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The Implications of Trade Policy and 'Natural' Barriers Induced Protection for Aggregate Demand for Imports: Evidence for Malawi

by

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Abstract
This paper analyses the relative importance of trade policy and 'natural' trade barriers in the demand for imports for Malawi, a geographically landlocked sub-Saharan African economy, using an augmented dynamic import demand model. Incidence analysis of protection shows that pre-liberalisation trade policy barriers were greater than 'natural' barriers but in post-liberalisation 'natural' barriers were greater. Econometric analysis of the import demand model shows that 'true' protection of importables has been a decisive disincentive to importing. Therefore, like other landlocked countries Malawi needs to aggressively lower not only trade policy barriers but also 'natural' barriers for greater efficient trade.

Outline

1. INTRODUCTION

Whilst it is recognised that trade barriers will affect the demand for imports, most studies using import demand analysis focus on the effects of exchange rates and aggregate (or nominal) measures of trade protection.[1] Theory shows that protectionist interventions and other trade barriers induce changes in domestic relative incentives for traded and non-traded goods which in turn lead to inter-sector resource shifts and import substitution. A few studies (e.g. Faini, Pritchett, & Clavijo, 1992; Santos-Paulino, 2001) have included commercial policy interventions in the form of nominal protection (proxied by import tariffs). Nominal protection is a limited, and often misleading, measure that does not account for effective protection, impact on relative prices (especially of traded and non-traded goods), and substitution effects. A better concept is 'true' protection (Sjaastad and Clements, 1981; Greenaway and Milner, 1987, 1993) which measures the incidence of protection accorded the importables sector (by means of commercial policy and/or 'natural' barriers) over the other domestic sectors, namely, exportables and non-traded goods, in a three-good small open economy. Positive 'true' protection for the domestic import-competing sector implies that demand for imports is curtailed. In this way 'true' protection can be seen as a useful variable to represent trade barrier-induced disincentive to importing and also take care of the domestic substitution effects associated with such trade barriers.

This paper extends the analysis of demand for imports by augmenting the widely used dynamic import demand model to include a 'true' protection variable with the view to explicitly account for commercial policy and 'natural' protection to importing (Malawi being a landlocked economy has a serious geographical disadvantage which acts as a 'natural' barrier to trade). The paper estimates 'true' protection rates (due to policy and 'natural' barriers), and then uses them in the import demand model to obtain the elasticities of import demand with respect to 'true' protection, among other variables (that is, external relative price of the *ppp*-type real exchange rate and income). To anticipate our results, the paper finds that despite import liberalisation since 1987/88 'true' protection rates are non-negligible mainly because of the largely unresolved 'natural' barrier source of protection and also some elements of commercial policy

[1] A review of some of the studies is available in Zgovu (2002).

instruments. As a variable in the import demand model the paper finds that 'true' protection is a significant disincentive to importing in both the long-run and short-run. These findings highlight the need for further reform action to help abate impediments to trade.

The rest of the paper is organised as follows. Section 2 identifies some of the main sources of trade protection in Malawi. To this end the section gives a brief review of Malawi's foreign trade (composition of imports), commercial policy stances, 'natural' barriers and trade regimes during 1970-2001. Section 3 sets out the modelling framework, specifically, the traditional model and evidence, and the augmented import demand model. In Section 4 we consider the measurement of 'true' protection rates for the cases of full and partial price transmission. Section 5 presents empirical results on elasticities of import demand with respect to 'true' protection, among other variables. Conclusions of the paper and policy implications are given in Section 6.

2. TRADE, COMMERCIAL POLICY AND TRADE REGIMES AND 'NATURAL' BARRIERS

Malawi is a landlocked southern African economy mainly dependent on tobacco (64 percent in total exports and 18 percent in GDP) and a few other agricultural commodities (tea and sugar) for export earnings. Over 80 percent of Malawi's exports are destined to distant markets (UK, US and the far east), and about 16 percent to the local markets of South Africa and Zimbabwe. Most imports originate from South Africa (33 percent) and UK (21 percent), then the US, the rest of the EU, Japan, and the rest of the far east. Imports *f.o.b.* average 23 percent of GDP, imports *c.i.f.* average 30 percent, and the gap between the two gives a rough indication of the burden of external transport costs on the economy.

Table 1 shows the broad composition of Malawi's imports. It can be seen that a large proportion of the imports are industrial goods (basic auxiliary materials, plant and machinery, intermediate and final goods for industry) which together accounted for average proportions of 83.9, 86.9 and 88.9 percent during 1970-1979, 1980-1986 and 1987-1989, respectively. The remainder are consumer goods. The dominance of industrial goods reflects the significant import substitution role played by the domestic industrial sector in meeting domestic supply needs.

Table 1: Composition of Imports

Year	Consumer Goods	Plant Machinery and Equipment	Transport Means	Materials for Building and Construction	Basic Auxiliary Materials for Industry	Intermediate and Final Consumption	Miscellaneous Transaction	TOTAL VALUE (MK mlln)[a]
As % of total								
1970 – 1979	*15.3*	*13.9*	*14.2*	*8.5*	*33.7*	*13.6*	*0.8*	1,762.9
1980 – 1986	*12.8*	*12.6*	*12.1*	*6.2*	*39.3*	*16.7*	*0.3*	3,887.4
1987 – 1989	*10.3*	*15.9*	*12.5*	*5.7*	*41.3*	*13.5*	*0.7*	10,443.0
1990 – 2001	-	-	-	-	-	-	-	13,558.1

Note - a: Exchange rate: US$1 = 72.20 Malawi Kwacha, 2001. "-" indicates data not available.

Source: Malawi Government (1970-2002b).

Commercial policy and trade regimes

In Malawi trade protection emanates from both commercial policy and non-policy or 'natural' barriers. Commercial policy instruments have taken the form of import tariffs, quantitative restrictions, import licensing, and foreign exchange rationing, *inter alia*. Table 2 identifies three distinct regimes of relatively free trade regime (1970-1979), restrictive regime (1980-1986) and a liberalising regime (1987/8-2001) according to the intensity and focus of instrument usage. The choice of instruments and increased intensity of their usage were dictated by balance of payments crises (due to the oil price shock, unfavourable terms of trade, increased external transport costs, *inter alia*) and underlying inclinations towards import substitution.

