditional and non-traditional exports are used to decompose the total export response to lowering 'true' export taxation into policy and natural barriers in Section 6. The conclusions and implications of the study are set out in Section 7.

2. TRADE BARRIERS AND REGIME CHANGES IN MALAWI

Malawi is a small landlocked economy in the southern African region that shares borders with Tanzania, Zambia and Mozambique. It is not natural resource abundant, but its major wealth-producing activities draw upon its relative abundance of low-skilled labour and agricultural land. As a result of this and relatively high transaction costs facing manufacturing activities, its exports have traditionally been dominated by particular agricultural products (tobacco, tea and sugar). Indeed the share of tobacco in total exports has tended to grow post-1970 (to over 65 per cent on average post-1987), with the share of manufactured exports declining over this same period from about 24 per cent to 17 per cent. The UK and US are significant markets for Malawi's exports, with South Africa and Zimbabwe still only receiving about one sixth of the country's exports.

Trade Regimes

Fig. 1 plots the average import tariff rates for the period 1970-1998.[1] Although capturing only tariff barriers the figure represents three distinct episodes for trade policy over this period; a relatively free trade regime (1970-79), a restrictive trade regime (1980-86) and a liberalising regime (1987-98). During 1970-79 there was limited intervention in the tradeable goods sector, with import tariffs used mainly for fiscal purposes and limited use of import licensing and foreign exchange licensing on selected competing consumer goods imports.[2] These conditions changed sharply after 1979 in response to crisis conditions, following a steady decline in export performance and the oil price shock.

1 Information of duty collected on imports rather than scheduled tariffs was used.

2 Like many other low-income developing countries, Malawi has a relatively high dependence on trade taxes

Further pressure on foreign exchange reserves was also exerted by the escalation of the civil war in Mozambique. Import tariffs were increased sharply and the coverage of quantitative import and foreign exchange controls increased substantially.

Fig. 2 plots the changes in the extent of non-tariff barriers to trade, using the black market premium as a proxy measure. It shows a sharp rise in the black market premium in particular after 1978, with a fall back to below 40 per cent after 1986. Tax reforms began in 1985, including tariff reduction and introduction of some export incentives (removal of export surcharges and reform of duty drawback arrangements), were complemented by the abolition of import licensing and quantitative restrictions in 1988 and with the substantial easing of foreign exchange controls. By the mid 1990s the average tariff was about 20 per cent and the black market premium was below 10 per cent.

Fig 1.

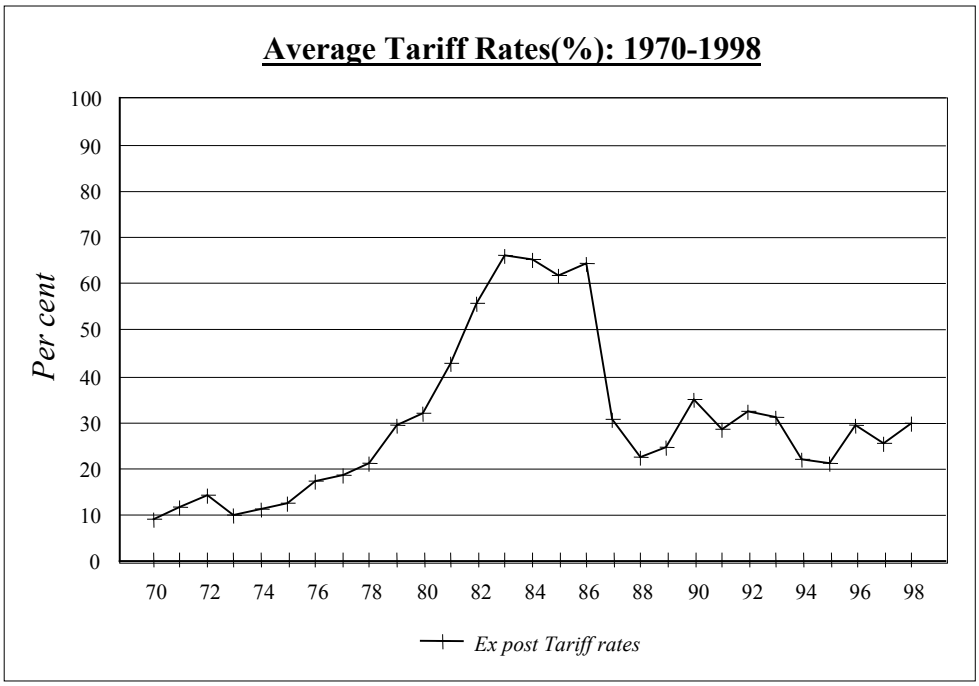
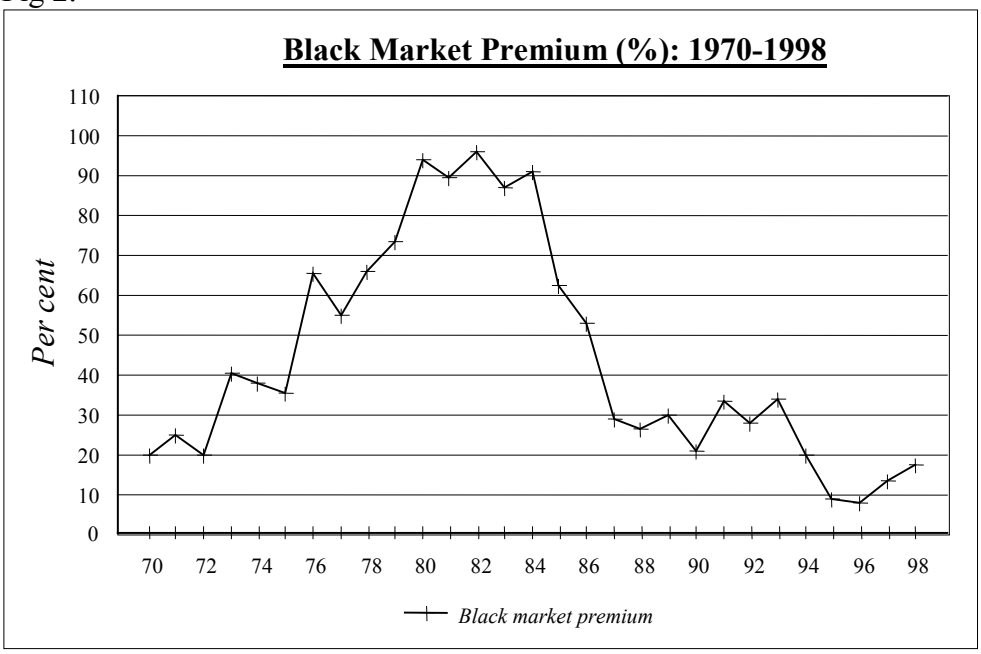


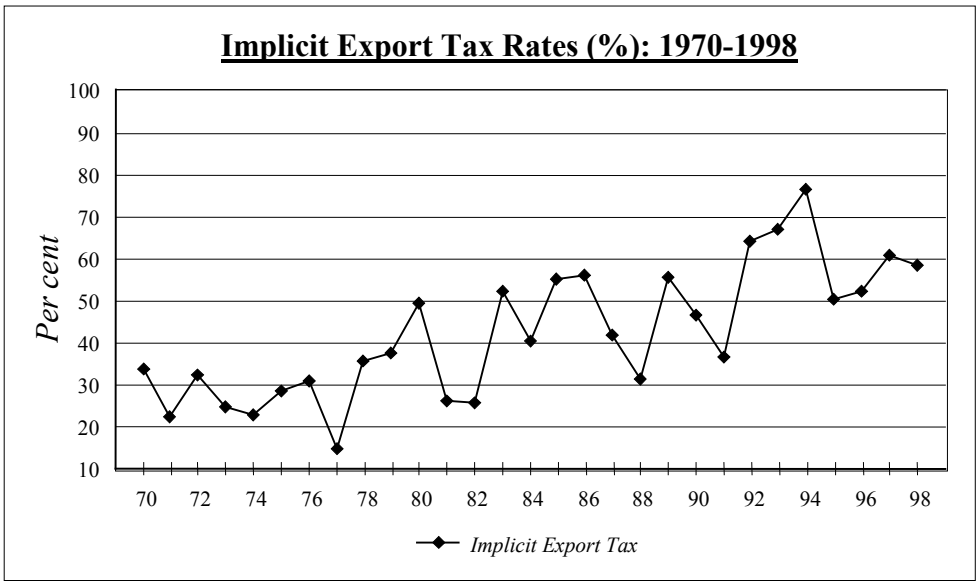
Fig 2.



Export Barriers

In addition to barriers against imports which serve as indirect disincentive to export, (implicit) direct taxation of exports has been used in Malawi either through periodic export surcharging or through the price-setting behaviour of the country's agricultural commodity marketing board (Harrigan, 1988; Kydd and Christiansen, 1982). We can capture this with the ratio of the difference between the world and domestic price relative to the world price. The average implicit export tax rate is shown for our period of analysis in Fig. 3. The rate has tended to rise over time, though with considerable fluctuation year-on-year.

Fig 3.



