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Bangladesh and the Uruguay Round: a general equilibrium welfare analysis

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Key to symbols used in tables

n.a.	**Not applicable**
..	**Not available**
-	**Zero**
.	**Insignificant**

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Abstract

Concerns have been expressed for the possible deleterious implications of the Uruguay Round of the GATT for the least-developed countries, especially the food importers. A general equilibrium approach is used in this paper to analyse the effects that the Round may have on the structure of the Bangladesh economy and on economic welfare. It is concluded that the Round is indeed welfare-reducing for Bangladesh. These results have potential implications for international compensation of Bangladesh, but if Bangladesh were to reduce its own protection at the developing country average of 25 per cent, the welfare-reducing consequences of the Uruguay Round would be approximately negated.

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Bangladesh and the Uruguay Round: a general equilibrium welfare analysis

The successful completion of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) may have implications for the structure of the Bangladesh economy and for economic welfare in that country. This analysis utilises a variant of a recently constructed 19-sector applied general equilibrium model of the Bangladesh economy. Using this model, the implications for Bangladesh of two kinds of exogenous shocks are simulated. First, the implications of various published estimates of the changes in international prices that may follow from the conclusion of the Uruguay Round are analysed. These international price changes are primarily the result of liberalisations undertaken by countries other than Bangladesh, as agreed under the Round. Second, because least-developed countries like Bangladesh are encouraged, but not required, to undertake liberalisation under the Round, the economic implications of reduced protection within Bangladesh are also simulated.

As the analysis is carried out in the 'second-best' situation wherein some policy distortions within Bangladesh still prevail, a methodology is innovated to decompose the changes in economic welfare within Bangladesh to show the contributions of both direct and indirect effects of exogenous changes. The indirect effects result from the interaction between the exogenous changes discussed above and existing policy distortions incorporated in the model.

The Uruguay Round, eighth in a series of multilateral trade negotiations under the auspices of the GATT, concluded in December 1994 (see GATT (1994) for details, and Schott and Buurman (1994) for a qualitative assessment of the agreement). The Round is a complex agreement which includes commitments on

- tariff reductions in manufactured products
- tariffication of non-tariff barriers in agriculture and reductions in the level of agricultural protection
- reduction of export and production subsidies in agriculture

- gradual elimination of voluntary export restraints, including the Multi-fibre Arrangement
- institutional and rule changes, such as the creation of the World Trade Organisation and safeguards, anti-dumping and countervailing duty measures
- aspects of trade policy not covered by earlier agreements, such as Trade Related Investment Measures, Trade Related Aspects of Intellectual Property Rights, the General Agreement on Trade in Services
- areas receiving greater coverage, such as government procurement.

Virtually all major Uruguay Round commitments on trading rules and market access vary among countries, depending on the level of development. The least developed countries, such as Bangladesh, are accorded concessions in many areas. For example, although these countries are required to bind their border protection they are otherwise exempted from the liberalisation commitments and the prohibition on subsidies that are contingent on export performance (Nguyen et al. 1993, 1995).

A substantial body of economic studies has emerged attempting to quantify the impact on the world economy of trade liberalisation broadly comparable to that achieved in the Uruguay Round (Duncan, Robertson and Yang 1994; Francois, McDonald and Nordström 1994; Andrews, Roberts and Hester 1994; Brandao and Martin 1993; Goldin, Knudsen and van der Mensbrugghe 1993; Vanzetti et al. 1993, 1994; Dee, Jomini and McDougall 1992). All these studies, based on various global computable general equilibrium models, have concluded that the Uruguay Round agreements would result in net aggregate gains for the world. The estimated magnitude of the gains vary significantly from study to study depending on the model and assumptions used. Nevertheless, while all such studies have emphasised the aggregate gains which may result from the Round, at least one (Goldin et al. 1993:25) projects potentially adverse impacts on the food-importing developing economies because of projected increases in the international prices of food grains in particular, relative to manufactured goods. This possibility has raised the issue of potential compensation of the poorest of these countries for the losses sustained (UNCTAD 1990; Hamilton and Whalley 1995).

Since Bangladesh is a major net importer of food, with heavy government involvement in the control and domestic marketing of these imports, an increase in international food prices could potentially aggravate budgetary and political problems in Bangladesh. In addition, the liberalisation of the textiles and clothing market, involving the phase out of the Multi-fibre Arrangement, could affect the country's balance of payments adversely. Despite its negative features in other respects (see for example Hamilton 1990), the Arrangement has ensured a secured overseas market for more than fifty per cent of Bangladesh's garment exports. The effect of its phase-out could be pronounced because of the narrow export base and high share of clothing in Bangladesh's total export earnings. While the structure of production and trade plays

an important role in determining the consequences of multilateral trade liberalisation under the GATT, the overall welfare effects depend on a host of other conditions, including the remaining policy distortions. The use of a multisectoral applied general equilibrium model to address these issues is thus appropriate, and perhaps essential.

The Bangladesh economy and policy background

Bangladesh is characterised by low per capita income and slow growth, and a large negative resource-balance to GDP ratio (Table 1). The structure of GDP began to change only in recent years and agriculture remains a large share of national output and employment. Since the early 1980s, the contribution of services to GDP has exceeded that of agriculture, while industry's contribution has remained static at around 16 per cent.

Since the mid-1980s, the structure of export trade has also changed (Table 2). Export shares of jute, jute goods and tea, the 'traditional' agro-based exports, have declined. Garments exports, which were insignificant in 1973, have become the major gross

Table 1 **Bangladesh: key economic indicators, selected years**

	1973	1981	1983	1985	1988	1990	1992
Current GNP per capita (US$)	80	150	150	150	180	210	220
Real GDP growth (per cent)	-0.2	9.5	4.6	3.9	2.8	6.6	4.2
Structure of GDP (per cent)							
Agriculture	57	40	40	42	39	36	34
Industry[a]	12	17	17	16	15	16	17
Manufacture	9	11	11	10	8	9	9
Services	31	43	43	42	46	48	49
Resource balance[b] (per cent of GDP)	-5	-12	-12	-11	-9	-10	-6
Terms of trade (1987=100)	164	93	100	122	97	104	116
Gross savings (per cent of GDP)	4.2	6.2	5.6	4.6	6.3	5.4	9.9
Inflation[c] (per cent)	49	16	9	11	9	8	5

[a]'Industry' consists of mining, manufacturing, construction, electricity, water and gas.
[b]Defined as the value of exports of goods and non-factor services minus the value of imports of goods and non-factor services.
[c]Based on CPIs
Sources: World Bank, 1993. *World Tables 1993*, World Bank, Washington, DC; Bangladesh, Government of, 1994. *Bangladesh Economic Review 1993–94*, Ministry of Finance, Dhaka.

foreign exchange earner; in 1993, more than half of gross export dollars were earned by garments alone. Exports of leather and leather products, shrimp and fish are also substantial. While the shift from traditional exports to non-traditional exports is evident, no fundamental broadening of the export base has occurred. Heavy reliance on one or two broad commodities still continues: garments in the 1980s and 1990s in place of jute goods, which were dominant until the 1970s.

