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**Kiel Working Paper No. 999**

**The German Economy and  
EU Industrial Tariff Reductions:  
Partial and CGE Analyses of a  
Stillborn Millennium Round**

by

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September 2000

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# **The German Economy and EU Industrial Tariff Reductions: Partial and CGE Analyses of a Stillborn Millennium Round**

## **Abstract**

The Millennium Round of MTNs, which was stillborn in Seattle, was supposed to have initiated wide-sweeping changes to the world's trading system. This paper deals with the impact on the German economy of some changes that might have been forthcoming from proposed liberalization strategies. It examines sectoral and global strategies with partial and general equilibrium methods. It underlines the advantages of more global strategies, but not only because the gains are significantly larger. The paper concludes that Germany in its own interests should throw its weight in the EU behind wide-sweeping liberalization and that developing countries stand to gain more from global liberalization.

**Keywords:** Millennium Round, WTO, Multilateral Trade Negotiations (MTN), Trade Liberalization, GTAP

**JEL:** C68, F02, F13, F14, L60, O52

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This paper was prepared for *The Third Annual Conference on Global Economic Analysis: Practical Policy Analysis* at the Centre of Policy Studies, Monash University in Melbourne, Australia, June 27-30, 2000. The authors would like to express appreciation for useful comments made at this conference. For remaining errors the authors apologize for not prompting the conference attendees to discover them.

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## **I. Introduction and Overview**

With the purpose of trying to jump-start another round of Multilateral Trade Negotiations (MTNs), perhaps by latching on to the Millennium hype, numerous WTO contracting parties tabled resolutions in the run-up to the Seattle Ministerial. Understandably, they tried to have any future trade negotiations structured in line with their own preferences. While there seemed to be a basic understanding that a new round would be worthwhile for numerous reasons, there were nonetheless major differences of opinion about how ambitious the round should be. Though some developing countries exhibited a very reserved attitude -- voicing unhappiness with the results of the last round -- it was the USA and the EU in particular who were at odds concerning what should be dealt with and initiated in the next round. For example, in the area of manufactures, the USA leaned toward APEC proposals and exhibited definite preferences for a sectoral liberalization. At the same time, the EU tended towards an across-the-board liberalization strategy.

To prepare for future trade negotiations, in 1998 the German Ministry of Economics launched a study of the implications of alternative trade liberalization strategies for the German economy. This was the first time that the German Government had sought such an analytical assessment ahead of anticipated major trade negotiations. It was decided to carry out the analysis of various

liberalization policies in both a partial and a general equilibrium (PE and GE) approach.

The PE analysis examined three liberalization strategies; (1) elimination of nuisance tariffs; (2) across-the-board tariff reductions (EU approach); (3) sectoral tariff reductions (APEC approach). Since, as it turned out, the APEC approach covered a mere 20% of German imports, equivalent tariff reductions were calculated. The GE analysis, based on GTAP4 and benchmarked to 1995 (with Germany plus 13 other countries/regions and 18 sectors) focused on three sets of experiments: (1) a narrow set of sectors (analogous to APEC) subjected to 50%/100% tariff cuts; (2) across-the-board tariff cuts of 50%/100%; (3) tariff cuts of 50% to a narrow set of sectors and across-the-board, but just for industrial countries.

In this paper provides an overview of this assessment. We start with presents a brief overview of protection in Germany. We then proceed in line with the various PE and GE scenarios before drawing conclusions for Germany with respect to the implications of various policies for the German economy. We close with a discussion of the lessons that might be learned from the failed "Millennium Round" for carrying out more successful MTNs in the future.

## **II. Protection in Germany**

The nominal protection rates in Germany are basically no different than in other EU countries, given the common external tariff, as well as the common internal market which came into existence in 1993. While there may be some minor bureaucratic or industry-induced barriers, which could cause differences (e.g. in the automobile industry), it is safe to say that tariff levels listed in Table 1 apply throughout the EU. With an average tariff of 3.3% after completing the Uruguay Round reductions it can be stated that tariff protection should really not be an issue. Of course there are a few industries like clothing, textiles, leather goods and the automotive industry considerably higher tariffs, but this is no different than in the past, except that relatively speaking protection of these industries is much higher than 40 years ago. Obviously, the past MTNs negotiations have focused on maintaining protection in these areas, while reducing the overall level.

As concerns the effective rates of protection, the same pattern applies. That is, in particular the tariffs in the above sectors are relatively higher than 40 years ago. Whereas the average effective rate of protection was 17.4% in 1964, the rate for the clothing industry was 22.3%. After the UR tariffs have been instituted the average effective rate of protection will be 5.9%, while the rate for the clothing industry will actually have increased to 24.4%! Similar trends can be observed for other industries. As concerns the textile and clothing industries it should be

added that these effective rates need to be further increased by the existence of quotas.