Natural Barriers

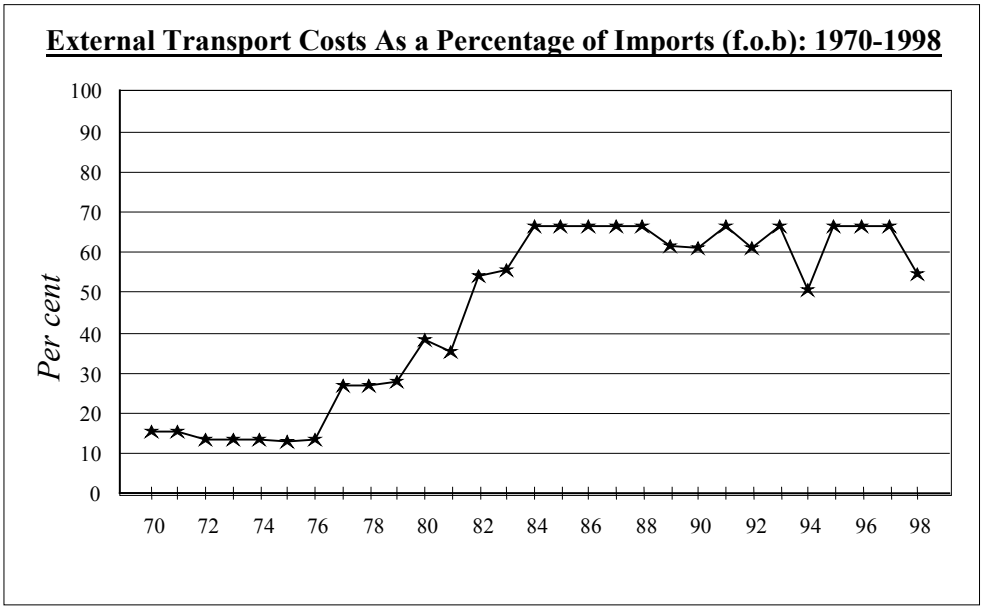
A further dimension of the barriers to trade that is often overlooked in policy-only focussed analyses is natural barriers[3]. It is particularly important not to do this in the case of a landlocked economy such as Malawi, with its limited and underdeveloped local freight capacity. When confronted by disruption of its traditional and shorter routes to the sea through Mozambique Malawi was forced to shift most of its international freight through South Africa, using road transport through Zambia and Zimbabwe (a distance of about 2,500 miles from its commercial centre of Blantyre)[4]. Not surprisingly the route diversion increased markedly the country's already substantial natural trade barriers. Fig. 4 plots the country's average international transport costs (freight and insurance costs as a percentage of the f.o.b. import value) over the time period. The normal barrier as a rate of tax from this source was about 15 per cent of the import value up to 1982. This jumped sharply after this, rising to over 60 per cent for the remainder of the period.

3 The terms 'natural' barrier is commonly used to capture the effects of factors such as geographical distance and location on international transaction costs. To the extent that it is such exogenous geographical factors involved the term is not misleading. To the extent, however, that it is endogenous factors such as the scale of international transactions or national policies affecting the competitiveness or efficiency of sectors such as international transport, then the term 'natural' may be misleading.

4 Rail transport through Tanzania was not used because of political differences, until the eventual complete closure of the Mozambique route. Dar es Salaam is however about 2,600 miles from Blantyre.

It is evident from this review of sources of trade 'taxation' in Malawi that concentration on import policy liberalisation as a means of stimulating export growth may lead to incorrect conclusions or inappropriate expectations. It is important that policy formulation is based on a full assessment of both trade policy and natural barrier sources of explicit and implicit export taxation.

Fig. 4.



3. MODELLING FRAMEWORK: EXPORT SUPPLY AND 'TRUE' EXPORT TAXATION

A standard export supply function is presented in terms of the foreign market price relative to alternative prices in the domestic market, and the economy's productive capacity to support export production. In formal terms the relationship is given as:

$$X_t = f\left(Reer_t, K_t, \mu_t\right) \tag{1}$$

where

X_t = real exports measured in period t;

K = the economy's productive capacity to produce exports;

Reer = real effective exchange rate defined as $E.P_{xw}/P_d$, sometimes referred to as a PPP real exchange rate; and

μ = error term.

An increase (decrease) of the *Reer* is interpreted as real exchange rate appreciation (depreciation).[5] Where exporters are price-takers in the world market, exchange rate depreciation leaves the foreign currency price of a unit of exports unchanged, but it provides incentives to expand export production as the number of domestic currency units increases.

The choice of the measure of productive capacity is contentious. Goldstein and Khan (1978, 1985), Bond (1985), Noland (1989), Fosu (1992), Senhadji and Montenegro (1999) use trend or secular output. The argument for this measure is that relative prices alone cannot fully explain the willingness and ability to supply exports. Beenstock *et al* (1994) argue that supplying the foreign markets is inversely related to increases in domestic demand pressures. Specifically, increasing domestic demand pressures for the export good makes it more profitable to supply the domestic market than the foreign markets. Among other notable studies, Muscatelli *et al* (1995) use the stock of fixed capital to capture the effects of increasing productive capacity and productivity on export supply for some Asian newly industrialised economies. While Haynes and Stone (1983) measure capacity utilisation as the deviation-from-trend income. Deviation-from-trend output has also been used by Bond (1985). Bayes *et al* (1995), Hossain *et al* (1997), and Ahmed (2000) measure capacity utilisation using trend output obtained from the predicted values of an estimated exponential growth function. Our choice for the present work was in fact data-constrained, and we take agricultural GDP as a proxy of capacity.

Most of the studies above have used "supply-quantity" models in which quantity is the dependent variable. The use of such "supply-quantity" equations has been questioned, however, and instead the "supply-price" equations in which price is the dependent variable is advocated (Horowitz, 1970; Goldstein and Khan, 1978; Haynes and Stone, 1983; and, Muscatelli *et al* 1995, among others). "Supply-price" models overcome any

5 This specification is the inverse measure of real effective exchange rate specified by the IMF(see *International Statistical Bulletin*). In above E = nominal exchange rate expressed in terms of units of domestic currency units per unit of foreign currency; P_{xw} = world ('world' proxied by Malawi's major trade partners) export price; P_d = domestic price proxied by a country's consumer price indices.

simultaneity bias as well the assumption that producers are price setters, at least in the short-run. The formulation starts with the specification of export supply and export demand models which are then solved simultaneously to express the price as dependent upon the quantity supplied and demanded. Specified in this way, it is argued that exporters set prices depending on the quantity that the market absorbs.

The assumption of 'price-setting' would be most applicable to the analysis of supply behaviour of major exporting countries or manufacturing firms with appreciable world export market control. In the context of a small open developing country, however, producers face an infinitely elastic demand for the export commodities in the world markets and are 'price-receivers'. Bond (1985) and Ahmed (2000) observe that in this context it is permissible to use a single equation export supply function.

Extended Model

We posit that besides external-domestic relative prices and capacity variables, export supply is also affected by internal relative prices or the level of true export taxation arising from policy and natural barriers to trade. Earlier studies have used similar policy-determined variables. For instance, Santos-Paulino (2000) uses estimates of export duties (as a measure of trade distortion) in the analysis of the implications of trade liberalisation for export demand. But this is a partial measure of the domestic relative incentive effect.

The extended function allows us to investigate explicit influences of *external-domestic relative price effects* and *internal relative price effects*. The latter are normally assumed constant in the standard export supply model. The external-domestic relative prices do not capture any anti-export biases (and anti-import biases) associated with internal relative price incentives (that is, inter-sectoral effects).[6]

Allowing for the above considerations, the extended export supply function can be expressed as:

6 In theoretical terms it is quite possible for a PPP-type real exchange rate (RER) and domestic relative price RER (i.e. true protection measure) to move in opposite directions (see for example Milner and McKay, 1996).

$$X_t = \delta_0 . IT_{Xt}^{\delta_1} . Reer_t^{\delta_2} . K_t^{\delta_3} . e^{\mu_t} \qquad \delta_1 < 0; \quad \delta_2 > 0; \quad \delta_3 > 0 \tag{2}$$

where IT_{Xt} is an index of the rate of 'true' taxation of exports ($\overset{*}{T}_{Xt}$), and the rest of the variables are as in (1).

Rewriting in logarithmic form we have:

$$\ln X_t = \ln \delta_0 + \delta_1 \ln IT_{Xt} + \delta_2 \ln Reer_t + \delta_3 \ln K_t + \mu_t \tag{3}$$

Taxation of Exports

The rate of true taxation of exports ($\overset{*}{T}_{Xt}$) is defined as the change in the domestic relative price (P) of exportables (relative to the endogenously determined price of non-tradeables) induced by trade policy and 'natural' barriers, namely:

$$\overset{*}{T}_{Xt} = \Delta\left(\frac{P_{Nt}}{P_{Xt}}\right) \tag{4}$$

where *X* denotes exportables, and *N* denotes non-tradeables. Rises in the relative price of non-tradeables increase true export taxation, and falls reduce the rate of taxation[7]. The traditional literature on true protection (Clements and Sjaastad, 1985; Greenaway and Milner, 1987) expresses true measures of protection as the inverse of eq 3 i.e. with P_N as the denominator.