Nevertheless, the unprecedented growth of Bangladesh's garment exports during the last 12 years has integrated the business community of Bangladesh with the rest of the world considerably. Even though the net foreign exchange earnings from garments exports are much lower than the gross earnings, due to heavy dependence on imported raw materials, these industries have created considerable employment opportunities for both skilled and semi-skilled workers and have greatly increased the outward-orientation of the Bangladesh economy.

About 60 per cent of total garments exports go to the United States under the Multi-fibre Arrangement (MFA). The Arrangement, which controls world trade in textiles and garments, formally expired in December 1992 and was due for renegotiation.

Table 2 **Bangladesh: structure of exports, selected years**

	1973	1981	1983	1985	1988	1990	1992	1993
Total exports (million US$)	354	711	686	934	1231	1524	1994	2383
Total exports (per cent of GDP)	6.1	5.0	5.6	6.0	6.4	6.8	8.4	9.6
Commodity group (per cent of total)								
Raw jute	37.8	16.8	16.0	16.1	6.6	8.2	4.3	3.1
Jute goods	52.3	51.6	46.6	41.7	24.4	21.5	15.2	12.3
Tea	2.7	5.7	6.8	6.5	3.2	2.6	1.6	1.7
Leather and leather products	4.5	8.0	8.5	7.5	11.9	11.7	7.5	6.3
Ready-made garments	.	0.5	1.7	12.5	35.3	40.0	53.4	53.3
Shrimp and fish	1.3	5.6	10.5	9.3	11.8	9.5	6.8	7.3
Others	1.4	11.8	9.9	6.4	6.8	6.5	11.2	16.0
Export price index (1987=100)	58	96	94	108	99	115	129	..

Sources: Bangladesh, Government of, 1994. *Export from Bangladesh 1972–73 to 1992–93*, Export Promotion Bureau, Government of Bangladesh, Dhaka; Bangladesh, Government of, 1994. *Bangladesh Economic Review 1993–94*, Ministry of Finance, Dhaka; World Bank, 1993. *World Tables 1993*, World Bank, Washington, DC.

After the successful conclusion of the Uruguay Round of the GATT in 1994, the MFA is to be phased out over a 10 year period. Increased competition following the withdrawal of export quotas under the MFA would lead to lower world prices of garments. At least in the short run, it will have adverse implications for the balance of trade, employment and welfare of a country where 50 per cent of merchandise exports earnings are from garments.

Food imports: political sensitivity and budgetary implications

One important feature of Bangladesh's import trade is that the share of capital goods has been increasing relative to that of food and major primary goods (Table 3). Nevertheless, food, predominantly rice and wheat, constitutes a considerable proportion of the total import bill with a combined share which ranged between 19 and 4 per cent from 1973 to 1993 (Table 3).

Table 3 **Bangladesh: composition of imports, selected years**

	1973	1981	1983	1985	1988	1990	1992	1993
Total imports (million US$)	780	2533	2309	2647	2986	3759	3464	3986
Total imports (per cent of GDP)	13.1	17.7	18.7	16.9	15.6	16.8	14.6	16.1
Commodity group (per cent of total)								
Food and major primary goods	54.7	28.1	35.5	31.6	25.2	12.8	14.4	10.2
Rice	..	1.6	4.2	6.6	5.0	2.7	0.1	0.2
Wheat	..	8.3	11.7	12.2	11.4	6.4	7.2	3.5
Major intermediate goods	16.1	16.7	13.5	16.3	15.9	17.8	17.2	18
Edible oil	1.3	3.6	3.6	3.9	5.9	5.3	4.1	3.8
Petroleum	3.9	6.3	3.6	5.0	4.6	4.6	4.9	4.1
Fertiliser	3.1	4.1	2.9	5.2	1.5	1.2	3.4	3.3
Cement	0.9	1.3	1.9	1.0	2.2	2.2	3.1	2.9
Capital goods	12.8	27.2	25.9	26.1	36.5	34.5	37.1	31.3
Miscellaneous	25.8	28.0	25.1	26.0	22.4	34.9	31.3	40.5
Import price index (1987=100)	35	103	94	89	102	110	111	..

Sources: Bangladesh, Government of, 1994. Imports, Planning Commission, Dhaka (unpublished); Bangladesh, Government of, 1994. *Bangladesh Economic Review 1993–94*, Ministry of Finance, Dhaka; World Bank, 1993. *World Tables 1993*, World Bank, Washington, DC.

Meeting the growing consumption requirements for cereals, particularly rice, remains an important political issue and a central objective of public policy. About eighty per cent of the total cultivated area (the cropping intensity in 1990–91 was 171 per cent) is devoted to intensive rice and wheat production, and yet can not produce enough food for Bangladesh (Bangladesh 1992). Imports account for an average of 10 per cent of domestic food grains absorption, the bulk occurring through food aid, although commercial imports are also significant (Salma and Warr 1994:9–10). Most of the commercial imports are controlled by the government to meet the target level of availability and to maintain low and stable food prices. Rising world prices thus put pressure on the balance of payments and on the government's budget.

Policy background: import substitution

The Bangladesh government has pursued a 'protectionist import-substitution' industrialisation strategy. For some selected manufacturing industries, it established import controls to insulate domestic markets from international competition. These included outright bans and discretionary quantitative restrictions through Import Policy Orders, import licenses and tariffs. Until 1984, import licenses were used to ration foreign currency at the official exchange rate to importers. The extent of the commodity coverage of the import licensing system has subsequently declined.