But what about protection in Germany's partner countries? Using the trade-weighted tariff rates calculated by the World Bank (see Finger, et al 1997) it can be quickly seen that they are 5 to 6 times higher, be they either the bound or the applied rates. Knowing that the weighting scheme generally decreases the height of the average tariff, the actual differences should be even higher. Although effective rates in the partner countries are not known, it is probable that the gap is even larger.

### **III. The Results of the Partial Equilibrium Analysis**

The PE analysis of the impact of tariff reductions is basically limited to the area in which the change takes place. That is, there is no interdependence between the industries and other macroeconomic variables, except in the case where effective tariff protection is calculated. These calculations are carried out using the appropriate input-output matrix.

The three strategies, which were examined, are as follows:

- I. Elimination of nuisance tariffs;
- II. Global tariff reductions (EU strategy);
- III. Limited sectoral tariff reductions (APEC strategy).

It quickly became apparent that the proposed APEC liberalization strategy covered such a small area of traded goods that the global approach seemed to be the only effective way of liberalizing. Specifically: whereas the APEC strategy covered only 20% of manufactured goods, the global approach covered by definition a broader range of products. In order to make the results of both strategies more comparable the equivalent tariff reduction (ETR) concept was introduced. The ETR represents that amount of tariff reduction over all 29 industries which would result from a specific reduction in a subset of industries. The results of the PE analysis are portrayed in Table 2 and 3 and can be summarized as follows:

- The nuisance tariff examined were indeed a nuisance in the case of the 2% tariff level. The calculated economic benefits stemming from the eliminations (DM 590,000) are probably even less than the cost of negotiation their elimination. Eliminating nuisance tariffs up to the 3% level, however, induces sizeable benefits (see Table 3). This should not be a surprise since the average nominal tariff rate amounts to 3.3%.
- The structure of the nominal and effective protection changes only in the case of the APEC strategy sector liberalization (Table 2). In particular, the chemical industry changes from a relatively higher protected industry to a relatively lower protected industry.



- The complete elimination of all tariffs induces the largest economic gains (Table 3). This applies both to the import tariffs in the EU and in particular the elimination of tariffs in third countries.
- The APEC strategies yield (both in a case of a complete elimination of some sectoral tariffs as well as a 50% reduction in those tariffs) considerably lower benefits from the liberalization process. This, of course, is exactly what could have been expected.
- The equipment tariff reduction applied to the APEC strategy. Actually induces even lower returns than in the case of the "pure" APEC strategy. This implies that – excluding the changes in the structure of production – the APEC strategy for Germany is not detrimental.
- Tariff reductions in third countries induces wide-sweeping macroeconomic gains, not only for German exporters but also for the level of German employment. This follows from the multilateral character of the tariff reduction, which in a highly open country like Germany leads to large gains. Taking into the account the export and the import side, the macroeconomic gains amount to a sizeable share of GDP, namely 6.8% in the case of a complete elimination of tariffs.

What was not estimated in this analysis is an issue which actually receives too little attention, i.e., the administration costs of the tariff system. These costs must

be taken into account, particularly when examining the results of the elimination of nuisance tariffs or the APEC strategy, and should not be underestimated. That is, regardless of which products are freed from tariffs, they still must be classified in order to be considered duty-free. Hence, aside from other bureaucratic barriers, only the complete elimination of tariffs would eliminate the necessity of classifying products.

#### **IV. A CGE Assessment of Post-Uruguay Round Tariff Liberalization Scenarios**

##### **A. Introduction**

The partial equilibrium analysis discussed in Section III made possible a detailed treatment of proposals for detailed tariff reductions that were focused on specific products. However, it has obvious limitations. On the one hand, it allows for detailed analysis. On the other hand, important macroeconomic effects are ignored. For this reason, the partial equilibrium analysis was complemented by general equilibrium analysis focused on the macroeconomic implications of three scenarios.

## **B. The Model**

### *B.1 CGE Model Data*

Our model data come from a number of sources. Data on production and trade are based on national social accounting data linked through trade flows (see Roland-Holst and Reinert 1997). Social accounting data are drawn directly from the Global Trade Analysis Project (GTAP) version 4 dataset. (GTAP 1999). The GTAP version 4 dataset is benchmarked to 1995. The basic social accounting and trade data are supplemented with trade policy data, including data on tariffs, NTBs, dumping duties, and government procurement preference margins.