The incidence of trade taxation was dictated mainly by fiscal revenue needs and import containment, and later dictated by the desire to stimulate domestic production whilst containing consumption of final and import consumer goods. With reduced trade taxation there has been reduced containment of consumption of the import goods. Exchange rate policy (e.g. overvaluation) also favoured importation which, as we have seen already, was largely for industrial usage. Policy reversal to float the exchange rate determination process in February 1994 resulted in the national currency (Kwacha) depreciating against the US dollar by over 70 percent, and posed a severe deterrent to importing. A managed float is maintained to restore confidence and currency stability particularly during off-season periods for tobacco sales. Foreign aid inflows have also played a particularly useful stabilising influence on the domestic currency.

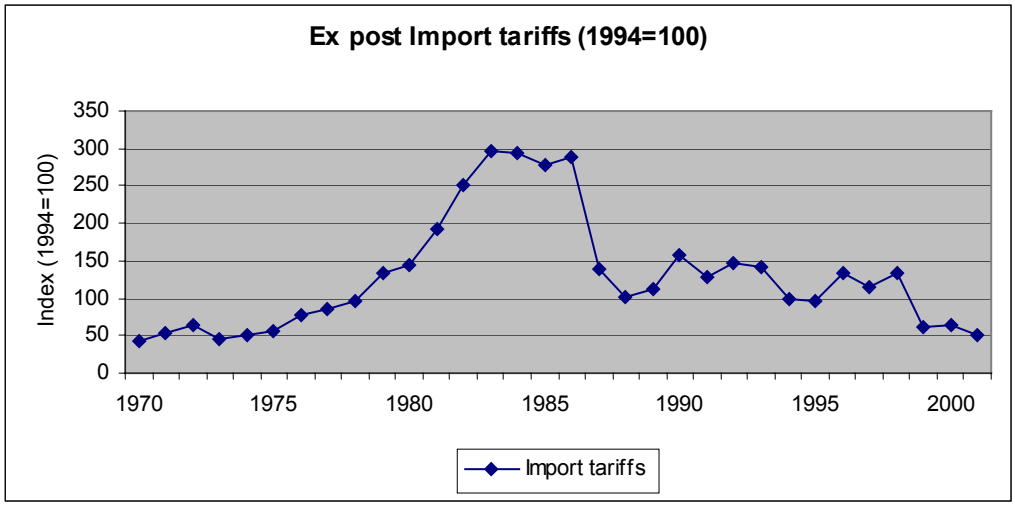
Table 2: Commercial Policy Instruments and Trade Regimes

Instrument	1970-1979	1980-1986	1987-2001
Import Tariffs and Tax Policy	Tariffs mainly used for fiscal revenue generation and against imports of consumer goods.	Considerable increase in tariff rates and dispersion. Import tariffs ranged from 20% to 45%.	Importing liberalised in 1988. Tax emphasis shifted from production to consumption (final and consumer goods). Average tariffs of 20% but soon raised again to 56% to counter excess demand for foreign exchange and generate more revenue. Later tariff rate reduced to 40%.
Import Licensing	Targeted imports of consumer goods.	Increased and widely applied. Favoured 'priority' industrial sector activities.	Discontinued by end 1987. But coercion used at times to discourage imports of goods similar to locally produced goods - the 'Buy Malawian' campaign.
Quantitative Restrictions	Sparsely applied against foodstuff imports	Increased use. Targeted against consumer goods.	Discontinued starting from February 1988.
Foreign Exchange Rationing	-	Introduced in 1979 but mostly used during 1984-86. Used to reduce imports by 59%.	Rationing reduced on 50% of imports by 1987, on 75% by 1989 and on 98% by 1990. Also coercion to dissuade importing and stepping of the 'Buy Malawian' campaign.
Exchange Rate	Kept at 'equilibrium' levels while pegged to a basket of foreign currencies.	Pegging disbanded due to overvaluation. Attempts to manage the exchange rate at pre-1978/79 levels.	Attempts to maintain real exchange rate at 20% below the 1978-79 levels. Floated in February 1994. Resorted to a managed float in 1996/7 to-date.

Source: Malawi Government (1970-2002a), World Bank (1991), and own analysis.

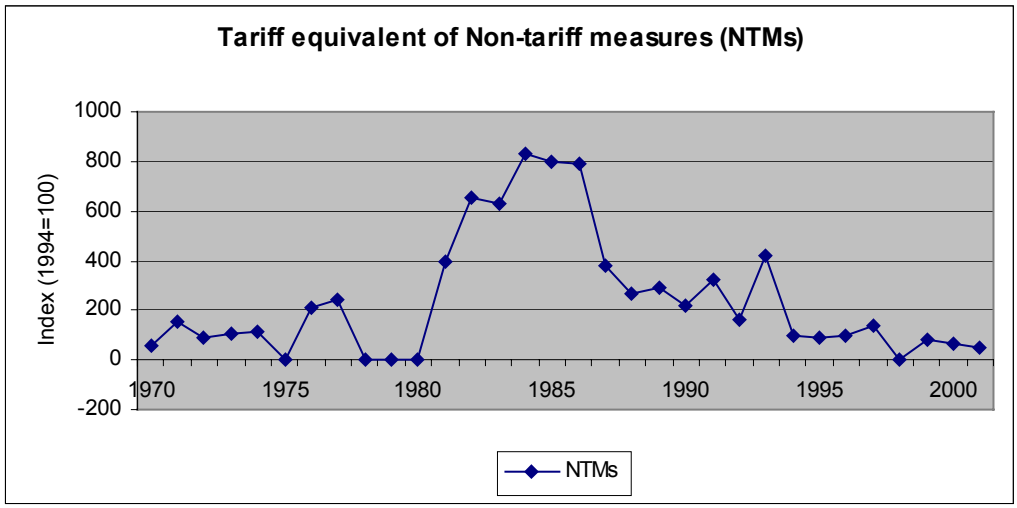
Fig. 1 depicts the index of ex post import tariff (collection) rates, whilst Fig.2 plots the index of import-weighted black market premium used as a proxy measure of non-tariff measures following Levine and Renelt (1992), Pritchett and Sethi (1994), and Edwards (1992). Both figures represent the trade regimes fairly well. For example, import tariffs underwent a sharp increase since 1980 and receded in 1987 following liberalisation efforts in 1987/88. During 1988-2001 import tariffs tended to fluctuate at fairly lower rates compared to those experienced during 1980-1986 but relatively higher compared to those witnessed during 1970-1979.