The tariff structure designed for protecting some selected domestic industries is also used to raise government revenue. Even in the late 1980s, more than 30 per cent of annual revenue came directly from tariffs (Bangladesh 1993). The result was high and discriminatory rates of protection which, instead of merely guiding investment decisions, tended to be an instrument of ensuring the *ex post* profitability of selected industrial investments. Import controls and limited export incentives meant that adjustments to the official exchange rate played a minor role as an instrument of trade policy (Ahammad 1995:17). The taka (the Bangladesh currency) was over-valued in the sense that, because of tariffs and exchange controls, the official exchange rate (taka per US$) was lower than it would have been, at an unchanged money supply, if these barriers to trade had been eliminated.

Agricultural and agro-based exports, namely jute, jute products and tea, were seriously disadvantaged by Bangladesh's tariff and exchange rate policies. The overall policy bias was in protecting industry at the expense of agriculture, directly through tariffs and non-tariff barriers, and indirectly through the overvalued exchange rate. An anti-export bias was also evident, with the possible exception of garments, due to its access to duty free imports and a secured overseas market. Estimates of effective rates of protection by Hutcheson (1986), show that the average overall level of effective protection to manufacturing was 114 per cent as against 13 per cent to agriculture (Table 4). The average effective rate of protection for import-substituting activities was 135 per cent compared to 11 per cent for export industries .

Table 4 **Bangladesh: nominal and effective rates of protection (per cent)**

	Nominal	Effective[a]
Rice growing	5.0	3.9
Wheat growing	5.0	3.6
Jute growing	22.4	25.9
Cotton growing	23.4	31.6
Tea cultivation	2.3	-6.1
Other crops	5.0	1.6
Livestock	7.9	6.9
Fishing	11.6	6.5
Forestry	32.6	33.8
Sugar	42.7	291.9
Edible oils	35.4	962.2
Salt	28.6	30.2
Tobacco products	7.5	-89.8
Other foods, nec	28.7	44.0
Cotton yarn	56.3	..[b]
Mill-made cloth	48.9	61.8
Hand loom cloth	48.5	45.8
Jute textiles	2.1	-5.2
Paper and paper products	69.6	290.4
Leather	2.7	-29.6
Fertiliser	-6.5	-28.6
Pharmaceuticals	33.2	21.8
Other chemicals, nec	58.0	225.6
Cement	13.9	-15.5
Basic metals	52.2	62.6
Metal products	61.9	87.5
Machinery	26.0	9.6
Automotive vehicles	147.2	994.8
Wood products	34.8	41.6
Miscellaneous products, nec	55.5	92.1
Petroleum products	27.7	38.5
Averages		
Primary activities	7.1	12.6
Manufacturing	45.9	114.3
Import substituting	49.5	134.9
Export sectors	10.2	11.2

[a]Based on 1977 inter-industry table. The estimates were based neither on Balassa method nor on Corden method, but on the conversion factor approach (for details, see Hutcheson 1986). The rates based on the prevailing exchange rate were called 'gross effective rates of protection'. If the entire protection structure were withdrawn, the exchange rate would have to rise sufficiently to maintain the same trade balance as before. The gross effective rates adjusted for such exchange rate effect, are the 'net effective rates of protection' (Hutcheson 1986).

[b]No value reported due to negative value-added at border prices.

Source: Hutcheson, T.L., 1986. *Effective Rates of Protection: an input-output analysis*, Doc. TIP-MU-H.3, Trade and Industrial Policy Reform Program, Dhaka.

In the 1980s several attempts were made to reform the tariff structure by reducing the variance of tariffs. In 1986, the number of statutory rates was reduced from 24 to 11. In 1988 the government adopted a phased three-year program intended eventually to reduce maximum tariffs

- for most final good imports, from over 200 per cent to 100 per cent
- for raw materials, to 20 per cent
- for intermediate products, to 75 per cent.

However, the situation has not improved much in recent years. Bhuyan and Rashid (1993) estimated the effective rates of protection for selected industries using survey data for 1990 and the Balassa and Associates (1971) method of treating non-traded inputs. The nominal rates of protection for most activities were very high, as high as 208 per cent for frozen food, crust and finished leather for example. The estimates showed that industries received degrees of effective protection which varied greatly. Wet-blue cow leather had a 4483 per cent effective rate of protection for domestic sale, while hand loom industry produce had effective protection as low as 20 per cent. Negative effective protection, due to value-added at border prices exceeding value-added at domestic prices, was also found for several industries. Negative rates of protection can also occur for another, quite different, reason—negative value-added at border prices. Negative rates arising from this source indicate industries receiving very high rates of protection because without their protection they would become non-viable. At least one example of this kind can be found for Bangladesh, a rate of -693 per cent for cotton fabric. It is obviously important to distinguish negative rates arising from negative value-added at border prices from the more usual source of (positive) value-added at border prices exceeding value-added at domestic prices because their implications are entirely opposite.

Import-substitution activities continued to enjoy very high protection (Bhuyan and Rashid 1993). Stern et al. (1988) estimated the real effective trade-weighted exchange rates for imports and exports, incorporating the effects of taxes, subsidies, relative inflation rates and changes in the relative values of trading partner currencies. From 1974 to 1985, the real effective exchange rate for imports consistently exceeded the real effective exchange rate for total exports. The real effective exchange rates for non-traditional exports (mainly garments) always exceeded those for the total exports, reflecting the policy bias towards the non-traditional activities and discrimination against the traditional agricultural exports.

The model

The global general equilibrium models used to study the impact of the successful conclusion of the Uruguay Round vary somewhat in their behavioural assumptions, but more significantly in their geographical (that is, regional) dimensions and levels of commodity aggregation. In all such global models of which the authors are aware, the Bangladesh economy has been aggregated with many other economies with diverse production and trade compositions, such as the entire South Asia region or 'low income Asia'. The need to simplify such global models is obvious, but important information can be lost in the aggregation process. The effects of the Uruguay Round on the Bangladesh economy could well be significantly different from that found for the region or country group within which Bangladesh is included.

Because of the vulnerability of a low income country like Bangladesh it is important to consider the implications of major international developments such as the Uruguay Round for their economic welfare. A detailed general equilibrium model of the Bangladesh economy is used here, which takes into account its specific trade structure and supply responses to investigate the effects of the Uruguay Round on economic welfare within Bangladesh.