The data on post-Uruguay Round tariffs are taken from recent estimates reported by Francois and Strutt (1999). These are taken primarily from the WTO's integrated database, with supplemental information from the World Bank's recent assessment of detailed pre- and post-Uruguay Round tariff schedules. All of this tariff information has been concorded to GTAP model sectors. The values of tariff equivalents for NTBs are based on estimates found in the literature, and reflect traditional non-tariff border measures.<sup>1</sup> Where applicable, quota rents are

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<sup>1</sup> Tariff equivalents of industrial NTBs are taken from Haaland and Tollefson (1994), Yang (1992, 1994), USITC (1993), Flam and Nordstrom (1994), published antidumping rates (all as described in Francois et al 1995), assessments of the automobile and chemical industry prepared for the EU-US joint study on transatlantic trade liberalization, and the UNCTAD TRAINS database. Agricultural protection are based on OECD and USDA data and on World Bank assessments of URAA commitments (see Ingco 1996).

calculated from these tariff equivalents. They also reflect data on NTBs from the UNCTAD-TRAINS database.

The basic GTAP dataset is benchmarked to 1995, and reflects applied tariffs actually in place in 1995. We want to work with a representation of post-Uruguay Round tariff rates. To accomplish this, before conducting any policy experiments we first run a "pre-experiment" in which we implement the rest of the Uruguay Round. As such, the dataset we work with for actual experiments is a notional world economy (based on 1995) wherein we have full Uruguay Round implementation.

The social accounting data have been aggregated to 14 regions and 18 sectors. The sectors and regions in our aggregation of the data are detailed in Table 4 (the mapping to ISIC sectors can be provided on request).

## *B.2 Theoretical structure*

The numerical analysis presented here (with an 18 sector, 14 region CGE model of the world economy) is based on a modified version of the GTAP model. The GTAP model is one of a class of computational models, a central feature of which is the input-output structure, which explicitly links industries in a value-added chain from primary goods, over continuously higher stages of intermediate processing, to the final assembling of goods and services for consumption. The link between sectors may be direct, like the input of steel in

the production of transport equipment, or indirect, via intermediate use in other sectors. Sectors are also linked through various economywide constraints, like the availability of production factors at a given time. We assume full employment in factor markets, which means that all sectors cannot expand simultaneously unless there is technological progress or factor accumulation.

In terms of theoretical structure, perfect competition is assumed in constant return to scale (CRS) sectors. These are indicated in Table 4. In all sectors, firms employ domestic production factors (capital, labor and land) and intermediate inputs from domestic and foreign sources to produce outputs in the most cost-efficient way that technology allows. There is a single representative, composite household in each region, with expenditures allocated over personal consumption and savings (future consumption). In CRS sectors, products from different regions are assumed to be imperfect substitutes in accordance with the "Armington" assumption. The composite household owns endowments of the factors of production and receives income by selling them to firms. It also receives income from the receipt of tariff revenue and rents accruing from import/export quota licenses (when applicable). Part of the income is distributed as subsidy payments to some sectors, primarily in agriculture. Prices on goods and factors adjust until all markets are simultaneously in (general) equilibrium. In the base model, we do not model changes in net international capital flows, but rather our capital market closure involves fixed net capital inflows and

outflows. Gross flows are fully endogenous, as manifested in changes in trade volumes. To summarize, factor markets are competitive, and labor and capital are mobile between sectors but not between regions.

We generally model manufacturing as involving imperfect competition and scale economies that are *internal* to each firm, depending on its own production level. In particular, based on estimates of positive scale elasticities (see the technical appendix), we model the sector as being characterized by Chamberlinian large-group monopolistic competition (for more on this approach, see Ethier 1982 and Krugman, 1980.) An important property of the monopolistic competition model is that increased specialization at intermediate stages of production yields returns due to specialization, where the sector as a whole becomes more productive the broader the range of specialized inputs. These gains spill over through two-way trade in specialized intermediate goods. With these spillovers, trade liberalization can lead to global scale effects related to specialization. With international scale economies, regional welfare effects depend on a mix of efficiency effects, global scale effects, and terms-of-trade effects (for more on this, see Francois and Roland-Holst 1997). Similar gains follow from consumer good specialization. As a result of the combination of specialization economies and input-output linkages, this model also exhibits properties found in the Michigan model and in more recent theoretical models on economic geography.

In other applications of this type of multiregion model with imperfect competition (Baldwin, Francois, and Portes 1997; Francois, McDonald and Nordstrom 1996a), a dynamic link has also been included, whereby the static or direct income effects of trade liberalization induce shifts in the regional pattern of savings and investment. These effects have been explored extensively in the trade literature.<sup>2</sup> This includes Baldwin (1992), Smith (1976, 1977), Srinivasan and Bhagwati (1980), and Francois et al (1996b). Several studies of the Uruguay Round have also incorporated variations on this mechanism.<sup>3</sup> Such effects compound initial output and welfare effects over the medium-run, and can magnify income gains or losses. How much these "accumulation effects" will supplement static effects depends on a number of factors, including the marginal product of capital and underlying savings behavior. In the present application, we work with a classical savings-investment mechanism. This means we model long-run linkages between changes in income, savings, and investment. The results reported here therefore include changes in the capital stock, and the medium- to long-run implications of such changes for production, incomes, and consumption.