Figure 1



Literature shows that black market premium increases under conditions of distortionary commercial policies, especially with non-tariff measures (e.g. foreign exchange rationing), besides other macroeconomic influences e.g. capital flows. The import-weighted index of black market premium used as a proxy measure of non-tariff measures plotted in Fig.2 shows dramatic rises from 1981 until 1986 but started to fall thereafter. Fig. 2 also shows a sharp decline in the black market premium in 1994, precisely reflecting the floatation of the exchange rate in February 1994. The decline in the premium closely follows the abolition in 1987/88 of non-tariff measures such as foreign exchange rationing, quantitative restrictions, and import licensing.

Figure 2

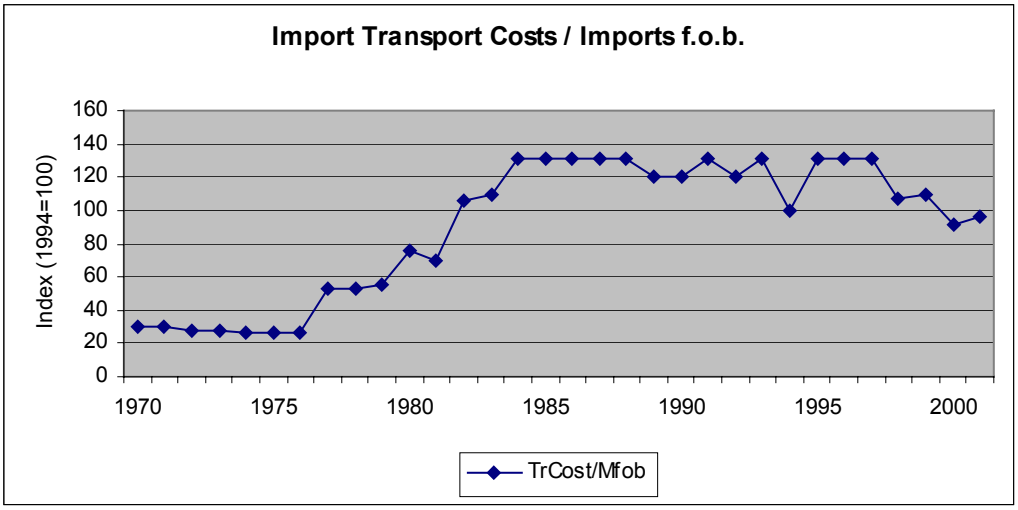


The country's agricultural development and marketing corporation (ADMARC) traditionally sets commodity prices well below the world price equivalents and uses the revenue to finance investment portfolios (some in import-competing industrial activities) and bail out insolvent parastatal organisations, *inter alia*. Such price-setting behaviour amounts to charging implicit taxes whose rate can be captured as the ratio of the difference between the world and domestic price relative to the world price. These implicit taxes lower the relative price of exportables, hence, substitution effects in the economy (between exportables and non-traded goods and importables) raise the relative price of importables which represent incentives to expand the production of importables and reduce the consumption of imports. Appendix Table A1 shows that implicit taxes have tended to increase with time during 1970-2001.

'Natural' barriers

The main source of 'natural' barriers to Malawi's foreign trade is being landlocked, and this is exacerbated by inadequate and under-developed institutional and infrastructure capacities for trade. Prior to the civil war in Mozambique, the relatively developed Beira port (350 miles) and Nacala port (465 miles, though with limited capacity to handle large ocean-liners) accounted for over 90 percent of Malawi's foreign trade (Gulhati, 1989). During and post-war Dar es Salaam and Durban (each about 2,500 miles away from the commercial city of Blantyre) have acted as the main sea ports for Malawi's foreign trade. The transport cost or 'natural' barrier implication of the shift in transport routes has been severe, as shown by the jump in the trend line between 1976 and 1982 in Fig. 3. Fig. 3 depicts movements in the index of Malawi's average international transport costs as a proportion of imports *f.o.b.*. The relatively low index levels (actual rates averaging 15 percent) obtained during 1970-1976. Oil price shocks were largely responsible for the developments between 1977 and 1981 although the start of the civil war in Mozambique soon after independence in 1976 also played a part. By 1982 the civil war intensified resulting in virtual closure of the rail routes through Mozambique and consequently Malawi's external transport costs increased dramatically. The end of the war saw rates decline but with lag effects as it has taken time to patch and mend broken infrastructure. Since the more important Beira route is still unrepaired the foreign trade transport costs pressure will continue to be felt.

Figure 3



On the whole, it is clear that the country's 'natural' barrier is significant and got worse with the route diversions in the wake of civil war through a strategic neighbouring country. Efforts to facilitate cheaper importation of goods and technologies need to accord 'natural' barrier sources of protection significant weight and priority.

3. THE MODELLING FRAMEWORK: THE TRADITIONAL AND AUGMENTED IMPORT DEMAND MODELS

The modelling of import demand is founded on the notion that the volume of imports consumed during a given period of time is dependent upon domestic income and the imports' prices relative to domestic prices. Demand for imports can be presented in the context of a country aiming to maximise utility from consuming imported (M) and domestically produced goods (D) which are traded at the respective prices P_{mw} and P_d, at a given level of real income, Y. Normalising by the domestic price leads to the explicit import demand function specified as:

$$M = \left(\frac{E.P_{mw}}{P_d}\right)^{\rho_1}\left(\frac{Y}{P_d}\right)^{\rho_2} \qquad (1)$$

where E is nominal exchange rate (units of domestic currency per unit of foreign currency); Δ_1 is price elasticity of demand for imports and Δ_2 is real income elasticity

of demand for imports. We linearise (in logarithmic terms) and differentiate eq. (1), and add a Gaussian error term, μ, to obtain an econometric model of the form:

$$\ln m_t = \rho_0 + \rho_1 \ln rer_t + \rho_2 \ln y_t + \mu_t \qquad (2)$$

where lnm_t is log of real imports during time period t; ln$y$ is log of real income; lnrer is log of real exchange rate (real exchange rate being defined as $E.P_{mw}/P_d$); and μ is an error term. Δ_1 and Δ_2 are elasticity parameters with expected signs $\Delta_1<0$ and $\Delta_2>0$.

