Barriers to wool fibre products trade

Costs to US consumers and Australian woolgrowers

A joint study by the Centre for International Economics, Canberra & Sydney, and The Trade Partnership, Washington DC

April 2000
The Centre for International Economics is a private economic research agency that provides professional, independent and timely analysis of international and domestic events and policies.

The Trade Partnership is a Washington (USA) based economic consulting firm with particular expertise in textile and apparel issues.

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About this study
THIS STUDY WAS INITIATED by Wool Council of Australia and was funded by Australian wool growers.

THE STUDY WAS CONDUCTED jointly by the Centre for International Economics (CIE) and the Trade Partnership.

The Trade Partnership, a Washington based economic consulting firm with particular expertise in textile and apparel issues, undertook the analysis of the effects of the agreed schedule of liberalisation of multifibre arrangements on the barriers to US imports of yarns, fabrics and apparel. The results of this analysis are reported in chapter 2 and appendixes A and B.

The CIE undertook the modelling analysis of the implications of these changes in barriers for US production and imports of fibre specific yarns, fabrics and apparel, US consumer expenditure on textiles and clothing, and Australian wool production and income. The results of this analysis are reported in chapters 3 and 4, and appendixes C, D and E.

The Trade Partnership provided assistance with the data and parameter requirements of the model.
Summary

- Under the Multifibre Arrangement (MFA) the US has for many years imposed fibre specific quotas on imports of textiles and clothing. As a result, US consumers are denied cheaper access to textiles and clothing and fibre producers in the US and elsewhere are disadvantaged.

- Under the WTO Agreement on Textiles and Clothing (ATC) – signed in the Uruguay Round – the US and other parties to the MFA agreed to phase out their MFA quotas over a ten year period from January 1995.

- The ATC has wider product coverage than the MFA and other (non-MFA) import restrictions. Products previously not subject to MFA-style restrictions are now included in the ATC phase out. The broader product coverage allows importing restraining countries to defer liberalisation of MFA restrictions until the end of the phaseout period.

- Because of the broader coverage, the US and the EU managed to meet their ATC obligations in Stages 1 and 2 of the phase out without actually liberalising (or integrating) many restrained products. Research by the International Textiles and Clothing Bureau shows that in Stages 1 and 2 the trade accounted for by products freed of quota restrictions represented only about 6 per cent (US) and less than 5 per cent (EU) of total restrained imports.

- If the ATC is implemented to schedule the influence of quotas will wane during the transition period. By 1 January 2005 the only protective barrier will be the tariff. Of particular interest is how the barriers will change under the ATC phase out and the implications of the phase out and faster liberalisation for US textile and clothing consumers and Australian wool producers.

- For yarns import quotas to the US are not projected to restrict trade over the ten year ATC phase out period. The total barrier to imports is the tariff which will fall slightly from 8 to 7 per cent (cotton yarn), 8 to 6 per cent (wool and wool blend yarn) and 9 to 7 per cent (other fibre yarn) between 1996 and 2006.

- Import quotas to the US for fabrics are also unlikely to be restrictive over the ATC phase out. Tariffs will fall from 9 to 8 per cent (cotton...
fabric), 25 to 18 per cent (wool and wool blend fabric) and 11 to 8 per cent (other fibre fabric).

- Quotas on imports to the US for cotton apparel, wool and wool blend apparel and other fibre apparel are likely to stay restrictive over the ten year ATC phase out. The total protective barrier (tariff plus tariff equivalent of quota) is projected to fall from 47 to 15 per cent (cotton apparel), 33 to 15 per cent (wool and wool blend apparel) and 70 to 20 per cent (other fibre apparel) between 1996 and 2005.

- For wool and wool blend apparel the protective barrier is projected to remain virtually unchanged for the first nine years of the ATC phase out. All of the fall in import protection occurs in year ten. US consumers of wool and wool blend apparel will not have access to cheaper imports until that year.