Consider the small country case with perfect substitutability between traded and local goods, i.e. with full transmission of changes in the border prices of exports to locally consumed exportables (or similarly from import prices to locally produced import substitutes)[8]. The nominal, domestic price of exportables can be affected by explicit

7 The literature on true protection (see for example Milner, 1995) typically identifies the rate of 'true' export subsidy as)(P_X/P_N), with negative values identifying positive taxation.

8 The small country assumption is a reasonable one for Malawi. Perfect substitutability between traded and domestic goods, especially in the importables basket, is less credible. The empirical estimates of true protection allow therefore also for imperfect transmission.

sources of taxation (t_X^e) or implicit export taxation (t_X^i) from the policies of export marketing agencies or from international transactions, in particular transport costs (t_X^n) borne by domestic producers of exports. Thus, for convenience, setting initial relative prices equal to unity, the true rate of export taxation in the absence of any export subsidies can be written as:

$$T_{Xt}^{*} = \frac{\hat{P}_N + \Sigma_{Xt}}{1 - \Sigma_{Xt}} \tag{5}$$

where

$\Sigma_{Xt} = t_{Xt}^e + t_{Xt}^i + t_{Xt}^n$ denoting the sum of explicit and implicit taxation of exports; and,

$\hat{P}_N$ = proportionate endogenous adjustment of the price of non-tradeables to changes in trade policy and 'natural' barriers on all tradeable goods.

Assuming substitutability between tradeables and non-tradeables and requiring homogeneity we can express the proportionate change in the price of non-tradeables as follows:

$$\hat{P}_N = \omega \hat{P}_M + (1-\omega)\hat{P}_X \qquad 0 \le \omega \le 1 \tag{6}$$

where

ω is the index of substitutability between non-tradeables and importables;

$\hat{P}_X$ is the proportionate fall in the nominal price of exportables following changes in t_{Xt}^e, t_{Xt}^i and t_{Xt}^n;

$\hat{P}_M$ is the proportionate change in the nominal price of importables following explicit or implicit subsidisation of importables from tariff, t_{Mt}^e, non-tariff, t_{Mt}^i, and 'natural' barriers, t_{Mt}^n.

Whether $\hat{P}_N$ is positive or negative depends on the relative magnitudes of the sources of nominal import taxation (raising P_M), and of nominal export taxation (lowering P_X), and the value of the substitutability index. As $\left|\hat{P}_X\right|$ increases and ω falls then the possibility of P_N falling increases.

Substituting (6) into (5) and for $\hat{P}_M$ and $\hat{P}_X$ gives us a measure of the overall true rate of export taxation arising from explicit and implicit sources of policy taxation and subsidisation from 'natural' barriers, namely:

$$T^*_{Xt} = \frac{\omega\Sigma_{Mt} + (2-\omega)\Sigma_{Xt}}{1-\Sigma_{Xt}} \tag{7}$$

where $\Sigma_{Xt} = t^e_{Xt} + t^i_{Xt} + t^n_{Xt}$ and $\Sigma_{Mt} = t^e_{Mt} + t^i_{Mt} + t^n_{Mt}$

The rate of true export taxation depends therefore not only on the direct tax effects on the price of exportables (t_{Xt}), but also on the indirect effects of trade policy interventions on the price of non-tradeables (t_{Xt}, t_{Mt}) and on the domestic substitution relationships (ω). True taxation of exports increases if any t_{Xt} and t_{Mt} increase (if ω>0). Similarly for given t_{Xt} and t_{Mt}, the rate of true export taxation increases as ω increases.

4. MEASUREMENT OF TRUE EXPORT TAXATION

The measurement of true export taxation requires information on nominal rates of trade taxation, and estimates of the substitution index (ω).

Nominal Rates of Trade Taxation

Some information on the component elements of trade taxation in Malawi for the period 1970-1998 were described in Section 2. The detailed annual information and the sources of this information are given in Appendix 1. The overall rates of nominal trade taxation (subsidisation) of imports (importables and import-competing production) ($\sum_{Mt}$) and exportables ($\sum_{Xt}$) are reported in table 1, as period averages for periods corresponding with the trade regimes discussed in Section 2. The table reports estimates based on the

assumption of both full and partial price transmission from traded to local goods[9]. In both cases the rates of nominal importables subsidisation increases in the early periods, but falls significantly after 1986. Average nominal exportables taxation increases progressively from period to period, despite the fact that we are not incorporating (for data unavailability reasons) transport costs on the export side into our measure of nominal (implicit) export taxation. Given the measured increase in transport costs on imported goods, one might also expect that transport costs on exports would also be driven up by the disruption to transport discussed in section 2. In both sectors, however, the nominal rates were, as expected, lower for the partial transmission case.

Table 1: Percentage Rates of Nominal Subsidisation[1] and Taxation of Tradeable Goods in Malawi

	1970-79	1980-82	1983-86	1987-98
Nominal Subsidisation of Importables (Σ_{Mt}):				
a) Full price transmission	41	119	199	116
b) Partial price transmission[2]	33	97	163	95
Nominal Taxation of Exportables (Σ_{Xt}):				
a) Full price transmission	28	34	51	54
b) Partial price transmission[3]	22	27	40	42

1 Subsidisation of import-competing production arising out of border taxation of imports.
2 Partial transmission of increases in tax-inclusive price of imports to domestic prices of importables.
3 Partial transmission of reductions in price received for exports to domestic prices of locally-consumed exportables.

Given positive nominal taxation of exportables, combined with positive subsidisation of importables, one may anticipate higher 'true' than nominal taxation of exports. The divergence of 'true' from nominal rates will be fashioned, however, by the substitution index.

Index of Substitutability (ω)

Indices of substitutability between exportables (aggregate or traditional and non-traditional separately) and non-tradeables were estimated using times series data on

9 Time series information on the prices of imports and import-competing goods and on the prices of exports and locally-consumed exportables were used to estimate transmission coefficients. (Regression estimates are available from the authors). The short run coefficient estimates were 0.65 and 0.79 for importables and exportables, respectively, and 0.82 and 0.79 for corresponding long run transmission coefficients.

prices of categories of tradeable and non-tradeable goods[10]. Times series models of relative price change, augmented from income and trade balance effects, were estimated for annual data for the period 1970-99. (The estimates are available from the authors on request). The resulting estimates of the short and long run index (ω) using the alternative categorisation of exportables are reported in table 2.

Table 2: Empirical Index of Substitutability (ω)

Model with Relative Price of:	Short run (ω)	Long run (ω)
Aggregate Exportables	0.77	0.87
Traditional Exportables	0.79	0.92
Non-traditional Exportables	0.76	0.81

The results indicate relatively high substitutability between non-tradeables and importables, and as expected higher substitutability in the long-run. Also in line with the values found for other developing countries, the index is higher when traditional rather than non-traditional exportables are used in the regression model[11].

True Export Tax Rates

Applying the alternative measures of nominal protection and estimates of the incidence parameter to equation (7), we can derive a number of alternative estimates of true export taxation for Malawi. These are reported in table 3 for the same time periods or policy episodes discussed earlier. For each period short and long run measures are reported for exportables as a whole and separately for traditional and non-traditional exportables, both for the full and partial transmission cases.

10 The indirect method of inferring the substitutional relationship from revealed adjustment over time in the relative prices of non-tradeables (P_N/P_X) to changes in the relative price of tradeables (P_M/P_X) is commonly used in the true protection or incidence literature (see Greenaway and Milner, 1993).

11 Recall that substitutability between exportables (X) and non-tradeables (N) is given by ($1-T$). For a higher value of T, therefore, we are identifying a lower level of substitutability between X and N. Given greater factor specificity and greater concentration of activities often in traditional export sectors, we would expect low substitutability between traditional exportables and non-tradeables.