Eq. (2) is the widely applied estimation equation in most studies[2]. This paper extends the traditional import demand model by adding a 'true' protection variable incorporating 'natural' barriers. The inclusion of the 'true' protection variable is meant to explicitly account for the often ignored domestic relative incentive changes arising from anti-import policy and non-policy instruments. Changes in domestic relative incentives have an important implication for the eventual import substitution that can take place when anti-import policy and non-policy instruments increase. The usual purchasing power parity price or *ppp*-type of real exchange rate does not capture any anti-import bias associated with internal relative price incentives. We also include foreign exchange reserves in that importing is directly affected by the availability of foreign exchange even when income and price remain fairly constant (Moran, 1989). The paper uses the domestic capacity and real exchange rate definitions used in Senhadji (1998). Domestic capacity in this case is the difference between gross domestic production and exported production (GDP-exports) which gives a finer measure of domestic endowment. The real exchange rate is proxied by the ratio of the import deflator to the GDP deflator.[i] Our augmented import demand model is specified as (all variables in logarithmic (ln) form):

$$\ln m_t = \beta_0 + \beta_1 \ln t_t^* + \beta_2 \ln(y - x) + \beta_3 \ln rer_t + \beta_4 \ln f_t + \mu_t \qquad (3)$$

where lnm_t is the volume of imports during time period t; lnt^* is 'true' protection rate; ln(y-x) is domestic endowment or capacity to import (GDP *minus* real exports); ln$f$ is

2 See Goldstein and Khan (1985), Moran (1989), Bertola and Faini (1991), Faini *et al* (1992), Bahmani-Oskooee and Rhee (1997), Senhadji (1998), and Santos-Paulino (2001).

foreign exchange reserves; ln*rer*is the ratio of unit import price to GDP deflator; μ is an error term assumed to be $\mu_t \sim iid(0, \Phi^2)$; and, $\exists_1$, $\exists_2$, $\exists_3$ and $\exists_4$ are elasticity parameters with expected signs $\exists_1<0$, $\exists_3<0$, $\exists_2>0$ $\exists_4>0$.

4. 'TRUE' PROTECTION MEASUREMENT UNDER FULL AND PARTIAL PRICE TRANSMISSION

'True' protection is defined as the proportionate change in the relative price of importables (relative to the endogenously determined price of non-traded goods) induced by trade policy and 'natural' barriers, given the degree of substitution in the economy. Algebraically, 'true' protection is specified as:

$$t_t^* = \Delta\left(\frac{P_{Mt}}{P_{Nt}}\right) \tag{4}$$

where P_M is the price of importables (M), P_N is the price of non-traded goods (N).

From eq. (4) commercial policy and/or 'natural' barriers that raise the relative price of importables increase the rate of 'true' protection. To operationalise the definition of 'true' protection we set initial relative prices equal to unity for convenience and rewrite eq. (4) as:

$$t_t^* = \frac{\hat{P}_{Mt} - \hat{P}_{Nt}}{1 + \hat{P}_{Nt}} = \frac{\Pi_{Mt} - \hat{P}_{Nt}}{1 + \hat{P}_{Nt}} \tag{5}$$

where "^" denotes proportional change, and A_{Mt} represents the proportional change in the price of importables caused by explicit nominal protection (namely, import tariffs, non-tariff measures and transport costs).

Eq.(5) typifies the case of a small country where there is full transmission of changes in the border prices of imports to locally consumed import substitutes. Full transmission in this case hinges on the assumption of perfect substitution between traded goods (imports) and local goods (importables). In the case of Malawi, however, the main imports (e.g. industrial goods) can hardly be said to be perfect substitutes of the range of importables produced locally. For this reason the proportional changes in the domestic

prices do not rise by as much as the border prices rise, hence, the domestic prices are weighted by an estimated coefficient of price transmission in the empirical estimation stage.

The price of non-traded goods is easily endogenised by considering that non-traded goods are substitutes of both importables and exportables (*X*). Substitution between importables and exportables, and intra-substitution within importables and exportables are ruled out for simplicity. Allowing for homogeneity in prices, the proportionate change in the price of non-traded goods can be specified as:

$$\hat{P}_{Nt} = \omega \hat{P}_{Mt} + (1-\omega)\hat{P}_{Xt} \qquad 0 \le \omega \le 1 \tag{6}$$

where T is index of substitution between importables and non-traded goods,[ii] "^" denotes proportional change, P_X is price of exportables (which varies with the introduction of implicit exportables taxes (A_{Xt}) by the marketing board in the case of Malawi), P_N is price of non-traded goods, and P_M is price of importables. Implicit taxes (A_{Xt}) on exportables lower P_X and eventually P_N. By lowering P_N implicit taxes raise the ratio P_M/P_N, and, hence, give rise to 'true' protection. Import tariffs, non-tariff measures and external transport costs faced by imports all raise P_M, and therefore, increase 'true' protection. Substituting eq.(6) into eq.(5) yields the overall rate of 'true' protection due to one or more sources of nominal protection:

$$t_t^* = \frac{(1-\omega)(\Pi_{Mt} - \Pi_{Xt})}{1+\omega\Pi_{Mt} + (1-\omega)\Pi_{Xt}} \qquad \Pi_{Mt} \ge 0 \quad \Pi_{Xt} \le 0 \tag{7}$$

where A_{Xt} denotes the implicit taxes on exportables.

From eq.(7), commercial policy and 'natural' barriers that raise the overall price of importables (i.e. $A_{Mt} > 0$) increase 'true' protection. Similarly, 'true' protection increases with increase in implicit exportables taxes $*A_{Xt}*>0$. As eq.(7) shows, the rate of 'true' protection crucially depends on the size of the substitution index. Under perfect substitution between importables and non-traded goods (T=1) the relative price of importables remains unchanged, hence the rate of 'true' protection is zero; under

imperfect substitution (T=0) the price of importables rises against unchanging price of non-traded goods, hence the rate of 'true' protection is at the highest achievable rate. Thus, 'true' protection increases with decreasing substitutability between non-traded goods and importables.

Empirical Estimates of 'True' Protection

Empirical estimates of 'true' protection can be determined using information on the explicit sources of nominal protection (A_{Mt}), nominal implicit exportables taxes (A_{Xt}), and an estimate of the substitution index, T. Table 3 summarises the overall explicit nominal protection (A_{Mt}) and implicit nominal protection ($*A_{Xt}*$) assuming both full and partial price transmission[3] for the sub-period 1970-1979, 1980-1986 and 1987-2001 reflecting the different trade regimes during 1970-2001 as discussed in Section 2.

Whether with full or partial price transmission both explicit and implicit nominal protection rates show a steep rise during 1980-1986 over the rates during 1970-1979, and a [1]decline during the remaining period. The escalation in the nominal protection rates reflects the increasingly protective trade stance taken by the country when faced with macroeconomic crises arising from both internal and external forces as discussed in Section 2.