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2 These effects relate to classical models of capital accumulation and growth, rather than to endogenous growth mechanisms.

3 These studies are surveyed in Francois et al (1996c).

### **C. The Experiments**

We turn now to a description of the experiments. The sets of experiments are described in Table 5. They map closely to those examined in the partial equilibrium assessments, in the sense that they examine both narrow and broad-based approaches to industrial tariff reductions. The first experiments (experiments 1 and 2) involve a narrow set of tariff cuts for selected sectors, based on the recent U.S. proposal for a limited, sector specific approach to negotiated tariff reductions. We report results for these narrow liberalizations involving a hypothetical 50% and 100% applied tariff cut for selected sectors. The choice of sectors is based on U.S. proposals at Seattle for a limited sector approach. The next set of experiments (experiments 3 and 4) involve a broader approach to tariff reduction with hypothetical 50% and 100% tariff cuts across all good sectors. Finally, the third set focuses on the narrow and broad versions of the hypothetical 50% tariff cuts, but with the assumption that tariff reductions are only undertaken by the developed countries (Western Europe, North American, Australia and New Zealand, and Japan).

Table 6 presents estimates of the annual income gains from each experiment. The totals for the each country and region are based on "equivalent variation", which is basically a real income effect. In the table we are reporting on the income change needed to support the estimated change in steady-state consumption



levels.<sup>4</sup> These estimates are based on two effects. The first is the direct change in nominal national income as a result of the experiments detailed in Table 5. The second effect is the change in the cost of consumer goods (the price of consumption). The combination of these two effects yields the change in the tables. This is reported in monetary terms in Table 6. The results as a percent of base GDP are also reported in Table 6.

It is interesting to note that for Germany and the other European Union Members, a broad liberalization is consistently superior to a narrower one. Hence, in terms of sectoral coverage, the narrow 50 percent tariff cut yields an increase in annual income of \$880 million (\$4.1 billion) for Germany (the EU14). These values are much larger with a broader set of tariff reductions. For the fifty percent tariff reduction scenario, the gains from extending this to full sectoral coverage involve a move from \$880 million to over \$6.9 billion in the case of Germany, and from \$4.1 billion to \$16.4 billion in the case of the other EU Members. It is also important that such liberalization be liberal, in terms of country coverage. Tariff reductions by developed and developing countries generally entail significant welfare gains for Germany and the EU14. However, when developing countries are left out of the scenario, terms of trade losses dominate and Germany and the EU14 are clear losers.

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<sup>4</sup> This is preferred to a quantity index-based measure of GDP as a measure of the value of national income, but is not sufficient as a measure of full-blown welfare effects over the entire time path.

Wage effects in Germany and the EU14 follow the same basic pattern. Skilled labor gains more than unskilled labor, though both generally benefit from the full range of tariff reduction scenarios. Like the income effects, European labor is significantly better off (with real wage increases of between 0.4 and 1.4 percent) than they are under the narrower scenarios.

Trade effects are reported in Tables 7 and 8. The positive terms-of-trade effects mean that less exports are required to buy a given quantity of imports. As a result, in the full multilateral scenarios, we see European imports rising faster than exports. The effect on the volume of world trade, by sector, the greatest increases in trade are in the textile and clothing sectors. This should not be surprising, as these are the sectors characterized by some of the highest rates of protection.

As concerns the impact on sectoral production, by scenario and by country, in general the greatest negative pressure on German output is felt in the textile and clothing sectors. At the same time, the broad liberalization scenarios point to a broad expansion in heavy industry. Apart from the textile and clothing sectors, the broad liberalization scenarios are very good for German industrial production, which is capital intensive. The greatest gains in output are realized in the automobile sectors, and in the other transport equipment sector. This is consistent with the expansion of the capital stock in Germany under these

scenarios. In contrast, the sectoral output effects are more muddled in the narrow liberalization scenarios, with chemicals benefiting the most.

## **Conclusions**

This paper has provided an brief overview of industrial liberalization strategies, from a German perspective. We have provided a discussion based on both partial and general equilibrium analyses. As far as the results of the PE analysis are concerned, the German Federal Government should be interested -- on behalf of German consumers -- in continued liberalization in the industrial sector. After all, since the tariff rates on average are very low, industry itself should have no real qualms about eliminating them. As a matter of fact, given the large export potential waiting to be tapped when the high trade barriers are reduced, if not eliminated in partner countries, there should be a very large incentive to move ahead. Knowing that in the case of the textile and clothing industries, which exhibited the highest nominal and effective rates of protection, there is a strong interest in Germany to truly open up the market, this would definitely be a path to move down. That is, speed up the implementation of the ATC in exchange for greater liberalization in the partner countries.