Table 3: Percentage Rates of True Export Taxation of Exports in Malawi

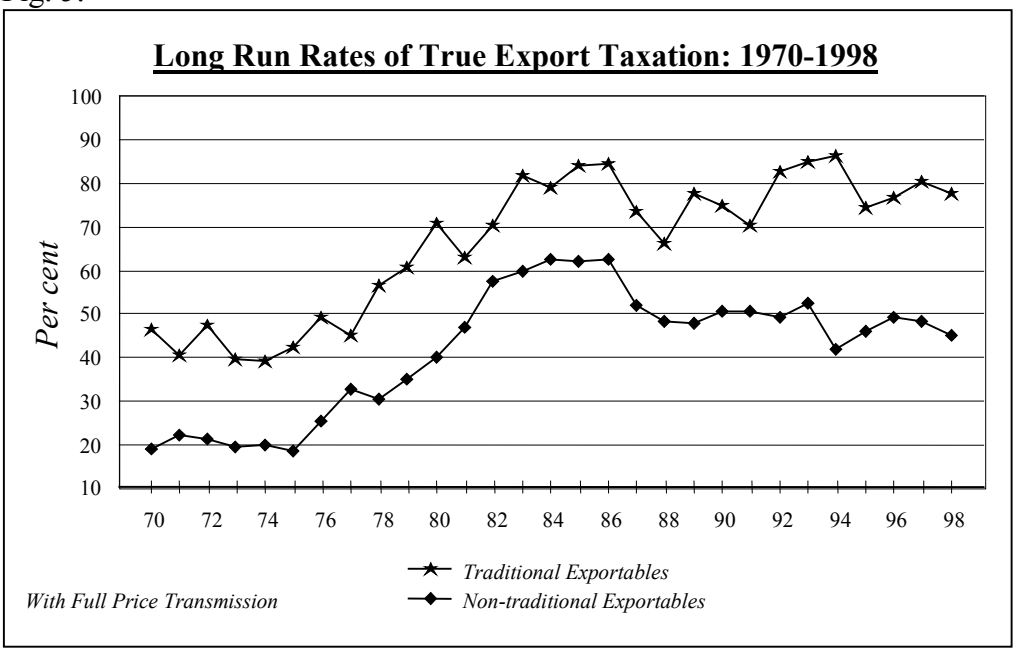
Alternative Estimates	1970-79	1980-82	1983-86	1987-98
Full Price Transmission:				
a) Short Run				
All Exportables	40	62	76	70
Traditional Exportables	43	68	80	74
Non-traditional Exportables	23	46	60	47
b) Long Run				
All Exportables	42	63	78	72
Traditional Exportables	47	68	83	77
Non-traditional Exportables	24	48	62	48
Partial Price Transmission:				
a) Short Run				
All Exportables	25	44	59	49
Traditional Exportables	25	45	60	49
Non-traditional Exportables	16	36	50	36
b) Long Run				
All Exportables	38	57	71	65
Traditional Exportables	40	61	76	69
Non-traditional Exportables	21	43	57	44

Firstly, it should be noted that positive true export taxation is consistently found for all measures and all time periods, with the highest values consistently found for the end of the restrictive trade policy episode (1983-6). Secondly, and as expected, true taxation rates are always higher for a particular category of measure for the full price transmission case than the partial transmission case, for the long run than the corresponding short run measure and for traditional rather than non-traditional exportables. Thirdly, we find that the long run rate of true export taxation is consistently higher than the corresponding nominal rate of export taxation (reported in table 1).

It is evident from Fig 5 that the movements in the true rates of taxation for traditional and non-traditional exportables are closely (positively) correlated. It is evident also that the increase in true taxation after 1978 was sharp and sustained. By contrast the easing

of taxation after 1986 is less marked and more gradual, with some evidence of reversal after 1993/4.

Fig. 5.



Before turning to investigating the impact of true export taxation on export supply, we can consider the relative importance of alternative sources of export taxation on the 'true' rate of taxation. In table 4 we show what the long-run true rates would be if a particular source of export taxation were eliminated. It is evident that by the period 1987-98 import trade barriers, especially QRs, were a relatively small source of export taxation; eliminating import tariffs lowers the true tax rate from 77 per cent to 71 per cent and eliminating QRs from 77 per cent to 76 per cent. By contrast eliminating implicit export taxes would substantially lower true taxation of traditional exports (77 per cent to 52 per cent), while eliminating even import transport costs on (the more intermediate import intensive) non-traditional export sector would lower true taxation from 48 per cent to 22 per cent.

Table 4: Impact of Eliminating Sources of Import and Export Taxation on Long Run Rate of True Taxation[4] (1987-98)

	Traditional Exports (%)	Non-traditional Exports (%)
Actual Rate	77	48

Hypothetical Rates with Removal of:		
Implicit Export Taxes	52	48
Import Tariffs (*t*)	71	36
Quantitative Import Restrictions	76	47
Import Transport Costs	64	22

[4] Corresponds to the full price transmission results in table 3.

Note that our estimates of true export taxation do not include any direct transport costs on exports for data reasons. Although indirect effects via transaction costs on imported intermediates are captured, it may well mean that we are underestimating the effects of transport costs on true export taxation.

5. ESTIMATION OF THE AUGMENTED EXPORT SUPPLY FUNCTION FOR MALAWI

The augmented export supply function (equation 3) was estimated using annual data for Malawi for the period 1974-1998. (Data definitions and sources for this stage of empirical work are set out in Appendix 2). We investigated first the time series properties of the data using augmented Dickey-Fuller unit root tests, and then used the Johansen-Juselius methodology to test for cointegration.

The unit root tests show (Appendix A.3) that the series are stationary in first differences, while the cointegration test statistics (table A3.2) allows us to conclude that there is a single cointegrating vector in which the right-hand side variables can be treated as weakly exogenous. On the basis of these results the export supply models may be estimated using a single equation methodology; the estimates being as efficient as those obtained by applying the Johansen approach. We apply the Engle-Granger two stage procedure. The long-run estimates of the elasticities of export supply with respect to the external relative prices, capacity of production and level of export taxation are obtained by means of recursive least squares (*RLS*) estimation (which is useful for the study of parameter constancy) of eq. (3) for both traditional and non-traditional exports. The elasticities are reported in table 5.

Table 5: Static Long Run Export Supply Model

Variables	Traditional Export Supply *Dependent Variable is* lnX_T	Non-traditional Export Supply *Dependent Variable is* lnX_N
Constant	0.01 (1.95)	1.78 (3.53)
$\ln IT_{TX,t}$	-0.65 (0.17)***	
$\ln IT_{NX,t}$		-0.54 (0.14)***
Ln*Reer*	0.70 (0.34)**	0.85 (0.40)**
$\ln K_t$	1.22 (0.24)***	1.02 (0.35)***
R^2	0.92	0.90
Wald Π^2	311.50 [0.00]***	140.6 [0.00]***
AR	2.00 [0.16]	0.93 [0.41]
ARCH	0.01 [0.92]	3.39 [0.08]
Normality	2.73 [0.26]	1.83 [0.21]
X_i^2	0.65 [0.69]	1.66 [0.22]
X_iX_j	0.40 [0.92]	1.59 [0.32]
RESET	0.10 [0.76]	3.42 [0.09]
Sample	29	25

Note: *Reer* = real effective exchange rate as a proxy of external relative prices, IT_{jXt} = index of the true export taxation of traditional exports (*T*) and non-traditional exports (*N*), *K* =production capacity proxied by real index of agriculture output; ** and *** denote statistical significance at 5 and 1 percent, respectively; values in (•) are standard errors, those in [•] are *p*-values.

The diagnostic tests from the static long-run model show statistically significant *Wald* Π^2, high proportions of explained variation (R^2), insignificant *AR F*-tests confirming the absence of serial autocorrelation of the residuals, insignificant *RESET* statistics showing that the models are well specified. Long run parameter constancy is indicated in both cases, with the estimated parameters lying within the 1-step residuals ± 2 s(e) bands. Insignificant Chow-test statistics from the estimations of 1.21 (*p*-value of [0.48]) for the traditional export supply model; and 1.53 [0.43] for the non-traditional exports model, respectively, confirm the parameter constancy.

The elasticity of export supply with respect to the various variables have expected signs, that is, positive signs on relative prices and production capacity, and a negative sign on the true export taxation variable in all export supply models. The elasticities of export supply with respect to true export taxation are statistically significant, with a 1 per cent increase in the true export taxation rate decreasing the volume of traditional exports supplied by 0.65 per cent and non-traditionals by 0.54.

The coefficients on external relative prices or the real effective exchange rate are statistically significant suggesting that in the long-run export producers benefit from the depreciation of the real effective exchange rate. The price elasticity for traditional exports of 0.7 is lower than that for non-traditional exports of 0.85. This supports the usual view that non-traditional exports (manufactures) are generally more responsive to relative prices than traditional exports. Although the above elasticities are less than unity, they are somewhat higher than those found in other studies. For instance, other studies have reported long-run price elasticities ranging between 0.42 and 0.78 (Reca, 1980), between 0.6 and 1.00 (Pandey *et al* 1982), between 0.4 and 0.5 (Chhibber, 1989), and between 0.11 and 0.54 (Bond, 1985).

An error correction mechanism (ECM) from the equilibrium model was used to model the short run dynamics. ADF test statistics confirm that the ECM is integrated of order $I(0)$, that is, the residuals are stationary. This in turn confirms the presence of cointegration in the long-run relationships generating the residuals. Thus, the ECM possesses long-run information and applying these together with the first-difference series we can generate further useful information relating to the speed of adjustment to equilibrium.

The short run or dynamic model estimates are reported in table 6. The models pass the usual diagnostic tests. The proportions of explained variation are reasonably high (nearly 70 per cent), the F statistics allow us to reject the hypothesis that all the parameters are zero, and the test statistics for serial correlation in the residuals, autoregressive conditional heteroscedasticity, and model misspecification allow us to reject the respective null hypotheses.

Table 6: Short Run (Dynamic) Export Supply Models

Variables	Traditional Export Supply	Non-traditional Export Supply
ECM_{t-1}	-0.53 (0.17)***	-0.92 (0.19)***
$\Delta \ln IT_{TX,t-1}$	-0.57 (0.22)***	
$\Delta \ln IT_{NX,t}$		-0.46 (0.17)***
$\Delta \ln K_{t-1}$	0.96 (0.35)**	0.92 (0.47)**
$\Delta \ln Reer$		0.75 (0.31)***
$\Delta \ln Reer_{t-1}$	0.53 (0.25)**	
R^2	0.68	0.69
AR	0.86 [0.54]	1.24 [0.41]
ARCH	0.30 [0.58]	0.01 [0.96]
Normality	0.71 [0.70]	2.42 [0.30]
X_i^2	0.65 [0.73]	0.20 [0.98]
X_iX_j	0.58 [0.82]	0.22 [0.99]
RESET	0.91 [0.35]	1.40 [0.25]
Sample	26	25

Note: *Reer* = real effective exchange rate as a proxy of external relative prices, IT_{jXt} = index of the true export taxation of traditional exports (*T*) and non-traditional exports (*N*), *K* =production capacity proxied by real index of agriculture output; ** and *** denote statistical significance at 5 and 1 percent, respectively; values in (•) are standard errors, those in [•] are *p*-values.