Table 3: Aggregate Explicit and Implicit Nominal Protection Rates

	1970-1979	1980-1986	1987-2001	1970-2001
Full price transmission				
Explicit taxes (A_{Mt}) %	41	165	108	99
Implicit taxes ($*A_{Xt}*$) %	28	44	49	42
Partial price transmission				
Short-run				
Explicit taxes (A_{Mt}) %	26	97	65	60
Implicit taxes ($*A_{Xt}*$) %	18	28	32	27
Long-run				
Explicit taxes (A_{Mt}) %	33	126	84	77
Implicit taxes ($*A_{Xt}*$) %	23	36	40	34

Source: Author's calculations.

[3] Price transmission coefficients were estimated using time series information on the prices of imports and import-competing goods following Tyres and Anderson (1992). The estimated long-run and short-run coefficients are 0.82 and 0.65, respectively. Regression results are available from the author.

Estimates of the index of substitution were obtained by estimating a rearranged eq.(6), augmented for income and trade balance effects, following Greenaway and Milner (1993) and McKay and Milner (1997). As in the above studies we applied annual data (1970-2001) on prices of categories of tradeables and non-traded goods, real income and trade balance (data obtained from Malawi Government, 1970-2002a). The estimated long-run and short-run substitution indexes are, respectively, 0.79 and 0.46 (full estimation results are available from the author).[iii] The long-run index is high, indicating high substitutability between non-traded goods and importables, and by implication (1-T), low substitutability between non-traded goods and exportables. As noted already in eq.(7), greater (smaller) substitutability translates into lower (higher) 'true' protection.

Estimates of 'true' protection rates use eq.(7) to combine estimates of nominal protection (explicit and implicit) and the substitution indexes. Estimates of 'true' protection rates for the case of partial price transmission required coefficients of price transmission in addition to information on nominal protection and substitution indexes. The results in Table 4 give the percentages by which the various sources of protection collectively raised the relative price of importables above what they would be in the absence of nominal protection.

Table 4: Aggregate 'True' Protection Rates (percent)

	1970-1979	1980-1986	1987-2001	1970-2001
Full price transmission				
Short-run	33	66	63	54
Long-run	7	12	12	10
Partial price transmission				
Short-run	22	47	43	38
Long-run	6	11	10	9

Source: Author's calculations.

Both short-run and long-run 'true' protection rates for both the full and partial price transmission cases show significant increases during 1980-1986 over the rates during 1970-1979 reflecting escalation of trade restrictions. 'True' protection did not fall significantly post-liberalisation, and in fact compared to the situation during the interventionist period the rates are almost twice as high. The reason behind this limited

fall could be the continuing effects of 'natural' barriers, implicit taxes, and some remnants of protectionist instruments (e.g. import tariffs). Owing to the higher long-run than short-run index of substitutability the long-run 'true' protection rates are significantly lower than the short-run rates. Estimates for the case of partial price transmission are, as expected, lower than estimates for the case of full price transmission.

Table 5 shows components of the higher short-run 'true' protection rates. Among the explicit sources of protection, 'natural' barriers are the highest contributors to 'true' protection for all the trade regimes (see rows (*a*) to (*c*)). 'True' protection due to 'natural' barriers declined only marginally during 1987-2001. This is not surprising considering that the capacities on the strategic routes through Mozambique are not yet restored to their pre-war state.

Table 5: Short-run 'True' Protection rates By Source of Protection

	1970-1979	1980-1986	1987-2001	1970-2001
Full transmission				
(a) Import tariff	7	22	11	12
(b) Non-tariff barriers	2	10	3	4
(c) 'Natural' barriers	8	22	24	19
(d)= (a)+(b)+(c)+Interactive effects§	17	45	36	32
(e) Implicit taxes	17	30	35	28
Partial transmission				
(a) Import tariff	5	16	8	9
(b) Non-tariff barriers	1	7	2	3
(c) 'Natural' barriers	6	15	17	13
(d)= (a)+(b)+(c)+Interactive effects§	11	33	25	22
(e) Implicit taxes	10	17	20	16

Notes: §: interaction between import tariffs and transport costs, say, when import tariffs are charged on imports valued on c.i.f. basis which leads to additional burden arising from the taxation of freight and insurance.

Source: Author's calculations

'True' protection arising from import tariffs and non-tariff measures show considerable decline in post-liberalisation 1987-2001 period compared to the 1980-1986 rates. The preponderance of 'natural' barriers post-liberalisation, however, indicates that by

ignoring 'natural' barriers policy reforms left out an important source of 'true' protection. Explicit taxes have a greater impact than implicit taxes on overall 'true' protection (see rows (*d*) and (*e*)) as expected. However, the impact of implicit taxes (on exportables sector) surpass that for any one other source of explicit taxes; the abolition of such implicit taxes would greatly benefit not only the exportables sector but also the importables sector (by improving efficient resource allocation) and importing.

These are only estimates of 'true' protection; due to data constraints, the list of sources of nominal protection is not exhaustive. For instance, 'natural' barriers are proxied by external transport costs on imports, but transactions costs due to an underdeveloped infrastructure for trade are not represented. Transport costs on the export side may also play a role in influencing changes in the price of importables relative to the price of non-traded goods, given some degree of substitution between exportables and non-traded goods and also between non-traded goods and importables in the economy. This implies that imports are subjected to even greater disincentives than is presented here.

5. EMPIRICAL ESTIMATION OF THE AUGMENTED IMPORT DEMAND MODEL

Estimation of the augmented model (eq. 3) used annual data covering 1970 to 2001. Unit root and cointegration tests are reported below. Data on import volumes, real domestic endowment (real gross domestic output *minus* real exports), real exchange rate and foreign exchange reserves are obtained from *International Financial Statistics* of the International Monetary Fund (IMF), *Financial and Economic Review* of the Reserve Bank of Malawi, and Malawi Government's *Economic Report*. Data on 'true' protection are those adjusted for partial transmission.[4] Unit root and cointegration tests are reported below. Results from unit root tests in Table 6[5] support the inference that all variables are stationary in first-differences, integrated of order 1, *I*(1) and with no significant drift.

[4] Either short-run or long-run series of 'true' protection could be used in modelling since the two are only distinguished apart by constant substitution indexes applied to the same set of nominal protection series. Here the higher short-run 'true' protection rates are preferred to the lower long-run rates.

[5] The standard AIC, SBC and HQC criterion were used to determine the appropriate lag length.