Overall, the pattern of results that emerges points to far greater gains under the broad tariff reduction scenarios than under the narrow scenarios. In addition, unless the initiative involves both developed and developing countries, there are

only minimal gains from industrial tariff reductions for the German economy or for the rest of the European Union. Limiting tariff reductions to a small number of sectors (along the lines of the detailed sectoral proposals of the United States) or limiting the reductions to developed countries severely limits the scope for gains by Germany and the rest of the European Union.

Table 1 – Nominal and Effective Protection in the German Manufacturing Industry after Completion of the Uruguay Round Tariff Change by the Year 2004<sup>a</sup>

Sector Group	Nominal tariff protection		Effective Zollschutz	
	2004	% Change in tariff since 1994	2004	% Change in tariff since 1994
<b>Primary/Intermediate Goods</b>	<b>2.5</b>	<b>-50.0</b>	<b>4.7</b>	<b>-53.0</b>
Stone, clay products	1.7	-50.0	2.5	-50.0
Basic iron, steel products	0.2	-95.7	-0.5	-104.0
Iron, steel foundries	2.6	-44.7	4.2	-43.2
Rolling, drawing mills	2.4	-48.9	4.1	-40.6
Primary NEF-metals	3.0	-33.3	7.5	-31.2
Chemical products	2.9	-32.6	4.8	-32.4
Petroleum products	4.3	-36.8	8.9	-35.0
Lumber, woodworking	2.1	-54.3	4.2	-56.7
Wood planing, pulp/paper mills	2.9	-57.4	7.4	-59.3
Rubber goods	2.7	-38.6	3.5	-41.7
<b>Capital Equipment</b>	<b>2.5</b>	<b>-45.7</b>	<b>3.9</b>	<b>-55.2</b>
Fabricated steel products, RR-Eqp.	2.2	-54.2	3.4	-54.7
Machinery	1.7	-54.1	2.2	-55.1
Automotive	5.7	-29.6	11.9	-25.2
Shipbuilding	1.0	-33.3	-0.4	-84.0
Aerospace	1.4	-44.0	1.6	-42.9
Electrotechnical products	3.1	-49.2	4.9	-50.0
Instruments, optical, timing devices	2.5	-49.0	3.2	-52.9
Iron, sheet-metal goods	2.7	-46.0	4.3	-42.7
Office eqp., data process eqp.	2.2	-46.3	4.3	-46.3
<b>Consumer Goods</b>	<b>4.8</b>	<b>-36.0</b>	<b>8.9</b>	<b>33.1</b>
Ceramic products	5.0	-29.6	8.1	-27.0
Glass, glass products	4.6	-33.3	8.3	-31.4
Woodworking products	1.6	-69.2	1.3	-83.1
Musical instr., toys, sport eqp.	2.7	-52.6	3.9	-55.2
Paper and paper products	4.5	-54.1	9.3	-54.6
Printing, publishing	1.5	-53.1	1.3	-58.1
Plastic products	3.7	-39.3	5.5	-38.9
Leather goods	6.7	-17.3	12.8	-12.9
Textiles	7.3	-27.7	14.5	-26.0
Clothing	10.6	-13.8	24.4	-7.2
<b>Total Industry</b>	<b>3.3</b>	<b>-43.1</b>	<b>5.9</b>	<b>-46.4</b>

<sup>a</sup> Bounded rates.

Source: Own calculations.

Table 2 – Impact of Alternative Liberalization Strategies on Nominal and Effective Tariff Levels in Germany's Manufacturing Industry (%)