The estimated coefficients are qualitatively similar to those in table 5, and again are consistent with the hypothesised relationships. As one might expect short run elasticities are lower than the corresponding long run values, export supply responding less in the short term to given changes in export taxation, the real exchange rate and productive capacity. Note also that the coefficient on the error correction term (ECM) is higher in the case of non-traditional exports. One would expect non-traditional exports to adjust more quickly to equilibrium, with about 90 per cent adjustment within one year compared to the less than 60 per cent adjustment in the case of traditional exports.

6. EXPORT SUPPLY RESPONSE TO LOWERING TRADE COSTS

Armed with estimated export supply functions and information about the relative importance of trade policy and other sources of export taxation, we can explore or illustrate the in- and out- of sample period export supply responses of 'assumed' changes in alternative elements of trade costs (for convenience adopting a 'holding other things constant' methodology).

Common percentage reductions in trade costs (in-sample)

The first experiment is to illustrate in turn the export response for the in-sample period for a 10% reduction only in each source of true export taxation (import tariffs, non-tariff import barriers, implicit export taxes and natural barriers). We use the coefficient on the index of true export taxation from the estimated long run supply models (table 5), holding the other variables constant. The results for this simulation are reported in table 7, part a) for traditional exports and part b) for non-traditional exports. Note that a common percentage reduction implies differential absolute reductions in the particular element of trade costs, given the magnitude of each element at each point in time. The 'simulated' percentage changes in export supply are reported for the policy episodes discussed earlier in the paper.

By considering a common reduction we are able to indicate where greater marginal effort might have been placed by the government of Malawi (and the multilateral agencies) in order to increase export supply. Clearly in the case of traditional exports the largest simulated increases in export supply arise from a given lowering in implicit export taxation, while for non-traditionals it is natural barrier reductions which exert the greater leverage. Note also that the export supply response to import tariff liberalisation does not exceed that of the reduction of natural barriers in any of the sub-periods. Of course this does not mean that one can advocate one form of trade cost reduction over another, given that there may be differential implementation costs and differential welfare and other costs and benefits associated with the lowering of each source of trade cost. Indeed one may well wish to use all forms of trade cost reduction to promote exports. One should note from table 7 that the simultaneous reduction of all trade costs produces a greater reduction in true taxation and increase in export supply than is evident from the simple addition of each of the component reductions. This arises because policy and natural barriers in this institutional setting have multiplicative effects on total trade costs.

Table 7 Hypothetical Export Responses to 10% Reductions in Alternative Trade Costs

a) Traditional Exports

	Percentage increase with reduction in:				
	Import tariffs only	NTB's only	Natural Barriers only	Export Taxes only	All Trade Costs
1970-79	0.9	0.2	1.1	2.9	5.3
1980-82	0.9	0.2	0.9	1.6	3.8
1983-86	0.5	0.1	0.5	1.4	2.8
1987-98	0.4	0.1	0.8	2.2	3.7

b) Non-Traditional Exports

	Percentage increase with reduction in:				
	Import tariffs only	NTB's only	Natural Barriers only	Export Taxes only	All Trade Costs
1970-79	1.9	0.4	2.2	0.0	4.6
1980-82	1.5	0.3	1.6	0.0	3.5
1983-86	1.1	0.3	1.1	0.0	2.7
1987-98	1.1	0.2	2.0	0.0	3.4

An alternative way of illustrating the relative importance of alternative sources of trade costs is to consider the following thought experiment: what would have happened to export supply if each of the policy sources of trade costs had been eliminated after the start of the liberalisation period in 1987 (assuming everything else constant), and how would this have matched up to a 75% reduction in 'natural' barriers.

The elimination of implicit export taxes would (hypothetically) have generated a 26% increase in traditional export supply, compared with a 5% increase from the elimination of import tariffs and an 8% increase associated with the partial removal of natural barriers. For non-traditional exports the important (hypothetical) export supply responses are associated with import tariff elimination (about a 15% increase) and natural barrier reduction (24% increase approximately). The story is clear, even for our incomplete capturing of natural barriers it is evident that for a landlocked country, like Malawi, natural barriers have been overall a more important constraint on export supply than border import taxes.

Out of sample simulations

Finally, we consider the 'predicted' out-of sample impact of the actual changes in trade costs that occurred between 1998 and 2001 on export supply (again holding other things constant). These are reported in table 8, which also records the changes in the nominal rates of each source of trade cost. The predicted percentage change in export supply is shown for each trade cost component separately, and for the combined or overall change in trade costs. The changes in import policy barriers were more modest than for natural barriers and export taxation, and as a result it is the change in the latter (58.5% to 19.8%) which is predicted to have to greatest impact on traditional export supply (+24%) and the fall in natural barriers (54.6% to 11.2%) which impacts most on non-traditional export supply (+25%). Overall there was a large decline in nominal trade costs and in true export taxation rates, which 'should' have brought about large increases in export supply; over 55% for traditionals and over 45% for non-traditionals.

Table 8 'Predicted' Out-of-Sample Export Supply Effects of Actual Changes in Trade Costs (1998-2001)

	Percentage Changes in:	
	Traditional Exports	Non-Traditional Exports
From:		
Fall in import tariffs (29.8% to 11.1%)	5.2	14.0
Increase in NTBS (0.9% to 1.8&+%)	-1.0	-2.3
Fall in natural barriers (54.6% to 11.2%)	8.5	25.2
Fall in export taxation (58.5% to 19.8%)	24.3	0.0
All trade costs	55.5	45.5

6. CONCLUSIONS

This paper has integrated policy-induced and other trade costs into a single framework, in order to examine both the relative importance of policy and natural sources of true export taxation and the impact of both sources of export taxation on relative incentives domestically to supply (traditional and non-traditional) exports. It has applied the framework to Malawi over the period 1970-98; a period over which this landlocked, developing country in Africa has experienced marked changes in both its trade policy

regime and in the nature of trade costs associated with transporting goods in and out of the country. The evidence shows that, for non-traditional exports in particular, international transport costs have been a major source of true export taxation, and that the export supply response is sensitive to trade cost-induced changes in true export taxation. It is clearly important in economies like Malawi to seek to increase the effectiveness of trade policy reform through the adoption of complementary measures to reduce other trade costs. It is also evident that it is important that both internal and external real exchange rate effects are incorporated into export supply functions, in particular where policy and other trade costs cause marked variations between movements in the relative internal and external prices of tradeable goods.

REFERENCES

Ahmed, N. (2000) "Export Response to Trade Liberalisation in Bangladesh: A Cointegration Analysis", *Applied Economics*, Vol.32, No.8, pp.1077-1084 (8).

Amjadi, A. and Yeats, A.J. (1996) "Have Transport Costs Contributed to the Relative Decline of African Exports?" *Working Paper*, World Bank: Washington.

Bayes, A., Hossain, M.I. and Rahman (1995) 'Trends in the External Sector: Trade and Aid' in R. Sobhan (ed), *Experiences with Economic Reform: A Review of Bangladesh's Development (1995)*, (Dhaka, University Press).

Beenstock, M, Lavi, Y. and Ribon, S. (1994) "The Supply and Demand for Exports in Israel", *Journal of Development Economics*, 44, 333-350.

Bond, M.E. (1985) "Export Demand and Supply for Groups of Non-Oil Developing Countries", *IMF Staff Paper*, 32, (March), 56-77.

Chhibber, A. (1989) "The Aggregate Supply Response: A Survey", in S. Commander (Ed), *Structural Adjustment and Agriculture*, (London: ODI).

Clements, K.W. and Sjaastad, L.A. (1985) *How Protection Taxes Exporters*, Thames Essay, 39, (London: Trade Policy Research Centre).

Collier, P. (1997) "Ugandan Trade Policy: Liberalisation in an Environment of Limited Credibility", *World Economy*, 20, 649-65.

Dickey, D.A. and Fuller, W.A. (1979) "Distribution of the Estimators for Autoregressive Time Series with a Unit Root," *Journal of the American Statistical Association*, 74, 427-31.

Fosu, K.Y. (1992) "The Real Exchange Rate and Ghana's Agricultural Exports", *African Economic Research Consortium Research Paper*, No. 10, Zakuna Printers Limited, Nairobi, Kenya.

Goldstein, M. and Khan, M.S. (1978) "The Supply and Demand for Exports: A Simultaneous Approach", *The Review of Economics and Statistics*, 59, 275-286.

Goldstein, M. and Khan, M.S. (1985) "Income and Price Effects in Foreign Trade", in R.W. Jones and P.B. Kenen (eds), *Handbook of International Economics*, 2, 1041-1099.