This study uses a 19-sector computable general equilibrium (CGE) model of the Bangladesh economy, based on the model CGE-B89, documented in Ahammad (1995) featuring a dual exchange market. In view of the recent dismantling of the legal secondary exchange market, the CGE-B89 model is modified to incorporate a single unified exchange rate. The Bangladesh model belongs to the Johansen class of CGE models. The structural equations are specified in percentage change form. Each sector produces a single composite commodity using intermediate inputs with two primary factors: labour and capital. The production functions concerned allow no substitution possibilities among the intermediate inputs or between any intermediate input and composite primary input. The composite primary input is a Cobb-Douglas aggregate of labour and capital.

Sectors maximise their total revenue by producing for domestic and overseas markets. Outputs sold domestically are imperfect substitutes for exported output. Symmetrically, domestically produced goods are treated as imperfect substitutes for the imported goods within the same statistical category. Only one representative household is considered, which maximises utility given its income from profits, wages and net transfers from the government. Consumer demands for commodities are based on a linear expenditure system (LES). The government also intervenes in domestic markets through indirect taxes, including trade taxes. Any surplus or deficit in the government budget is financed by lump-sum subsidies to or taxes on the household.

A compressed version of the unified exchange rate version of the Bangladesh model follows. This compressed version differs from the full CGE model used for simulations in the present study in that, for simplicity, the former treats all traded and their domestic equivalents as perfect substitutes, and does not capture the non-refundable indirect taxes on some intermediate inputs.

For every imported commodity j

$$M_j = C_j(P^c, U) + G_j + I_j - Y_j(P^s, W) \quad (1)$$

where M_j, C_j, G_j, I_j and Y_j denote the quantities of imports, consumption, government demand, investment demand, and net output (gross output minus intermediate usage by other industries) of good j, respectively, P^c and P^s denote the vectors of consumer and producer prices, respectively, U is the household's utility, and W is the wage rate.

If commodity j is exported, Equation (1) becomes

$$X_j = Y_j(P^s, W) - C_j(P^c, U) - G_j - I_j \quad (2)$$

where X_j denotes the quantity of exports of commodity j. For a non-traded commodity,

$$Y_j(P^s, W) = C_j(P^c, U) + G_j + I_j \quad (3)$$

Producer prices, given by the vector P^s, depend, in the case of traded goods, on the *ad valorem* tariffs (tariffs plus tariff equivalents of non-tariff barriers, or net export subsidies in the case of an export), the vector t, and the vector of world prices P^* converted at the exogenously fixed exchange rate, ϕ (taka per US$)

$$P_j^s = (1+t_j)\phi P_j^* \quad (4)$$

Consumer prices, given by the vector P^c, exceed the producer prices by the amount of explicit sales taxes and excise duties, τ

$$P_j^c = (1+\tau_j)P_j^s \quad (5)$$

The economy is 'almost' small in the sense that it takes the foreign currency world prices for its imports as exogenously given, but the foreign currency world prices of its exports (P_j^*) depend inversely on the quantities exported (X_j)

$$P_j^* = f^j(X_j) \quad (6)$$

The foreign trade deficit, measured in foreign currency, is

$$F = \sum_{j=1}^{J} M_j P_j^* - \sum_{j=1}^{J} X_j P_j^* \qquad (7)$$

The variables t_j, τ_j, W, ϕ, G_j and I_j are exogenous. If either U or F is treated exogenously, the number of equations is equal to the number of endogenous variables and the model is closed.

The compensated demand equations, $C_j(P^c, U)$, have the property that

$$P^c C(P^c, U) = E(P^c, U) \qquad (8)$$

where $E(P^c, U)$ is the aggregate nominal consumption expenditure function. This property, used together with the above equations, defines the aggregate nominal expenditure of the household as

$$E(P^c, U) = P^s Y - P^s I + \{\tau P^s C + t\phi P^* M - t\phi P^* X - P^s G\} + \phi F \qquad (9)$$

where Y, I, C, M, X and G are vectors of commodity outputs, investment demands, consumption demands, imports, exports and government demands, respectively.

Equation (9) states that aggregate nominal consumption expenditure is met by income from ownership of the primary factors net of investment expenditure, government net transfers to the household plus net foreign transfers (involving workers remittances, foreign debts and aid). Equation (9) can also be viewed as the national budget constraint. It can be derived from the balance of payments constraint (Equation 7) and the supply and demand balances for each good or factor. That is, Equation (9) is implied by the rest of the system by Walras' law, and is not included in the model explicitly.

Manipulation of the total differential of Equation (9) at the fixed exchange rate and base-year tax rates, gives the change in household utility as

$$\lambda dU = \phi(X - M)dP^* + P^S dY + \{\tau P^S dC + t\phi P^* dM - t\phi P^* dX\} - P^S dI - P^S dG + \phi dF \qquad (10)$$

Equation (10) is a variant of the fundamental equation of applied welfare economics (Harberger 1971). The left hand side of Equation (10) denotes the monetary measure of welfare, and can be shown to be equal to the change in aggregate consumption evaluated at the base-year purchaser prices (Ahammad 1995:77–8). Equation 10 states that the change in utility dU scaled by the inverse of the marginal utility of income or expenditure, (denoted by λ) may be decomposed as follows.

(i) The first term, given by $\phi\,(X - M)dP^*$, measures changes in welfare due to *changes in the terms of trade.*

(ii) The second term, given by $P^s dY$, measures the change in welfare due to supply-side based changes in value added, arising from *changes in factor employment.* If the employment of primary factors is exogenously fixed, this term disappears.

(iii) The third set of terms, contained within the brackets {.}, measures welfare changes due to changes the level of activity in any distorted market multiplied by the excess of the marginal social benefit of that activity over its marginal social cost. In the present framework, only tax distortions are present—sales taxes and trade taxes—and so this term captures *changes in the levels of taxed activities.* The household gains from any increase in total tax revenue, because it is effectively returned to the household in the form of reductions in income tax, as explained above.

(iv) Finally, the fourth set of terms measures the welfare effect of *changes in the levels of investment* ($P^s dI$), *government expenditure* ($P^s dG$), *and the level of the foreign trade deficit* ($\phi\, dF$).