Sectors Groups  (1)	Initial level 2004		Nuisance tariffs				Global liberalization 50 % reduction		Sectoral liberalization 50 % reduction		Equivalent liberalization 50 % reduction      100 % reduction              reduction	
	Nominal tariff (2)	Effective tariff (3)	2 % limit		3 % limit		Nominal tariff (8)	Effective tariff (9)	Nominal tariff (10)	Effective tariff (11)	Nominal tariff (12)	Effective tariff (13)
			Nominal tariff (4)	Effective tariff (5)	Nominal tariff (6)	Effective tariff (7)						
<b>Primary/Intermediate Goods</b>	<b>2.5</b>	<b>4.7</b>	<b>2.3</b>	<b>4.3</b>	<b>2.0</b>	<b>3.8</b>	<b>1.2</b>	<b>2.3</b>	<b>1.9</b>	<b>3.5</b>	<b>2.2</b>	<b>1.8</b>
Stone, clay products	1.7	2.5	1.2	1.4	1.1	1.4	0.9	1.2	1.6	2.5	1.5	1.2
Basic iron, steel products	0.2	-0.5	0.2	-0.4	0.1	-0.4	0.1	-0.2	0.2	-0.3	0.2	0.1
Iron, steel foundries	2.6	4.2	2.0	3.1	1.4	2.0	1.3	2.1	2.5	4.1	2.3	1.9
Rolling, drawing mills	2.4	4.1	1.9	3.2	1.1	1.8	1.2	2.1	2.2	3.8	2.1	1.8
Primary NEF-metals	3.0	7.5	3.0	7.5	2.8	6.9	1.5	3.8	3.0	8.1	2.6	2.2
Chemical products	2.9	4.8	2.7	4.5	2.6	4.3	1.5	2.4	2.8	4.7	2.5	2.1
Petroleum products	4.3	8.9	4.3	8.9	4.3	9.0	2.2	4.4	2.4	4.5	3.8	3.2
Lumber, woodworking	2.1	4.2	2.1	4.3	1.8	3.7	1.1	2.1	1.4	2.7	1.8	1.5
Wood planing, pulp/paper mills	2.9	7.4	2.9	7.5	2.9	7.5	1.5	3.7	1.5	3.6	2.5	2.1
Rubber goods	2.7	3.5	2.5	3.2	1.7	1.7	1.3	1.8	1.5	1.5	2.3	1.9
<b>Capital Equipment</b>	<b>2.5</b>	<b>3.9</b>	<b>2.2</b>	<b>3.4</b>	<b>1.4</b>	<b>2.0</b>	<b>1.2</b>	<b>2.0</b>	<b>2.3</b>	<b>3.7</b>	<b>2.2</b>	<b>1.8</b>
Fabricated steel prod., RR-Eqp.	2.2	3.4	1.6	2.2	0.8	0.9	1.1	1.7	1.6	2.3	1.9	1.6
Machinery	1.7	2.2	1.1	1.0	0.4	-0.0	0.9	1.1	1.5	1.9	1.5	1.2
Automotive	5.7	11.9	5.6	11.9	4.9	10.7	2.8	5.9	5.6	12.0	4.9	4.1
Shipbuilding	1.0	-0.4	0.3	-1.9	0.0	-1.8	0.5	-0.2	0.9	-0.0	0.8	0.7
Aerospace	1.4	1.6	1.3	1.4	0.6	0.4	0.7	0.8	1.2	1.4	1.2	1.0
Electrotechnical products	3.1	4.9	3.0	4.9	1.8	2.7	1.6	2.4	2.8	4.5	2.7	2.3
Instruments, optical, timing devices	2.5	3.2	2.5	3.3	1.6	2.0	1.2	1.6	2.1	2.8	2.2	1.8
Iron, sheet-metal goods	2.7	4.3	2.4	3.9	1.2	1.5	1.4	2.1	2.6	4.3	2.4	2.0
Office eqp., data process eqp.	2.2	4.3	1.9	3.7	0.9	1.4	1.1	2.1	2.2	4.5	1.9	1.6
<b>Consumer Goods</b>	<b>4.8</b>	<b>8.9</b>	<b>4.7</b>	<b>8.7</b>	<b>4.3</b>	<b>8.0</b>	<b>2.4</b>	<b>4.5</b>	<b>4.4</b>	<b>8.4</b>	<b>4.2</b>	<b>3.5</b>
Ceramic products	5.0	8.1	4.9	7.8	4.6	7.3	2.5	4.0	4.9	7.9	4.4	3.7
Glass, glass products	4.6	8.3	4.4	7.8	3.5	6.1	2.3	4.2	4.5	8.5	4.0	3.4
Woodworking products	1.6	1.3	1.5	1.2	1.2	0.9	0.8	0.6	1.2	0.7	1.4	1.2
Musical instr., toys, sport eqp.	2.7	3.9	2.6	3.7	1.7	2.2	1.4	1.9	2.5	3.7	2.4	2.0
Paper and paper products	4.5	9.3	4.5	9.3	4.5	9.4	2.3	4.6	2.5	5.0	3.9	3.3
Printing, publishing	1.5	1.3	1.3	1.1	0.9	0.5	0.7	0.7	0.9	0.8	1.3	1.1
Plastic products	3.7	5.5	3.3	4.7	2.8	3.7	1.9	2.7	2.6	4.1	3.2	2.7
Leather goods	6.7	12.8	6.5	12.4	6.1	11.6	3.4	6.4	6.7	13.1	5.9	4.9
Textiles	7.3	14.5	7.3	14.5	7.3	14.5	3.6	7.2	7.3	15.1	6.3	5.3
Clothing	10.6	24.4	10.6	24.3	10.5	24.1	5.3	12.2	10.6	24.5	9.3	7.7
<b>Total Industry</b>	<b>3.3</b>	<b>5.9</b>	<b>3.1</b>	<b>5.5</b>	<b>2.6</b>	<b>4.7</b>	<b>1.7</b>	<b>3.0</b>	<b>2.9</b>	<b>5.3</b>	<b>2.9</b>	<b>2.4</b>

Source: Own calculations.