Greenaway, D. and Milner, C.R. (1987) 'True Protection Concepts and Their Role in Evaluating Trade Policies in LDCs', *Journal of Development Studies*, 23, 200-219.

Greenaway, D. and Milner, C.R. (1993) *Trade and Industrial Policy in Developing Countries*, (London: Macmillan).

Harrigan, J. (1988) "Malawi: The Impact of Pricing Policy on Smallholder Agriculture: 1971-1988", *Development Policy Review*, 6, 415-433.

Haynes, S.E. and Stone, J.A. (1983) "Specification of Supply Behaviour in International Trade", *The Review of Economics and Statistics*, 65, No.4, 626-632.

Hossian, M.I., Rahman, M.A. and Rahman, M. (1997) "Current External Sector Performance and Emerging Issues in Growth or Stagnation?" in R. Sobhan (ed), *A Review of Bangladesh's Development (1996)* (Dhaka, University Press).

International Monetary Fund, *International Financial Statistics Quarterly Bulletin*, (various issues), Washington D.C.

International Monetary Fund, *International Financial Statistics Yearbook*, (various issues), Washington D.C.

Johansen, S. (1988) "Statistical Analysis of Cointegration Vectors", *Journal of Economic Dynamics and Control*, 12, 231-254.

Kydd, J. and Christiansen, R. (1982) "Structural Change in Malawi Since Independence: Consequences of a Development Strategy Based on Large-scale Agriculture", *World Development*, 10, 5, 347-369.

Malawi Government, (1970-1999a) *Economic Report*, Department of Economic Planning and Development, (Zomba: Government Printer).

Malawi Government, (1970-1999b) *Monthly Statistical Bulletin*, National Statistical Office, (Zomba: Government Printer).

Malawi Government, (1970-1999c) *Statement of External Trade*, National Statistical Office, (Zomba: Government Printer).

Milner, C.R. (1995) "Relative Incentives and Trade Strategies: Typologies and Possibilities", *Economic Record*, 71, 230-39.

Milner, C.R. (1997) "On Natural and Policy-Induced Sources of Protection and Trade Regime Bias", *Weltwirtschaftliches Archiv*, 132, pp.740-52.

Milner, C.R. and A. McKay (1996) "Real Exchange Rate Measures of Trade Liberalisation: Some Evidence for Mauritius", *Journal of African Economies*, 5, No.1, 69-91.

Milner, C.R., Morrissey, W.O. and Rudaheranwa, N. (2000) "Policy and Non-policy Barriers to Trade and Implicit Taxation of Exports in Uganda", *Journal of Development Studies*, 37, 67-90.

Muscatelli, V.A., Stevenson, A.A and Montagna, C. (1995) "Modelling Aggregate Manufactured Exports for Some Asian Newly Industrialized Economies", *The Review of Economics and Statistics*, 77, No.1, 147-155.

Noland, M. (1989) "Japanese Trade Elasticities and the J-Curve", *The Review of Economics and Statistics*, 71, No.1, 175-179.

Pandey, S., Pigott, R. and McAuley, T. (1982) "The Elasticity of Aggregate Australian Supply: Estimates and Policy Implications", *Australian Journal of Agricultural Economics*, Vol.26, No.3, pp.202-219.

Reca, L. (1980) "Argentina: Country-Case Study of Agricultural Prices and Subsidies", *World Bank Staff Working Paper*, No. 386, Washington D.C..

Rodrik, D. (1999) *The New Global Economy and Developing Countries: Making Openness Work*, Overseas Development Council, Washington.

Santos-Paulino, A. (2000) 'Trade Liberalisation and Export Performance in Selected Developing Countries', Department of Economics Research Paper, University of Kent.

Senhadji, A.S. and Montenegro, C.E. (1999) "Time Series Analysis of Export Demand Equations: A Cross-country Analysis", *IMF Staff Papers*, 46, No. 3, 259-73.

World Bank, (2000) *African Development Indicators 2000*, (Washington D.C: The World Bank).

APPENDIX 1: Nominal Rate of Trade Taxation and Sources of Information

The values for the rates of taxation - explicit (t^e), implicit (t^i) and 'natural' (t^n) for exportables (X) and importables (M) to estimate eq. (7) in the text for each year over the period 1970-98 were based on the definitions and taken from the sources below:

t_M^e = nominal tariff rate. Sources: *Statement of External Trade* (Malawi Government, 1970-1999c); *International Financial Statistics* (IMF, various issues).

t_M^i = nominal tariff equivalent rate. Source: *African Development Indicators* (World Bank, various issues).

t_M^n = nominal rate of import protection due to natural barriers proxied by unit import external transport costs. Sources: *Statement of External Trade* (Malawi Government, 1970-1999c); *International Financial Statistics* (IMF, various issues).

t_X^e = nominal export tax rate.

t_X^i = implicit export tax rate (the ratio of the difference between the world and domestic price relative to the world price of relevant commodities). Source: *Financial and Economic Review* (Reserve Bank of Malawi, 1970-1999), and *International Financial Statistics* (IMF, various).

The annual values for each of the taxes were as follows:

Year	t_M^e	t_M^i	t_M^n	$t_M^e \times t_M^n$	Σ_M	$\Sigma_X = t_X^i$
1970	9.5	2.2	15.6	1.5	28.8	33.7
1971	11.7	5.9	15.6	1.8	35.0	22.3
1972	14.4	3.4	13.8	2.0	33.6	32.3
1973	10.0	4.1	13.8	1.4	29.2	24.7
1974	11.3	4.5	13.5	1.5	30.8	22.9
1975	12.7	0.0	13.2	1.7	27.6	28.9
1976	17.5	8.0	13.5	2.4	41.3	30.9
1977	18.9	9.3	27.0	5.1	60.3	15.2
1978	21.5	0.0	27.0	5.8	54.3	35.8
1979	29.6	0.0	28.2	8.3	66.1	37.8
1980	32.1	0.0	38.3	12.3	82.7	49.8
1981	42.7	15.3	35.4	15.1	108.5	26.5
1982	55.9	25.1	54.0	30.1	165.1	25.8
1983	66.1	24.4	55.9	37.0	183.4	52.6
1984	65.2	32.2	66.7	43.5	207.6	40.4
1985	61.7	30.8	66.7	41.1	200.2	55.3
1986	64.2	30.5	66.7	42.8	204.2	56.2
1987	30.7	14.8	66.7	20.4	132.6	41.9
1988	22.6	10.2	66.7	15.0	114.5	31.7
1989	24.8	11.4	61.4	15.2	112.9	55.7
1990	35.1	8.3	61.3	21.5	126.3	46.8
1991	28.5	12.4	66.7	19.0	126.5	36.6
1992	32.7	6.4	61.3	20.0	120.4	64.2
1993	31.3	16.1	66.7	20.9	134.9	66.9
1994	22.2	3.9	50.9	11.3	88.3	76.3
1995	21.5	3.4	66.7	14.3	105.9	50.7
1996	29.5	3.8	66.7	19.7	119.7	52.2
1997	25.6	5.2	66.7	17.1	114.5	61.1
1998	29.8	0.0	54.6	16.3	100.7	58.5
1999	13.9	3.2	17.7	2.4	37.1	40.1
2000	14.5	2.6	17.7	2.6	37.3	36.5
2001	11.1	1.8	11.2	1.2	25.3	19.8

APPENDIX 2: Variable Definitions and Data Sources from the Export Supply Function

X_t = real exports in period t, proxied by export volume indexes (1980=100) of traditional (agricultural) exports and non-traditional (semi-processed primary and manufactures) exports. The sources of data are Malawi Government (1970-1999a), Malawi Government (1970-1999b), and Reserve Bank of Malawi (1970-1999).

IT_X = index of true taxation of exports.

Reer = real effective exchange rate index (1980=100) defined as $E.P_{xw}/P_d$, that is, domestic-international relative price (sometimes referred to as a PPP real exchange rate). Source: *International Financial Statistics Yearbook* and *International Financial Statistics Yearbook* (IMF, various issues).

K = the economy's productive capacity to produce exports proxied by a real index of agricultural gross domestic output (1980=100). The sources of data are Malawi Government (1970-1999a), Malawi Government (1970-1999b), and Reserve Bank of Malawi (1970-1999).