In interpreting this last group of terms it is vital to recognise the limitations of the modelling framework adopted here. First, changes in investment expenditure produce no measured benefits in a one-period model and changes in government expenditure produce no measured benefits in a model which does not capture the public good benefits that government expenditure can create. Expenditure on investment and government expenditure, as modelled, produces only costs. Similarly, increases in the current account deficit, as modelled, produce only benefits—in the form of increased absorption of traded commodities—because changes in the levels of foreign debts and credits are changes in future obligations and produce no measured benefits or costs in a one-period model.

Clearly, changes in welfare arising from the category (iv) terms would, in this modelling framework, be attributable to artefacts of the model. Simulation results in which changes in these terms were important could be highly misleading. To avoid such possibilities, the $P^s dI$, $P^s dG$ and $\phi\, dF$ terms are each constrained to be zero by holding real investment, real government spending and the current account deficit constant during simulations. This is done through appropriate choice of model closure, as described below. As a result, each of the three terms contained in category (iv) reduce to zero and changes in welfare can arise only from changes in terms (i) to (iii).

It should be noted that the decomposition of the sources of welfare changes depicted by Equation (10) is independent of the choice of model closure—the division of variables between endogenous and exogenous categories—and the set of shocks used in a particular simulation. Nevertheless, the economic interpretation of the decomposition must reflect the closure and shocks used.

The database and simulations

The model contains base period structural coefficients including cost, revenue and sales shares. It also has numerous elasticities: Armington trade elasticities; elasticity of transformation; substitution elasticities between primary factors; household expenditure elasticities; and world export demand elasticities.

The share coefficients are calculated from the same input–output table for 1989 used by Mansur and Khondker (1991), supplemented by data from other official documents. The elasticity parameters were based on an extensive literature search. The complete sets of input–output data files and the elasticity and miscellaneous parameter files are documented in Ahammad (1995). It should be noted that the incorporation of a single unified exchange rate into the present model has required some minor adjustments for the c.i.f. import values and f.o.b. export values.

Model closure

The simulations are designed to evaluate the impact of the successful completion of the Uruguay Round on the structure and welfare of the economy in a one-period framework. The changes in the economy, brought about by the exogenous changes in world prices following the multilateral trade liberalisation under the Round and the unilateral tariff cuts, are constrained to channel on to household consumption. To do this, investment expenditures of all kinds, government current consumption, and the balance of trade are held at their base-year levels, because changes in these values would not lead to any measured benefit to the household in a one-period context. The government budget is balanced in the sense that any increase (decrease) in the government's net budget surplus is transferred to (from) households in lump sum form. A fixed current account deficit should be understood to mean that any short-run change in the current account balance will be eliminated by policy adjustments exogenous to the model.

As explained above, the economy is a price taker for its imports, and faces constant elasticity downward-sloping foreign demand curves for its exports. For all exports, except for raw jute and jute goods, these elasticities are very large. The low elasticities for jute and jute products are based on the empirical studies (Imam 1970; Nguyen and Bhuyan 1977; Thomas 1979). Capital is industry specific. A slack employment market under constant real wages is assumed so as to capture the reality of involuntary unemployment in Bangladesh.

Policy simulations

Ten scenarios of the world price changes due to the conclusion of the Uruguay Round are reported in Table 5. (For a critical review of the models underlying most of these studies, see Schott and Buurman 1994.) Ten experiments have been carried out, each based on one of these ten sets of world price changes. Another experiment for a 25 per cent across-the-board tariff cut has also been performed. All experiments have been implemented under the fixed real-wage closure.

For all commodities except jute and jute goods, export demand elasticities are finite but very large. The world prices for these commodities are 'almost' exogenous. But Bangladesh enjoys some market power for world trade in jute and jute products. Any rise (or fall) in Bangladesh exports of jute and jute products would, therefore, reduce (or raise) their world prices. As a result of the supply responses of Bangladesh exporters, price rises (or falls) of jute and jute goods would be somewhat less than those actually predicted by those studies under consideration.

Results

Effects of the world price changes

The simulated effects of the world price changes (Table 5) will now be discussed. All ten scenarios imply a reduction of real income and economic welfare in Bangladesh. Since the results are qualitatively similar for all 10 sets of world price changes, only two will be discussed in detail. For this purpose, we have chosen scenarios 1 and 2 from Table 5 (based on Duncan et al. 1994 and Dee et al. 1992, respectively) because they are based on studies which involve more extensive commodity coverage than most. The simulation results are summarised in Tables 6 through 8. For comparison, a summary of the simulated results from the other eight world price scenarios is presented in Appendix Table 2.

Macroeconomic and welfare effects. The simulation results show that the world price changes flowing from the liberalisation under the Round would reduce real GDP in Bangladesh, measured both at factor cost and at market prices (Table 6). The world price changes would lead to an increase in involuntary unemployment at the fixed real wages (Table 7), which implies a fall in the real value-added to labour. At roughly fixed real value added to capital (capital being sector specific), real GDP at factor cost would thus fall. Total revenue collected from indirect taxes, evaluated at the fixed tax rates and base-year prices, also falls (Table 7). Consequently, GDP at market prices—the sum of GDP at factor cost and total indirect taxes—falls in real terms. The terms of trade worsens (Table 7), causing a transfer of domestic resources to the rest of the

Table 5 **Industry's shares in base-year total exports and imports, and impact of the Uruguay settlement on the average world prices, various studies** (per cent)