Table 3 – Macroeconomic Results from the Partial Equilibrium Analysis of Various Tariff Liberalization Scenarios

Liberalization scenario  (1)	Imports <sup>a</sup>				Exports <sup>a</sup>				Total			
	Macroeconomic impact		Employment		Macroeconomic impact		Employment		Macroeconomic impact		Employment	
	Mill. DM (2)	% of GDP <sup>b</sup> (3)	absolute (4)	in % <sup>c</sup> (5)	Mill. DM (6)	% of GDP <sup>b</sup> (7)	absolute (8)	% <sup>c</sup> (9)	Mill. DM (10)	% of GDP <sup>b</sup> (11)	absolute (12)	% <sup>c</sup> (13)
1. 100% global tariff reduction	225.80	0.03	-31,441	-0.54	46,430	6.79	140,000	2.39	46,656	6.82	108,559	1.86
2. 50% global tariff reduction	56.45	0.01	-15,720	-0.27	22,508	3.29	70,000	1.20	22,564	3.30	54,280	0.93
3. Global equivalent liberalization to 100% sectoral reduction	16.79	0.00	-8,575	-0.15	12,217	1.79	38,000	0.65	12,234	1.80	29,425	0.50
4. Global equivalent liberalization to 50% sectoral reduction	3.78	0.00	-4,068	-0.07	5,320	0.78	17,000	0.29	5,324	0.78	12,932	0.22

<sup>a</sup>Liberalization vis-à-vis post UR tariff levels. — <sup>b</sup>Share of manufacturing GDP in total GDP. — <sup>c</sup>In % of employed in manufacturing industry. — [Basic data: GDP of manufacturing industry 1996: 683.97 bill. DM. – employees in manufacturing industry 1996: 5.85 mill.].

Source: Own calculations.

Table 4 – Model Sectors and Regions

1. Germany	+	1. Agriculture
2. Rest of EU	+	2. Forestry and wood products
3. EFTA	+	3. Fisheries
4. Central European Associates	*	4. Processed foods
5. Australia & New Zealand	*	5. Textiles
6. Japan	*	6. Clothing
7. Korea & Taiwan	*	7. Paper and publishing
8. China	*	8. Chemicals and petroleum products
9. Hong Kong	*	9. Coal, oil, and gas
10. Rest of East Asia	*	10. Metal products and minerals
11. South Asia	*	11. Automobiles and parts
12. NAFTA	*	12. Other transportation equipment
13. Latin Amerca	*	13. Electrical machinery
14. Rest of world	*	14. Other manufactured goods
	+	15. Construction
	+	16. Trade, transport, and communications
	+	17. Private services
	+	18. Other services

Note: A \* denotes an increasing returns sector, and a + denotes a constant returns sector.

Table 5 – Experiment Description

Experiment 1:	Narrow tariff liberalization by all trading countries (50% tariff reduction for forestry/wood products; fisheries; chemicals/ petroleum products; electrical machinery; and coal, oil, and gas.)
Experiment 2:	Narrow tariff liberalization by all trading countries (100% tariff reduction for products listed in experiment 1)
Experiment 3:	Broad tariff liberalization by all trading countries (50% reduction in tariffs for all sectors.)
Experiment 4:	Broad tariff liberalization by all trading countries (100% reduction in tariffs for all sectors.)
Experiment 5:	Narrow MFN tariff liberalization limited to developed countries (50% tariff reduction for products listed in experiment 1)
Experiment 6:	Broad MFN tariff liberalization limited to developed countries (50% tariff reduction in tariffs for all sectors.)



Table 6 – National Income Gains (millions of 1995 dollars and percent change)