APPENDIX 3: Unit Root and Cointegration Test Results

a) Unit Root Test Results

Table A.3.1: Unit Root Tests (Export Supply Models)

Unit-root tests	Variables	ADF ϑ	Lags	Inference
Sample: 1974 to 1998;	$\ln X_{TX}$	-0.57529	2	Non-stationary
Critical values:	$\ln X_{NX}$	-1.2303	2	Non-stationary
5%=-2.98;	$\ln K$	-0.30748	2	Non-stationary
1%=-3.708;	$\ln Reer$	0.24639	2	Non-stationary
Trend and Constant included	$\ln IT_{TX}$	-1.2548	2	Non-stationary
	$\ln IT_{NX}$	-0.9520	2	Non-stationary
Sample: 1973 to 1998;	$\Delta\ln X_{TX}$	-5.5120***	1	$I(1)$: stationary
Critical values:	$\Delta\ln X_{NX}$	-4.0716***	1	$I(1)$: stationary
5%=-1.955;	$\Delta\ln K$	-2.6808***	1	$I(1)$: stationary
1%=-2.656	$\Delta\ln Reer$	-4.4055***	1	$I(1)$: stationary
No deterministic variables	$\Delta\ln IT_{TX}$	-2.7226***	1	$I(1)$: stationary
	$\Delta\ln IT_{NX}$	-2.8041***	1	$I(1)$: stationary

Note: *** denotes significance at 1 percent.

b) Cointegration Test Results

Table A.3.2: Testing for Reduced Rank in the Export Supply Systems

System		Trace Likelihood Ratio Test		Maximal Likelihood Ratio Test	
Traditional Exports	Ho:rank=p		95%		95%
Model	$p = 0$	23.9**	21.0	30.0**	29.7
=f(ln*Reer*, lnIT_{TX},ln*K*)	$p \leq 1$	5.8	14.1	5.9	15.4
	$p \leq 2$	0.1	3.8	0.1	3.8
Non-traditional Exports					
Model	$p = 0$	36.3***	27.1	68.2***	47.2
=f(ln*Reer*, lnIT_{NX},ln*K*)	$p \leq 1$	20.5	21.0	27.8	29.7
	$p \leq 2$	8.9	14.1	11.4	15.4
	$p \leq 3$	2.5	3.8	2.5	3.8

Note: ** and *** denote significance at 5 and 1 percent levels.

CREDIT PAPERS

01/01 **Tim Lloyd, Oliver Morrissey and Robert Osei,** "Aid, Exports and Growth in Ghana"

01/02 **Christophe Muller,** "Relative Poverty from the Perspective of Social Class: Evidence from The Netherlands"

01/03 **Stephen Knowles,** "Inequality and Economic Growth: The Empirical Relationship Reconsidered in the Light of Comparable Data"

01/04 **A. Cuadros, V. Orts and M.T. Alguacil,** "Openness and Growth: Re-Examining Foreign Direct Investment and Output Linkages in Latin America"

01/05 **Harold Alderman, Simon Appleton, Lawrence Haddad, Lina Song and Yisehac Yohannes, "**Reducing Child Malnutrition: How Far Does Income Growth Take Us?"

01/06 **Robert Lensink and Oliver Morrissey,** "Foreign Direct Investment: Flows, Volatility and Growth"

01/07 **Adam Blake, Andrew McKay and Oliver Morrissey,** "The Impact on Uganda of Agricultural Trade Liberalisation"

01/08 **R. Quentin Grafton, Stephen Knowles and P. Dorian Owen,** "Social Divergence and Economic Performance"

01/09 **David Byrne and Eric Strobl,** "Defining Unemployment in Developing Countries: The Case of Trinidad and Tobago"

01/10 **Holger Görg and Eric Strobl,** "The Incidence of Visible Underemployment: Evidence for Trinidad and Tobago"

01/11 **Abbi Mamo Kedir,** "Some Issues in Using Unit Values as Prices in the Estimation of Own-Price Elasticities: Evidence from Urban Ethiopia"

01/12 **Eric Strobl and Frank Walsh,** "Minimum Wages and Compliance: The Case of Trinidad and Tobago"

01/13 **Mark McGillivray and Oliver Morrissey,** "A Review of Evidence on the Fiscal Effects of Aid"

01/14 **Tim Lloyd, Oliver Morrissey and Robert Osei,** "Problems with Pooling in Panel Data Analysis for Developing Countries: The Case of Aid and Trade Relationships"

01/15 **Oliver Morrissey,** "Pro-Poor Conditionality for Aid and Debt Relief in East Africa"

01/16 **Zdenek Drabek and Sam Laird,** "Can Trade Policy help Mobilize Financial Resources for Economic Development?"

01/17 **Michael Bleaney and Lisenda Lisenda,** "Monetary Policy After Financial Liberalisation: A Central Bank Reaction Function for Botswana"

01/18 **Holger Görg and Eric Strobl,** "Relative Wages, Openness and Skill-Biased Technological Change in Ghana"

01/19 **Dirk Willem te Velde and Oliver Morrissey,** "Foreign Ownership and Wages: Evidence from Five African Countries"

01/20 **Suleiman Abrar,** "Duality, Choice of Functional Form and Peasant Supply Response in Ethiopia"

01/21 **John Rand and Finn Tarp,** "Business Cycles in Developing Countries: Are They Different?"

01/22 **Simon Appleton,** "Education, Incomes and Poverty in Uganda in the 1990s"

02/01 **Eric Strobl and Robert Thornton,** "Do Large Employers Pay More in Developing Countries? The Case of Five African Countries"

02/02 **Mark McGillivray and J. Ram Pillarisetti,** "International Inequality in Human Development, Real Income and Gender-related Development"

02/03 **Sourafel Girma and Abbi M. Kedir, "**When Does Food Stop Being a Luxury? Evidence from Quadratic Engel Curves with Measurement Error"

02/04 **Indraneel Dasgupta and Ravi Kanbur,** "Class, Community, Inequality"

02/05 **Karuna Gomanee, Sourafel Girma and Oliver Morrissey,** "Aid and Growth in Sub-Saharan Africa: Accounting for Transmission Mechanisms"

02/06 **Michael Bleaney and Marco Gunderman, "**Stabilisations, Crises and the "Exit" Problem – A Theoretical Model"

02/07 **Eric Strobl and Frank Walsh,** "Getting It Right: Employment Subsidy or Minimum Wage? Evidence from Trinidad and Tobago"

02/08 **Carl-Johan Dalgaard, Henrik Hansen and Finn Tarp,** "On the Empirics of Foreign Aid and Growth"

02/09 **Teresa Alguacil, Ana Cuadros and Vincente Orts,** "Does Saving Really Matter for Growth? Mexico (1970-2000)"

02/10 **Simon Feeny and Mark McGillivray,** "Modelling Inter-temporal Aid Allocation"

02/11 **Mark McGillivray,** "Aid, Economic Reform and Public Sector Fiscal Behaviour in Developing Countries"

02/12 **Indraneel Dasgupta and Ravi Kanbur,** "How Workers Get Poor *Because* Capitalists Get Rich: A General Equilibrium Model of Labor Supply, Community, and the Class Distribution of Income"

02/13 **Lucian Cernat, Sam Laird and Alessandro Turrini,** "How Important are Market Access Issues for Developing Countries in the Doha Agenda?"

02/14 **Ravi Kanbur,** "Education, Empowerment and Gender Inequalities"

02/15 **Eric Strobl,** "Is Education Used as a Signaling Device for Productivity in Developing Countries?"

02/16 **Suleiman Abrar, Oliver Morrissey and Tony Rayner,** "Supply Response of Peasant Farmers in Ethiopia"

02/17 **Stephen Knowles,** "Does Social Capital Affect Foreign Aid Allocations?"

02/18 **Dirk Willem te Velde and Oliver Morrissey,** "Spatial Inequality for Manufacturing Wages in Five African Countries"

02/19 **Jennifer Mbabazi, Oliver Morrissey and Chris Milner,** "The Fragility of the Evidence on Inequality, Trade Liberalisation, Growth and Poverty"

02/20 **Robert Osei, Oliver Morrissey and Robert Lensink,** "The Volatility of Capital Inflows: Measures and Trends for Developing Countries"

02/21 **Miyuki Shibata and Oliver Morrissey,** "Private Capital Inflows and Macroeconomic Stability in Sub-Saharan African Countries"

02/22 **L. Alan Winters, Neil McCulloch and Andrew McKay,** "Trade Liberalisation and Poverty: The Empirical Evidence"

02/23 **Oliver Morrissey,** "British Aid Policy Since 1997: Is DFID the Standard Bearer for Donors?"

02/24 **Öner Günçavdi, Suat Küçükçifçi and Andrew McKay**, "Adjustment, Stabilisation and the Analysis of the Employment Structure in Turkey: An Input-Output Approach"

02/25 **Christophe Muller,** "Censored Quantile Regressions of Chronic and Transient Seasonal Poverty in Rwanda"

02/26 **Henrik Hansen,** "The Impact of Aid and External Debt on Growth and Investment"

02/27 **Andrew McKay and David Lawson,** "Chronic Poverty in Developing and Transition Countries: Concepts and Evidence"

02/28 **Michael Bleaney and Akira Nishiyama,** "Economic Growth and Income Inequality"

03/01 **Stephen Dobson, Carlyn Ramlogan and Eric Strobl,** "Why Do Rates of Convergence Differ? A Meta-Regression Analysis"

03/02 **Robert Lensink and Habeab T. Mehrteab,** "Risk Behaviour and Group Formation in Microcredit Groups in Eritrea"

03/03 **Karuna Gomanee, Oliver Morrissey, Paul Mosley and Arjan Verschoor,** "Aid, Pro-Poor Government Spending and Welfare"

03/04 **Chris Milner and Evious Zgovu,** "Export Response to Trade Liberalisation in the Presence of High Trade Costs: Evidence for a Landlocked African Economy"

SCHOOL OF ECONOMICS DISCUSSION PAPERS

In addition to the CREDIT series of research papers the School of Economics produces a discussion paper series dealing with more general aspects of economics. Below is a list of recent titles published in this series.