Table 6: Unit root test results

Series in level						**Series in first difference**			
	no drift	C	C & T	lags	*Inference*		no drift[a]	lags	*Inference*
Ln*m*	1.170	-0.477	-1.066	2	*non-stationary*	)ln*m*	-5.413	0	*stationary, I(1)*
ln*t**	-0.525	-1.056	0.870	2	*non-stationary*	)ln*t**	-4.799	0	*stationary, I(1)*
ln(*y*-*x*)	2.770	0.034	-3.431	2	*non-stationary*	)ln(*y*-*x*)	-7.421	0	*stationary, I(1)*
Ln*rer*	1.513	-1.771	-3.315	2	*non-stationary*	)ln*rer*	-6.317	0	*stationary, I(1)*
Ln*f*	0.486	-1.125	-1.543	2	*non-stationary*	)ln*f*	-6.179	0	*stationary, I(1)*
5% Crit.[b]	*-1.953*	*-2.966*	*-3.573*	*2*		*5% Crit.c*	*-1.953*	*0*	

Notes: C and C & T denote, respectively, "constant" and "constant and trend" included in the ADF test equation.

a: C and T were statistically insignificant when included in the ADF unit root test equation.

b: 5% significance level critical values for ADF statistic.

c: 5% significance level critical values for Dickey-Fuller (DF) statistic.

A vector autoregressive (VAR) model is used to test for cointegration. In this case our (restricted intercept) VAR(k) model is a system of equations for individual $\ln M_t$, $\ln t^*_t$, $\ln(y\text{-}x)_t$ and $\ln f_t$ variables. We use the framework Johansen and Juselius (1992) developed for testing and estimating long-run relationships among non-stationary series. The *reduced-rank* regression of the Johansen-Juselius Maximum Likelihood Cointegration technique yielded *maximal* and *trace* likelihood ratio test statistics based on the largest *eigenvalues* reported in Table 7[6]. The statistically significant adjusted and unadjusted *maximal eigenvalue* statistics indicate that the null hypothesis of no cointegration (i.e. r=0) can be rejected at, respectively, 5 and 1 percent significance levels. Consequently, the alternative hypothesis of r=1 is accepted. However, the null hypothesis cannot be rejected for higher ranks up to r (n – 1), when n = 5, the number of variables in the system. Thus, the test results indicate that there is only one cointegrating vector[7].

6 Using a general-to-specific modelling approach we started with the maximum lag length, k =3, given the sample size, and arrived at an order of k=1 for the VAR as the best representation of the data.

7 Under the trace tests we reach the same conclusions for both adjusted and unadjusted statistics. That is, we can reject the null hypothesis of no cointegration in favour of the alternative that there is utmost one cointegrating vector. The rest of the null hypotheses (i.e. from r#1 up to r#4) cannot be rejected, hence, the alternatives from $r\exists$2 up to $r\exists$5 are rejected. This means that there is indeed only one cointegrating relationship among the non-stationary variables in the system, hence, we can obtain a non-spurious import demand regression output.

Table 7: Johansen-Juselius Maximum Likelihood Cointegration test results[8]

Maximal test[a]					Trace test[a]				
NH[b]	AH[b]	Statistic	Adjusted[c]	95%	NH[b]	AH[b]	Statistic	Adjusted[c]	95%
r[d] = 0	r = 1	38.7***	32.4**	30.0	r = 0	$r \geq 1$	76.5***	64.2**	59.5
$r \leq 1$	r = 2	19.7	16.5	23.8	$r \leq 1$	$r \geq 2$	37.8	31.7	39.9
$r \leq 2$	r = 3	11.6	9.7	17.9	$r \leq 2$	$r \geq 3$	18.1	15.2	24.3
$r \leq 3$	r = 4	6.5	5.4	11.4	$r \leq 3$	$r \geq 4$	6.5	5.5	12.5
$r \leq 4$	r = 5	0.1	0.1	3.8	$r \leq 4$	$r \geq 5$	0.1	0.1	3.8

Notes: a: Tests were performed using *PcFmil version* 9.10 (Doornik and Hendry, 1997).
b: NH and AH are "null hypothesis" and "alternative hypothesis", respectively.
c: Maximal and trace test statistics adjusted for degrees of freedom (Reimers, 1992).
d: r denotes the number or "rank" of cointegrating vectors.
** and *** denotes significance at, respectively, 5 and 1 percent level.

Cointegration also permits the use of the stationary error correction term in the dynamic version of the import demand model to recover long-run information lost due to differencing. On account of there being only one cointegration vector we resort to the equally efficient single-equation estimation technique.

Solved Long-run and Short-run Dynamic or Error-correction models

The solved static long-run model was estimated in autoregressive distributed lag (ADL) form with a lagged dependent variable. For both the long-run and short-run models, the Hendry-type "*general-to-specific*" approach was used to arrive at the results reported in Table 8.[9] All elasticities have the correct signs. 'True' protection (t^*), domestic endowment (y-x) and real exchange rate (*rer*) are found to be significant in both the solved long-run and short-run models. Foreign exchange reserves (*minus* gold) is an important determinant in the long-run only.

8 The maximal and trace statistics adjusted for degrees of freedom (sample size) (Reimers, 1992) are also reported. Ostewald-Lenum critical values at 95 percent are used to evaluate the results.

9 There is no evidence of misspecification (from insignificant RESET F-statistic), serial correlation (insignificant AR F-statistic), heteroscedasticity (insignificant F-statistic for the autoregressive conditional heteroscedasticity), and non-normality in the residuals.

Table 8: Estimated Long-run and Short-run Import demand models

Solved Long-run model (Dependent variable: *m*)			**Error-correction Model** (Dependent variable:)*m*)		
Variable	Coefficient (std error)		Variable	Coefficient (std error)	
Intercept	1.90	(0.44)***	ECM_{t-1}	-0.23	(0.09)***
ln t^*	-0.72	(0.14)***	)ln t^*_{t-1}	-0.46	(0.22)**
ln (*y*-*x*)	1.81	(0.23)***	)ln$(y\text{-}x)_{t-1}$	0.79	(0.33)***
ln *rer*	-0.64	(0.17)***	)lnrer_{t-1}	-0.32	(0.14)**
ln *f*	0.09	(0.04)***	)lnf_t	0.05	(0.04)
R^2	0.87		R^2	0.67	
Wald test Π^2 (3):	151.07	[0.00]***			
RESET F(1,21):	0.05	[0.83]	RESET F(1,22):	1.96	[0.18]
AR 1-2 F(2,20):	0.10	[0.75]	AR 1-2 F(2,21):	2.68	[0.12]
ARCH 1 F(1,20):	0.86	[0.36]	ARCH 1 F(1,21):	0.11	[0.74]
Normality Π^2(2):	2.20	[0.33]	Normality Π^2(2):	0.45	[0.80]
Sample size:	28		Sample size	27	

Notes: numbers in (**.**) are standard errors, [**.**] are *p*-values.