CGE-B89 industry	S1		S2	S3	S4	S5	S6	S7	S8	S9	S10	S_X	S_M
	c.i.f.	f.o.b.											
Rice	6.60	7.10	16.87	8.48	8.00	10.00	7.00	-1.90	5.60	1.99	4.22	0.00	1.20
Wheat	10.30	10.90	12.52	13.26	8.00	7.00	7.00	5.90	30.20	4.35	6.32	0.00	5.46
Jute[a]	4.60	5.40	-0.45	-0.15								10.04	0.00
Tea[a]	0.60	0.60	-0.59	-0.51				3.00	17.50	1.88	2.34	0.28	0.00
Fishing[a]	1.10	1.10	-0.66	-0.21								13.18	0.00
Forestry[a]	1.80	2.20	-0.88	-0.55								0.01	0.00
Edible oil	4.60	5.40	-0.45	-0.15	6.00		7.00	4.10	17.70	2.51	4.52	0.00	5.03
Other agriculture	1.70	1.80	-0.07	0.71	2.00	2.00	4.00	5.90	27.10	1.23	2.23	2.15	10.53
Sugar refining	4.60	5.40	-0.45	-0.15	1.00	1.00	3.00	10.20	59.30	6.31	10.18	0.00	3.50
Textiles	-6.70	-7.10	-1.07	-1.85								0.00	3.25
Garments[a]	-6.70	-7.10	-2.14	-14.51								29.36	0.16
Jute textiles[a]	4.60	5.40	-1.07	-1.85								26.92	0.00
Paper and paper products	0.20	0.10	-0.77	-0.71								1.08	2.10
Leather & footwear[a]	0.20	0.10	-0.99	-1.56								13.27	0.01
Chemicals	0.20	0.10	-0.74	-0.59								0.04	4.60
Other manufacturing	0.20	0.10	-0.57	-0.32								3.68	64.14
Physical overheads	0.60	0.60	-0.43	-0.05								0.00	0.00
Social overheads	0.60	0.60	-0.22	-0.42								0.00	0.00
Export Price index	n.a.	0.11	-1.21	-5.01	0.04	0.04	0.09	0.14	0.63	0.03	0.05		
Import price index	1.13	n.a.	0.39	0.56	1.08	0.75	1.34	1.48	7.54	0.74	1.21		
Terms of trade	-1.02		-1.60	-5.57	-1.04	-0.71	-1.25	-1.34	-6.91	-0.71	-1.16		

Notes: **S1** is Scenario 1 based on Duncan, R. et al. 1994; **S2** is Scenario 2 based on Table 3 in Dee, P. et al. *1992;* **S3** is Scenario 3 based in Dee, P., 1994; **S4** is Scenario 4 drawn from Table 1 in Andrews, N. et al. 1994; **S5** is based on Scenario 1 of Table 9 in Vanzetti, D. et al. 1994; **S6** is based on Scenario 1 of Table 2 in Vanzetti, D., Andrews, N. et al. 1993; **S7** and **S8** are based on Scenario 1 (PLIBA) and Scenario 2 (FLIBA), respectively, of Table 3.1 in Goldin, I. et al. *1993;* **S9** and **S10** are Scenario 9 and Scenario 10 drawn, respectively, from columns 1 and 5 of Table 7 in Brandao, A.S.P. and Martin, W.J., 1993; S_X and S_M are, respectively, the industry's shares in base-year aggregate exports and imports in Bangladesh ;
[a] Exporting industry in the Bangladesh CGE model.

world. With the reduced income consequent upon the reduced real GDP at market prices and worsened terms of trade, the base-year consumption of the household cannot be maintained.

Thus, the changes in the world prices are welfare-reducing (Table 7). In both cases, welfare losses due to worsening terms of trade are significant. Welfare losses due to the reduced household's wage income in real terms as involuntary unemployment increases, are also substantial. When the aggregate revenue income of the government falls, it has to raise the compensating amount of revenue to maintain the pre-determined

Table 6 **Effects of the world price changes and a 25 per cent across-the-board tariff cut (per cent)**[a]

	Scenario 1	Scenario 2	25 per cent tariff cut
GDP at factor cost (real)[b]	-0.16	-0.17	0.40
GDP at market prices (real)[c]	-0.20	-0.18	0.46
Consumer price index (CPI)	0.14	-0.44	-1.49
GDP (at market prices) deflator	-0.17	-0.68	-1.80
Composite producer's price			
Rice	0.06	-0.35	-1.34
Wheat	3.13	3.38	-0.93
Output of industry aggregates			
Agriculture	0.08	0.03	0.25
Manufacturing	-1.04	-0.74	0.96
Services	-0.31	-0.26	0.36
Exporting	-0.42	-0.92	1.87
Import-competing	-0.26	-0.07	0.19
Highly protected	0.20	-0.25	-0.56
Lightly protected	-0.32	-0.05	0.28
Quantity of imports			
Rice	-10.58	-27.60	-0.77
Wheat	-7.03	-8.77	-0.26

[a]See Table 5 for sources of the world price change scenarios. Figures are the percentage changes of the base-year prices, values or quantities.
[b]Share-weighted sum of the changes in the real value-added to labour and capital.
[c]Share-weighted sum of the changes in real consumption and investment expenditure (private and public), and net export value. Also equal to the share-weighted sum of the changes in real GDP at factor cost and the total net indirect tax revenue evaluated at the base-year tax rates and prices.
Source: Model simulations

Table 7 **Decomposition of the welfare effects[a] of the exogenous world price changes and an across-the-board reduction in tariffs by 25 per cent**

	Scenario 1		Scenario 2		25 per cent tariff cut	
	per cent	value (million taka)	per cent	value (million taka)	per cent	value (million taka)
(1) Terms of trade effect[b]	n.a.	-1889.76	n.a.	-868.62	n.a.	-194.53
(2) Employment effect	-0.35	-1036.51	-0.36	-1067.01	0.85	2534.06
(3) Government revenue effect	n.a.	-321.15	n.a.	-146.36	n.a.	527.03
Revenue from taxes on						
HH consumption	-0.92	-74.91	-0.33	-27.10	0.95	77.29
intermediate inputs	-0.31	-32.76	-0.41	-43.24	0.79	83.84
tariffs	-1.16	-213.47	-0.41	-76.02	1.98	365.89
(4) Aggregate welfare[c]	-1.23	-3247.41	-0.79	-2081.99	1.09	2866.55

[a]Based on Equation (10). Percentage changes give the changes in relevant quantities. The value changes (except for the terms of trade effects, see note b below) are evaluated at the base-year prices, tax, subsidy rate and exchange rate. A change in the aggregate welfare is defined as the change in utility divided by the marginal utility of income (normalised to unity). It is also equal to the change in aggregate real consumption spending at constant prices. The decomposition thus shows the various sources of the change in consumer's real spending.
[b]First term in Equation (10). Note that in the full model, changes in export prices could be different from those of import prices.
[c]Identity: (4) = (1)+(2)+(3).
Source: Model simulations.

real expenditure (evaluated at the base-year prices and tax rates), through lump-sum taxes on household incomes, causing a welfare loss to the household.