00/1 **Tae-Hwan Kim and Christophe Muller,** "Two-Stage Quantile Regression"

00/2 **Spiros Bougheas, Panicos O. Demetrides and Edgar L.W. Morgenroth,** "International Aspects of Public Infrastructure Investment"

00/3 **Michael Bleaney,** "Inflation as Taxation: Theory and Evidence"

00/4 **Michael Bleaney,** "Financial Fragility and Currency Crises"

00/5 **Sourafel Girma,** "A Quasi-Differencing Approach to Dynamic Modelling from a Time Series of Independent Cross Sections"

00/6 **Spiros Bougheas and Paul Downward,** "The Economics of Professional Sports Leagues: A Bargaining Approach"

00/7 **Marta Aloi, Hans Jørgen Jacobsen and Teresa Lloyd-Braga,** "Endogenous Business Cycles and Stabilization Policies"

00/8 **A. Ghoshray, T.A. Lloyd and A.J. Rayner,** "EU Wheat Prices and its Relation with Other Major Wheat Export Prices"

00/9 **Christophe Muller,** "Transient-Seasonal and Chronic Poverty of Peasants: Evidence from Rwanda"

00/10 **Gwendolyn C. Morrison,** "Embedding and Substitution in Willingness to Pay"

00/11 **Claudio Zoli,** "Inverse Sequential Stochastic Dominance: Rank-Dependent Welfare, Deprivation and Poverty Measurement"

00/12 **Tae-Hwan Kim, Stephen Leybourne and Paul Newbold,** "Unit Root Tests With a Break in Variance"

00/13 **Tae-Hwan Kim, Stephen Leybourne and Paul Newbold,** "Asymptotic Mean Squared Forecast Error When an Autoregression With Linear Trend is Fitted to Data Generated by an I(0) or I(1) Process"

00/14 **Michelle Haynes and Steve Thompson,** "The Productivity Impact of IT Deployment: An Empirical Evaluation of ATM Introduction"

00/15 **Michelle Haynes, Steve Thompson and Mike Wright,** "The Determinants of Corporate Divestment in the UK"

00/16 **John Beath, Robert Owen, Joanna Poyago-Theotoky and David Ulph, "**Optimal Incentives for Incoming Generations within Universities"

00/17 **S. McCorriston, C. W. Morgan and A. J. Rayner,** "Price Transmission: The Interaction Between Firm Behaviour and Returns to Scale"

00/18 **Tae-Hwan Kim, Douglas Stone and Halbert White,** "Asymptotic and Bayesian Confidence Intervals for Sharpe Style Weights"

00/19 **Tae-Hwan Kim and Halbert White,** "James-Stein Type Estimators in Large Samples with Application to the Least Absolute Deviation Estimator"

00/20 **Gwendolyn C. Morrison,** "Expected Utility and the Endowment Effect: Some Experimental Results"

00/21 **Christophe Muller,** "Price Index Distribution and Utilitarian Social Evaluation Functions"

00/22 **Michael Bleaney,** "Investor Sentiment, Discounts and Returns on Closed-End Funds"

00/23 **Richard Cornes and Roger Hartley,** "Joint Production Games and Share Functions"

00/24 **Joanna Poyago-Theotoky,** "Voluntary Approaches, Emission Taxation and the Organization of Environmental R&D"

00/25 **Michael Bleaney, Norman Gemmell and Richard Kneller,** "Testing the Endogenous Growth Model: Public Expenditure, Taxation and Growth Over the Long-Run"

00/26 **Michael Bleaney and Marco Gundermann,** "Credibility Gains and Output Losses: A Model of Exchange Rate Anchors"

00/27 **Indraneel Dasgupta,** "Gender Biased Redistribution and Intra-Household Distribution"

00/28 **Richard Cornes and Roger Hartley,** "Rentseeking by Players with Constant Absolute Risk Aversion"

00/29 **S.J. Leybourne, P. Newbold, D. Vougas and T. Kim,** "A Direct Test for Cointegration Between a Pair of Time Series"

00/30 **Claudio Zoli,** "Inverse Stochastic Dominance, Inequality Measurement and Gini Indices"

01/01 **Spiros Bougheas,** "Optimism, Education, and Industrial Development"

01/02 **Tae-Hwan Kim and Paul Newbold,** "Unit Root Tests Based on Inequality-Restricted Estimators"

01/03 **Christophe Muller,** "Defining Poverty Lines as a Fraction of Central Tendency"

01/04 **Claudio Piga and Joanna Poyago-Theotoky,** "Shall We Meet Halfway? Endogenous Spillovers and Locational Choice"

01/05 **Ilias Skamnelos, "**Sunspot Panics, Information-Based Bank Runs and Suspension of Deposit Convertibility"

01/06 **Spiros Bougheas and Yannis Georgellis,** "Apprenticeship Training, Earnings Profiles and Labour Turnover: Theory and German Evidence"

01/07 **M.J. Andrews, S. Bradley and R. Upward,** "Employer Search, Vacancy Duration and Skill Shortages"

01/08 **Marta Aloi and Laurence Lasselle,** "Growing Through Subsidies"

01/09 **Marta Aloi and Huw D. Dixon,** "Entry Dynamics, Capacity Utilisation, and Productivity in a Dynamic Open Economy"

01/10 **Richard Cornes and Roger Hartley,** "Asymmetric Contests with General Technologies"

01/11 **Richard Cornes and Roger Hartley,** "Disguised Aggregative Games"

01/12 **Spiros Bougheas and Tim Worrall,** "Cost Padding in Regulated Monopolies"

10/13 **Alan Duncan, Gillian Paull and Jayne Taylor,** "Price and Quality in the UK Childcare Market"

01/14 **John Creedy and Alan Duncan,** "Aggregating Labour Supply and Feedback Effects in Microsimulation"

01/15 **Alan Duncan, Gillian Paull and Jayne Taylor,** "Mothers' Employment and Use of Childcare in the United Kingdom"

02/01 **Mark A. Roberts,** "Central Wage Setting Under Multiple Technological Equilibria: A Mechanism for Equilibrium Elimination"

02/02 **Mark A. Roberts,** "Employment Under Wage-Only and Wage-Employment Bargaining: The Role of the Government Budget Constraint"

02/03 **Mark A. Roberts,** "Can the Capital Gains Arising from an Unfunded Pensions Reform Make it Pareto-Improving?"

02/04 **Mehrdad Sepahvand,** "Privatisation in a Regulated Market, Open to Foreign Competition"

02/05 **Mark A. Roberts,** "Can Pay-As-You Go Pensions Raise the Capital Stock?"

02/06 **Indraneel Dasgupta,** "Consistent Firm Choice and the Theory of Supply"

02/07 **Michael Bleaney,** "The Aftermath of a Currency Collapse: How Different Are Emerging Markets?"

02/08 **Richard Cornes and Roger Hartley,** "Dissipation in Rent-Seeking Contests with Entry Costs"

02/09 **Eric O'N. Fisher and Mark A. Roberts,** "Funded Pensions, Labor Market Participation, and Economic Growth"

02/10 **Spiros Bougheas,** "Imperfect Capital Markets, Income Distribution and the 'Credit Channel': A General Equilibrium Approach"

02/11 **Simona Mateut, Spiros Bougheas and Paul Mizen,** "Trade Credit, Bank Lending and Monetary Policy Transmission"

02/12 **Bouwe R. Dijkstra,** "Time Consistency and Investment Incentives in Environmental Policy"

02/13 **Bouwe R. Dijkstra,** "Samaritan vs Rotten Kid: Another Look"

02/14 **Michael Bleaney and Mark A. Roberts,** "International Labour Mobility and Unemployment"

Members of the Centre

Director

Oliver Morrissey - aid policy, trade and agriculture

Research Fellows (Internal)

Simon Appleton – poverty, education, household economics
Adam Blake – CGE models of low-income countries
Mike Bleaney - growth, international macroeconomics
Indraneel Dasgupta – development theory, household bargaining
Norman Gemmell – growth and public sector issues
Ken Ingersent - agricultural trade
Tim Lloyd – agricultural commodity markets
Andrew McKay - poverty, peasant households, agriculture
Chris Milner - trade and development
Wyn Morgan - futures markets, commodity markets
Christophe Muller – poverty, household panel econometrics
Tony Rayner - agricultural policy and trade

Research Fellows (External)

David Fielding *(University of Leicester)* – investment, monetary and fiscal policy
Ravi Kanbur (*Cornell*) – inequality, public goods – Visiting Research Fellow
HenrikHansen *(University of Copenhagen)* – aid and growth
Stephen Knowles *(University of Otago)* – inequality and growth
Sam Laird (*UNCTAD*) – trade policy, WTO
Robert Lensink *(University of Groningen)* – aid, investment, macroeconomics
Scott McDonald *(University of Sheffield)* – CGE modelling, agriculture
Mark McGillivray *(WIDER, Helsinki)* – aid allocation, aid policy
Doug Nelson *(Tulane University)* - political economy of trade
Shelton Nicholls *(University of West Indies)* – trade, integration
Eric Strobl *(University of Louvain)* – labour markets
Finn Tarp *(University of Copenhagen)* – aid, CGE modelling