** and *** denote significance at 5 and 1 percent levels, respectively.

The elasticity estimates are within the range of those reported in earlier studies (see Section 3). Domestic endowment has the largest elasticity. Long-run and short-run elasticities of, respectively, -0.72 and -0.46 for 'true' protection indicate a very high degree of import demand responsiveness to, hence, importance of, commercial policy and 'natural' barriers. This serves to confirm that trade barriers have successfully induced domestic resource shifts in favour of the import-competing activities at the expense of consumption of imports.

Between true protection and real exchange rate, aggregate import demand was more responsive to the former than to the latter. The greater relative importance of true protection over real exchange rate suggests that episodes of trade protection (due to both policy and 'natural' barriers) had far greater implications for importing than real exchange rate movements. Considering that the bulk of imports are for industrial use and these are subject to long-term contracts it may well be the case that commercial policy actions, developments in external routes (upon which the burden of 'natural' barrier depends) and domestic endowment are regarded as the most crucial determinants of the volume of imports. The weak role of foreign exchange reserves in the short-term may well indicate that it is the long-term foreign exchange considerations that play a decisive role. In the short-run other means of financing imports (e.g. aid, which during

1987-2001 was over 25 percent of GDP, and domestic endowment) could be playing a major role. Otherwise, the result is inconsistent with *a priori* expectations.

The error correction coefficient gives the speed at which the system corrects short-run disequilibrium towards the equilibrium path. A coefficient of -0.23 indicates that only 23 percent of the disturbances are corrected within a year, the rest spills over to the following year. Such a rather slow speed of convergence to equilibrium is plausible for a typical developing countries where markets are underdeveloped and function with imperfections including partial price transmissions.

6. CONCLUSIONS AND POLICY IMPLICATIONS

The paper sought to analyse the relative importance of trade policy and 'natural' barriers in the determination of the aggregate import demand for Malawi using annual data over the period 1970 to 2001. The paper estimates series of the incidence of protection ('true' protection rates) caused by the above trade barriers using a relatively new framework of the incidence of protection. The significance of the incidence of protection is analysed, and the series are used together with foreign exchange reserves (*minus* gold) to augment and estimate a traditional (aggregate) import demand equation.

The inclusion of 'true' protection is the major distinction of this study from others that have sought to account for trade barrier effects using indirect approaches e.g. assuming that the effects of commercial policy instruments are endogenised in the *ppp*-real exchange rate, or using nominal import tariffs which are void of substitution effects as they are not a "relative" concept, among other variables. The size of 'true' protection for any given change in commercial policy or 'natural' barriers depends on the extent of substitutability between imports and importables (hence, extent of border-to-domestic price transmission), and also the degree of substitution (in consumption and production) between the traded and non-traded goods in the economy. Thus, a given rate of nominal import tariff may not bring about incentives to change consumption and production patterns if certain substitutability conditions exist.

Allowing for partial price transmission (of import border prices to domestic importables prices) the paper reports generally large estimates of 'true' protection arising from both commercial policy and 'natural' barrier instruments. The largest estimates obtain for the

period that Malawi had the most restrictive trade regime (1980 to 86/7) as the country attempted to contain balance of payment crises besides the long-term desire to prop up its industrial sector. Estimates of 'true' protection over the liberalised trade regime (1988/9 to 2001) are generally higher than those found for the period (1970 to 1979) prior to intensive trade protection. In this connection the most important and remaining causes of 'true' protection are "natural" barriers (external transport costs) and domestic implicit taxation of the traded goods sector, both of which culminate in raising the relative price of importables. In post-liberalisation commercial policy instruments played a small but important role in relation to the other two; in pre-liberalisation commercial policy was more dominant. The main impression here is that Malawi is yet to rid itself of sources of sectoral incentives biases that have profound implications for resource allocation in the economy.

The paper also finds that 'true' protection has had decisive negative implications for aggregate imports consumption in both the long-run and short-run terms. Interestingly, the paper finds that demand for imports is more responsive to 'true' protection than to real exchange rate. This points to the importance of 'true' protection in the specification of the aggregate import demand for Malawi. Other variables (i.e., domestic endowment, real exchange rate and foreign exchange reserves) also appear to have played important roles in determining the volume of imports into Malawi and are thus useful targets for policy to influence aggregate import demand. The error correction model (ECM) revealed a slow annual speed of adjustment (23 percent) to equilibrium path. The rather slow speed means that the system sustains disturbances (e.g. episodes of high incidence of protection) over a number of years, and when these are not one-off disturbances the effect can span over periods of time even after some policy reversal (e.g. import liberalisation). It is, therefore, not surprising that not only are the estimates of 'true' protection high post-liberalisation but also that 'true' protection elasticities remain well high post-liberalisation.

The lessons for policy can be stated as follows. Some sources of nominal protection (e.g. import tariffs, and implicit taxation) are within the control of policy and, therefore, can be influenced to stir the economy away from a highly import-restrictive bearing. 'Natural' barriers embodied in exorbitant external land transport costs pose a fundamental challenge for the economy in respect of achieving cheaper access to

imports. The armed conflict in Mozambique that devastated the strategic road and rail routes ended nearly a decade ago. To date, however, the more important Beira route remains unrepaired and consequently 'natural' barriers remain largely unresolved. It is obvious that the cost implications to rectify this problem are enormous, and the infrastructure is outside the control of Malawi. May be a model to emulate in this respect is the TANZAM (Tanzania-Zambia) railway link project jointly financed and owned by the two countries. TANZAM (run by the Tanzania-Zambia Railway Authority, TAZARA) connects geographically landlocked Zambia (from its capital Lusaka) to the Tanzanian and main east African sea port of Dar es Salaam. The distance covered is much longer than connecting Malawi and Tanzania and several folds longer than connecting Malawi's commercial city of Blantyre to Mozambican sea port of Beira. Investment in this (Beira-Blantyre) railway infrastructure has the potential to greatly reduce one of the main elements of 'natural' barriers, and is therefore, an area that Malawi needs to pursue aggressively.

Endnotes

[i] Thus, the model contains both domestic and external relative prices or real exchange rates. Milner and McKay (1996) have shown that in theoretical terms it is quite possible for a *ppp*-type real exchange rate and the domestic relative price real exchange rate (i.e. 'true' protection) measure to move in the opposite direction.