In the case of our simulations, each of the four components of the right hand side of Equation (10) is endogenous except the first—the terms of trade effect. As described above, the terms of trade is 'almost' exogenous, in so far as the price of two export commodities—jute and jute textiles—are sensitive to the levels of export supply. The decomposition thus separates the overall effect of a change in international prices into a direct effect—for given values of each of the other three terms in Equation (10)—and an indirect effect, via changes in the levels of employment, government revenue and the levels of distorted activities.

Sectoral effects. Both exporting and importing sectors in the aggregate contract (Table 6). Only the agricultural sector expands as against the contraction in manufacturing and services sectors. Even though agricultural output increases in the

aggregate, the two main employers of labour in agriculture contract. These are rice and 'other agriculture' (livestock and various minor crops including sugar cane, cotton and tobacco), which together employed about 40 per cent of the economy's total labour force in the base year. Service sectors, employing about 42 per cent of the economy's working labour force in the base year, also contract. The labour released by these sectors is too much for the few expanding sectors to absorb, resulting in an increase in involuntary unemployment.

Effects of a 25 per cent across-the-board tariff cut

Macroeconomic and welfare effects. The reduction in tariff rates leads to a rise in real GDP, both at factor cost and market prices (Table 6). The household sector loses some of its income to the rest of the world due to worsened terms of trade (Table 7). But the loss is more than offset by its additional income from wages (flowing from additional employment) and the lump-sum transfers from the government. The net increase in income finances the household sector's additional real consumption of 2867 million taka.

The increase in aggregate welfare is decomposed into its various components in Table 7. The negative terms of trade effects are not significant relative to revenue and employment effects

Sectoral effects. As expected, the exporting sectors expand (Table 6). The highly protected industries such as edible oil, sugar and chemicals, contract (Table 8). The paper sector, although highly protected, expands because its exports expand. Some other sectors identified as import-competing also expand. For example, rice, wheat, other agriculture and cotton textiles. As a result, the import-competing sector in the aggregate expands. As shown in Appendix Table 1, the import-competing sector falls into two distinct categories in so far as rates of protection are concerned. The highly protected component (the sectors edible oil, sugar, paper and chemicals) contracts when protection is reduced but the lightly protected component (the sectors rice, wheat, 'other agriculture', cotton textiles and 'other manufacturing') expands significantly. Clearly, the sectors which benefit from reduced protection in Bangladesh are not confined to the exporting sectors or to those sectors plus agriculture, but also include lightly protected import-competing manufacturing sectors. The substantial expansion in these sectors as well as the export-oriented manufacturing industries such as garments, jute textiles and leather, leads to an expansion of the manufacturing sector as a whole. Because all industries except the highly protected import-competing manufacturing sectors expand, aggregate employment increases.

Table 8 **Industry's share in the base-year total employment, and effects[a] of the world price changes and an across-the-board tariff cut by 25 per cent on sectoral employment and output (per cent)**

		Scenario 1		Scenario 2		25 per cent tariff cut	
	Labour share	Employment	Output	Employment	Output	Employment	Output
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rice	23.1	-0.17	-0.09	0.22	0.12	0.32	0.18
Wheat	0.9	7.94	4.35	10.27	5.62	1.49	0.82
Jute[b]	1.8	1.62	1.53	-0.14	-0.13	0.68	0.64
Tea[b]	0.1	-1.21	-0.08	-0.85	-0.06	1.36	0.09
Fishing[b]	6.2	0.22	0.15	-0.40	-0.28	1.34	0.94
Forestry[b]	1.2	-1.23	-0.17	-0.82	-0.12	0.93	0.13
Edible oil	0.3	4.50	1.30	-0.45	-0.13	-3.13	-0.91
Other agriculture	14.0	-0.12	-0.05	-0.42	-0.18	0.58	0.24
Sugar refining	0.8	2.35	1.40	-0.30	-0.18	-1.62	-0.97
Textiles	2.0	-6.18	-5.49	-1.25	-1.11	1.38	1.23
Garments[b]	0.7	-41.78	-27.44	-9.11	-5.98	10.21	6.71
Jute textiles[b]	1.4	24.54	22.64	-1.97	-1.82	6.90	6.37
Paper and paper products	0.3	-2.14	-1.12	-0.91	-0.48	0.10	0.05
Leather & footwear[b]	0.4	1.30	0.75	-1.20	-0.69	8.50	4.93
Chemicals	0.2	-3.14	-0.36	-2.04	-0.23	-4.06	-0.46
Miscellaneous manufacturing	4.7	-0.83	-0.34	-0.65	-0.27	0.70	0.29
Physical overheads	20.2	-0.83	-0.27	-0.74	-0.24	1.10	0.35
Social overheads	7.4	-0.42	-0.37	-0.30	-0.27	0.33	0.29
Public adminstration	14.1	-0.64	-0.42	-0.48	-0.31	0.65	0.42

[a]Percentage changes in the base-year levels.
[b]Exportable industry.
Source: Model simulations.

Conclusions

The conclusion of the Uruguay Round will affect the prices Bangladesh pays for its imports and receives for its exports on world markets. These effects are primarily the results of liberalisation among other trading countries, as agreed under the Round. The results of this paper suggest that the economic consequences will be negative for Bangladesh, for two reasons. First, Bangladesh is a net food importer and the Uruguay Round appears to imply increases in the international prices of agricultural commodities, especially food grains, relative to other internationally traded commodities. Second, Bangladesh is dependent on exports of garments and the phasing-out of the Multi-fibre Arrangement will mean a loss of some of its privileged access to world markets. For both these reasons, Bangladesh's terms of trade will worsen. Paradoxically, these negative aggregate economic effects mean that Bangladesh's reliance on imported food may actually decline, due to the reduction in the demand for food induced by the decline in real incomes within Bangladesh.

These deleterious effects arise from international price changes over which Bangladesh has essentially no control. It does, however, control its own trade policies. Newspaper reports suggest that Bangladesh's commitments to reduced protection under the Round were small. Our simulation results indicate that reductions in protection within Bangladesh have welfare-enhancing effects which offset some of the negative implications of the Uruguay Round, as discussed above. If Bangladesh were to liberalise at the developing country average of 25 per cent, the welfare reducing consequences of the Round would be approximately negated. Such a liberalisation would also contribute further to reducing Bangladesh's dependence on food imports because reduced protection favours the agricultural sectors through reducing the policy bias against agriculture implicit in the structure of protection seen in Bangladesh.