	experiment 1	experiment 2	experiment 3	experiment 4	experiment 5	experiment 6
	Millions of 1995 dollars					
<b>Germany</b>	<b>880,3</b>	<b>1835,4</b>	<b>6983,2</b>	<b>14855,5</b>	<b>-320,5</b>	<b>-604,9</b>
Rest of EU	4124,9	8626,6	16400,7	29643,1	-1828,8	-1096,2
EFTA	454,9	897,4	3173,0	3565,3	20,6	1602,5
Central European Associates	31,9	53,3	1578,1	2760,4	135,2	1104,7
Australia & New Zealand	117,1	345,6	7374,0	19794,7	-270,0	4462,7
Japan	4028,1	8633,5	45749,6	97373,2	915,9	27328,4
Korea & Taiwan	4305,0	9427,9	26493,1	52888,1	839,3	6514,4
China	3843,4	-2770,1	51150,0	5119,0	120,0	19701,2
Hong Kong	438,2	1168,8	3712,6	9602,9	-5,3	944,8
Rest of East Asia	5287,2	9838,8	38712,2	71012,2	1734,4	4346,8
South Asia	-286,8	-1987,2	21299,9	32006,6	-100,4	5725,9
NAFTA	3078,6	6354,6	20227,0	43820,1	-93,8	585,3
Latin America	2108,6	3717,1	20778,5	40633,1	268,6	4712,4
Rest of world	-3151,1	-9014,3	5883,6	2336,6	1045,6	6182,5
<b>TOTAL</b>	<b>25260,2</b>	<b>37127,4</b>	<b>269515,4</b>	<b>425410,9</b>	<b>2460,7</b>	<b>81510,4</b>
	Percent change					
<b>Germany</b>	<b>0.0</b>	<b>0.1</b>	<b>0.3</b>	<b>0.7</b>	<b>0.0</b>	<b>0.0</b>
Rest of EU	0.1	0.2	0.3	0.6	0.0	0.0
EFTA	0.1	0.2	0.8	0.9	0.0	0.4
Central European Associates	0.0	0.0	0.6	1.1	0.1	0.4
Australia & New Zealand	0.0	0.1	2.0	5.4	-0.1	1.2
Japan	0.1	0.2	1.0	2.2	0.0	0.6
Korea & Taiwan	0.6	1.4	3.9	7.8	0.1	1.0
China	0.6	-0.4	7.4	0.9	0.0	2.8
Hong Kong	0.5	1.3	4.2	10.8	0.0	1.1
Rest of East Asia	0.9	1.7	6.6	12.2	0.3	0.7
South Asia	-0.1	-0.5	5.0	7.6	0.0	1.4
NAFTA	0.0	0.1	0.3	0.6	0.0	0.0
Latin America	0.2	0.3	1.7	3.3	0.0	0.4
Rest of world	-0.2	-0.5	0.4	0.1	0.1	0.4

Table 7 – Imports (percent change)

	experiment 1	experiment 2	experiment 3	experiment 4	experiment 5	experiment 6
<b>Germany</b>	<b>0.7</b>	<b>1.5</b>	<b>6</b>	<b>12.2</b>	<b>0.2</b>	<b>2.2</b>
Rest of EU	0.7	1.6	4.1	8.8	0.3	1.8
EFTA	0.6	1.2	5.9	13.8	0.2	3.6
Central European Associates	2.3	5	14.1	31.7	0.3	3.7
Australia & New Zealand	1.5	3.3	19.5	43.7	0.9	14.7
Japan	2.1	4.8	20.1	43.4	0.8	7
Korea & Taiwan	4.4	9.6	23.5	44.8	0.5	4.6
China	6.6	17.1	73.5	147	0.1	7.7
Hong Kong	0.5	1.5	9.4	14.2	-0.1	3.6
Rest of East Asia	3.7	7.7	21.7	44.1	0.7	0.2
South Asia	6.7	13.3	46.1	87.6	-0.2	8.4
NAFTA	1.4	2.9	8.2	16	0.6	3.8
Latin America	3.4	7.3	18.4	40.2	0.2	3.8
Rest of world	3.3	7.1	16.8	34.8	0.3	2.7

Table 8 – Exports (percent change)

	experiment 1	experiment 2	experiment 3	experiment 4	experiment 5	experiment 6
<b>Germany</b>	<b>0,6</b>	<b>1,3</b>	<b>5,4</b>	<b>10,8</b>	<b>0,2</b>	<b>2,6</b>
Rest of EU	0,7	1,4	3,7	7,8	0,3	2,1
EFTA	0,4	0,8	4,6	10,7	0,1	3,2
Central European Associates	2,5	5,4	14,9	33,4	0,2	3,0
Australia & New Zealand	1,6	3,4	15,4	31,0	1,1	12,9
Japan	1,5	3,4	16,4	35,2	0,6	6,7
Korea & Taiwan	4,1	8,8	23,0	43,4	0,3	4,2
China	5,8	15,1	68,5	145,7	0,0	5,7
Hong Kong	0,4	1,1	8,7	7,5	-0,1	3,9
Rest of East Asia	3,9	8,2	22,4	46,0	0,7	-0,2
South Asia	8,3	16,6	58,1	116,4	-0,2	8,3
NAFTA	1,3	2,8	7,7	14,0	0,6	4,3
Latin America	4,2	9,0	21,0	46,1	0,2	3,3
Rest of world	3,8	8,2	18,5	38,9	0,2	2,1

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