[ii] By implication, $(1-T)$ is a proxy of the index of substitutability between non-traded goods and exportables in the case of full price transmission, and is an index of substitutability between non-traded goods and both exports and locally-consumed exportables in the case of partial price transmission.

[iii] As there was no evidence of parameter instability in the models used to estimate these indexes (over 1970-2001) we will assume constant substitutability over the study period in subsequent analyses.

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Tables Appendix

Table A1: Nominal Protection by Source and True Protection (1994=100)

Year	Import tariffs	Tariff equival. of NTMs	Transport Cost / Imports fob	Interactive effects	Implicit Taxes	True Protection
1970	42.6	58.0	30.7	13.1	44.2	50.1
1971	52.6	153.6	30.6	16.1	29.3	43.7
1972	64.7	88.6	27.1	17.5	42.3	51.2
1973	45.0	105.4	27.1	12.2	32.4	42.7
1974	50.8	115.8	26.5	13.4	30.0	42.0
1975	57.1	0.0	26.0	14.9	37.9	45.3
1976	78.7	207.5	26.5	20.9	40.5	53.6
1977	85.0	241.7	53.0	45.1	19.9	49.6
1978	96.7	0.0	53.1	51.4	46.9	62.3
1979	133.1	0.0	55.4	73.7	49.5	67.6
1980	144.3	0.0	75.2	108.6	65.2	80.4
1981	192.0	397.2	69.5	133.5	34.7	71.7
1982	251.2	651.0	106.1	266.6	33.8	82.2
1983	297.4	632.1	109.9	326.7	68.9	97.7
1984	293.1	834.7	131.1	384.4	52.9	94.6
1985	277.3	797.9	131.1	363.5	72.5	100.7
1986	288.8	789.9	131.1	378.7	73.6	101.5
1987	137.9	382.9	131.1	180.8	54.9	85.5
1988	101.5	263.7	131.1	133.1	41.6	76.3
1989	111.6	294.3	120.8	134.8	73.0	90.4
1990	158.0	215.0	120.5	190.5	61.3	87.1
1991	128.1	320.5	131.1	168.0	47.9	81.4
1992	147.0	164.8	120.5	177.2	84.2	96.6
1993	140.9	416.3	131.1	184.7	87.6	100.1
1994	100.0	100.0	100.0	100.0	100.0	100.0
1995	96.6	88.6	131.1	126.7	66.5	86.1
1996	132.7	98.7	131.1	174.0	68.4	89.2
1997	115.1	135.0	131.1	150.9	80.1	93.9
1998	134.0	0.0	107.4	143.9	76.6	89.9
1999	62.5	81.6	109.7	68.6	52.5	59.2
2000	65.2	68.4	92.0	60.0	47.8	56.3
2001	49.9	46.6	95.9	47.9	62.8	36.4

Sources: Import tariffs and transport costs calculated using aggregate HS data from the *Statement of External Trade* (National Statistical office, Malawi) - various issues; tariff equivalents of NTMs are import-weighted black market premium rates (from *African Development Indicators*, World Bank, 2002) (Zgovu, 2002); Implicit taxes calculated using ADMARC producer prices (for major export crops handled by ADMARC) published in the *Economic Report* (Malawi Government, 1970-2002a) and corresponding world prices published in the *International Financial Statistics* (IMF) - various issues.

Table A2: Selected Macroeconomic Data

Year	Import Volume (1994=100)	Import Price (1994=100)	GDP Deflator (1994=100)	Current Price GDP (MK mln)	Merch. Exports (MK mlln)	Reserves-gold (US$m)	Exchange Rate MK/US$
1970	47.3	1.8	7.0	267.1	49.7	91.2	0.833
1971	50.9	1.9	7.1	334.9	59.3	89.3	0.831
1972	57.0	2.0	7.3	359.1	64.5	93.8	0.802
1973	58.1	2.4	8.0	364.0	79.9	171.9	0.819
1974	67.7	3.2	9.5	461.5	101.3	199.9	0.841
1975	86.3	3.9	10.3	529.7	122.1	143.2	0.864
1976	68.2	4.4	11.2	612.0	151.6	51.1	0.913
1977	67.4	4.9	12.8	728.0	180.3	187.7	0.903
1978	89.4	4.9	13.0	800.7	155.7	148.8	0.844
1979	98.8	5.6	13.5	864.5	189.8	127.4	0.817
1980	91.5	6.7	15.8	1,005.1	239.3	121.8	0.812
1981	71.1	8.1	18.4	1,108.1	255.8	62.0	0.895
1982	65.1	13.2	20.1	1,245.1	256.6	28.6	1.056
1983	65.8	10.5	22.4	1,436.9	270.6	18.0	1.175
1984	61.6	11.1	25.5	1,707.4	446.2	73.1	1.413
1985	50.5	11.7	27.8	1,944.9	422.0	58.2	1.719
1986	42.7	15.0	31.0	2,197.6	462.1	28.6	1.861
1987	50.1	20.4	36.1	2,614.0	615.1	63.0	2.209
1988	65.5	25.3	45.7	3,417.9	751.7	174.0	2.561
1989	71.8	29.1	54.0	4,199.2	743.2	116.2	2.76
1990	70.1	32.0	62.2	5,069.9	1,123.5	150.2	2.729
1991	77.9	33.9	70.3	6,177.2	1,326.4	165.3	2.803
1992	91.8	44.1	80.1	6,484.2	1,488.9	39.3	3.603
1993	66.5	46.9	129.0	8,968.9	1,410.9	55.9	4.403
1994	100.0	100.0	100.0	10,227.4	2,953.6	34.1	8.736
1995	82.7	181.4	243.2	21,940.0	6,192.6	105.8	15.284
1996	72.3	179.2	365.9	36,454.0	7,358.8	217.0	15.309
1997	89.7	192.5	396.9	42,310.4	8,827.4	153.1	16.444
1998	94.8	339.3	526.3	57,319.0	13,861.3	246.9	31.073
1999	122.3	461.0	696.7	78,621.9	19,907.4	231.6	44.088
2000	155.7	613.6	842.0	97,159.0	23,630.4	223.5	59.544
2001	168.5	743.1	1,052.0	127,600.0	32,734.9	182.1	72.197

Source: *International Financial Statistics* (International Monetary Fund) - various issues, *Financial and Economic Review* (Reserve Bank of Malawi, 1970-2002) - various issues.

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