Appendices

Appendix Table 1 **Industry characteristics of the Bangladesh model**

	Gross output (million taka)	Value-added to output ratio	Capital-labour ratio	Export-output ratio	Import-demand ratio[a]	Average tariff rate
Exportables						
Jute	9,336	0.62	0.05	0.34	n.a.	n.a.
Tea	7,785	0.73	13.45	0.01	n.a.	n.a.
Fish	35,005	0.76	0.43	0.12	n.a.	n.a.
Forestry	31,705	0.79	6.02	0.00	n.a.	n.a.
Ready-made garments	10,714	0.31	0.52	0.87	0.14	n.a.
Jute textiles	10,204	0.44	0.08	0.83	n.a.	n.a.
Leather	4,983	0.39	0.72	0.84	0.02	n.a.
Importables						
Rice	164,498	0.75	0.77	n.a.	0.01	n.a.
Wheat	6,628	0.77	0.83	n.a.	0.54	n.a.
Edible oil	11,293	0.31	2.46	n.a.	0.43	0.23
Other agriculture	151,517	0.66	1.40	0.00	0.09	0.04
Sugar	12,455	0.33	0.67	n.a.	0.33	0.23
Cotton textiles	20,485	0.33	0.13	n.a.	0.20	0.12
Paper	10,821	0.15	0.90	0.03	0.26	0.27
Chemicals	23,571	0.26	7.82	n.a.	0.27	0.37
Other manufactures	110,583	0.31	1.41	0.01	0.48	0.13
Non-tradables						
Physical overheads	277,868	0.67	2.09	n.a.	n.a.	n.a.
Social overheads	27,932	0.89	0.12	n.a.	n.a.	n.a.
Public administration	78,172	0.83	0.53	n.a.	n.a.	n.a.
Total	1,005,555	0.63	1.12	0.03	0.14	0.13

[a]Imports and domestic demands include both final consumption and intermediate uses.
All ratios are calculated at the basic prices.
Source: Ahammad, H., 1995. *Foreign Exchange and Trade Policy Issues in a Developing Economy: the case of Bangladesh*, Avebury, England.

Appendix Table 2 **Effects of world price changes**[a]

	Scenario 3		Scenario 4		Scenario 5		Scenario 6	
	%	value	%	value	%	value	%	value
GDP at market prices (real)	-0.83		-0.18		-0.09		-0.22	
GDP at factor cost (real)	-0.74		-0.15		-0.08		-0.18	
Consumer price index (CPI)	-2.82		0.42		0.34		0.64	
GDP (at MKT price) deflator	-3.62		0.21		0.20		0.39	
Composite producer's price								
Rice	-3.03		0.39		0.39		0.58	
Wheat	1.89		2.65		2.34		2.55	
Imports								
Rice	-18.77		-12.26		-15.37		-10.31	
Wheat	-11.39		-5.27		-4.53		-4.51	
Output of industry aggregates								
Agriculture	-0.06		0.01		0.04		0.04	
Manufacturing	-3.15		-0.32		-0.25		-0.44	
Services	-0.93		-0.26		-0.16		-0.32	
Exporting	-3.81		-0.37		-0.30		-0.54	
Import-competing	-0.48		-0.04		-0.00		-0.02	
Welfare decomposition								
Terms of trade		-2324.36		-1478.38		-1012.78		-1817.95
Export prices	-4.88	-1542.63	0.13	40.34	0.12	38.44	0.23	72.81
Import prices	0.56	781.73	1.08	1518.73	0.75	1051.22	1.34	1890.75
Employment	-1.57	-4699.51	-0.32	-961.64	-0.16	-494.08	-0.39	-1169.17
Total revenue		-902.51		-235.22		-96.89		-319.02
Revenue from								
taxes on HH consumption	-1.87	-151.27	-0.78	-62.91	-0.37	-30.00	-1.07	-86.91
taxes on intermediate inputs	-1.48	-157.14	-0.28	-30.14	-0.19	-19.86	-0.38	-40.05
tariffs	-3.21	-594.10	-0.77	-142.17	-0.25	-47.04	-1.04	-192.05
Aggregate welfare	-3.01	-7926.38	-1.01	-2675.25	-0.61	-1603.75	-1.25	-3306.14

Appendix Table 2 (continued)

	Scenario 7		Scenario 8		Scenario 9		Scenario 10	
	%	value	%	value	%	value	%	value
GDP at market prices (real)	-0.25		-1.24		-0.13		-0.21	
GDP at factor cost (real)	-0.20		-0.98		-0.10		-0.17	
Consumer price index (CPI)	0.82		4.14		0.32		0.55	
GDP (at MKT price) deflator	0.57		2.86		0.18		0.32	
Composite producer's price								
Rice	0.66		3.49		0.25		0.45	
Wheat	2.42		12.20		1.49		2.23	
Imports								
Rice	4.09		-3.46		-2.85		-6.12	
Wheat	-3.65		-18.78		-2.85		-4.13	
Output of industry aggregates								
Agriculture	0.02		0.06		-0.02		-0.03	
Manufacturing	-0.42		-1.92		-0.12		-0.21	
Services	-0.34		-1.72		-0.17		-0.28	
Exporting	-0.73		-3.65		-0.28		-0.48	
Import-competing	0.00		0.07		-0.00		-0.00	
Welfare decomposition								
Terms of trade		-1981.99		-10084.55		-1006.30		-1652.51
Export prices	0.33	105.45	1.63	516.32	0.10	31.76	0.18	55.37
Import prices	1.48	2087.44	7.54	10600.87	0.74	1038.06	1.21	1707.88
Employment	-0.42	-1259.59	-2.08	-6246.50	-0.22	-659.98	-0.36	-1077.29
Total revenue		-405.38		-2081.81		-215.93		-358.61
Revenue from								
taxes on HH consumption	-1.31	-105.99	-6.50	-527.24	-0.61	-49.74	-1.03	-83.30
taxes on intermediate inputs	-0.43	-45.86	-2.16	-229.79	-0.20	-20.82	-0.33	-34.80
tariffs	-1.37	-253.52	-7.17	-1324.78	-0.79	-145.37	-1.30	-240.50
Aggregate welfare	-1.38	-3646.96	-6.98	-18412.86	-0.71	-1882.21	-1.17	-3088.40

Note: [a] For sources of the world price change scenarios, see Table 5; see also notes to Tables 6 and 7.
Source: Model simulations.

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