- Elimination of tariffs and quotas on US imports of yarns, fabrics and apparel in 1999 delivers major gains to US consumers. Consumers are able to increase their consumption of textiles and clothing by switching to cheaper imports and still have US$20 billion left over to spend on other goods and services. US production of apparel falls substantially and imports increase. Australia’s wool production is projected to increase by about 0.3 per cent and Australian wool producer income improves by A$17 million per year. The percentage increase in Australia’s cotton production is nearly three times that for wool. Cotton producer income increases by A$15 million per year.

- US import quota liberalisation now with tariffs remaining in place delivers gains to US consumers of about 60 per cent of the gains from elimination of both quotas and tariffs. The gain in Australian wool industry income is about half the gain achievable liberalisation by the US of both quotas and tariffs.

- Step by step quota liberalisation in the first nine years of the ten year phase out slightly worsens the position of wool apparel relative to cotton and other fibre apparel in the US market because of a faster rate of decline in the tariff equivalent of quotas on cotton and other fibre apparel relative to wool apparel. This leads to a very small decline (less than 1 per cent) in Australian wool industry income over this period.

- All of the gains to the Australian wool industry from step by step quota liberalisation occur in the last year — to January 2005. This result highlights the importance to the Australian wool industry of achieving complete removal of US import quotas as soon as possible and certainly by the end of the ATC.
Introduction

SINCE ITS INCEPTION IN 1974, the Multi-Fibre Arrangement (MFA) has allowed developed countries to negotiate discriminatory quotas on imports of textiles and clothing from participating exporting countries and to unilaterally impose country specific restrictions where agreement with supplying countries could not be reached. The United States, the European Union (EU), Canada, Norway, Japan and Switzerland are the developed country participants in the MFA, though Switzerland and Japan have not, for some time, imposed restrictions under the Arrangement. On average, around 30 exporting countries have been signatories to the arrangement though many more countries have had restrictions imposed on their exports under the Arrangement.

The product and country coverage, and trade restrictiveness of the MFA have increased over time. All clothing and textiles of wool, cotton and synthetic fibres have been included since 1974. Each importing country used its own product classification for specification of restrictions and the set of products for which restrictions were specified varied between exporting countries. Under the MFA the US imposed fibre-specific textile and clothing quotas.

These restrictions have resulted in higher prices of textiles and clothing to consumers in developed countries, reduced textiles production in both exporting and importing countries and reduced prices and incomes of raw fibre producers.

The MFA has also changed the composition of textiles and clothing, and fibre demand and production. Consumer demand has shifted toward less restricted (and hence cheaper) categories of textiles and clothing. Depending on the fibre composition of these categories, the restrictions, while disadvantaging all fibre producers, disadvantaged some categories of fibres relative to others.

Replacement of the MFA with the ATC

The WTO Agreement on Textiles and Clothing (ATC) was negotiated during the GATT Uruguay Round of multilateral trade negotiations. Under the ATC, members of the WTO, which includes all developed countries imposing MFA sanctioned restrictions against textile and clothing imports...
from developing countries, agreed to progressively bring the textiles and clothing trade under WTO disciplines, and in particular to phase out their MFA restrictions over a ten year period from 1 January 1995. That is, all textiles and clothing products will be progressively integrated into the GATT 1994 (which forbids the imposition of quotas) and quota growth rates for products not yet integrated will be increased.

Under the ATC all MFA quotas and other restrictions in force on 31 December 1994 had to be notified to the WTO. Notified restrictions are regarded as the only restrictions being maintained by WTO members against other WTO members (i.e. if the restrictions were not notified they became WTO-illegal). WTO importing restraining members (the US, the EU, Canada and Norway) were further required to accelerate MFA quota growth rates by an agreed annual percentage during each stage of the ATC phase out program.

Both the percentage of total 1990 import volume of products to be integrated at each stage of the phase out, and the quota growth rate acceleration factor are minimum requirements. That is, importing restraining countries are required by the ATC to increase the percentage of products integrated and the quota growth rates at each stage by not less than the agreed percentage. There are specific provisions in the ATC which encourage faster integration and unilateral liberalisation.

The phase out program is in four stages, during which the coverage of products for which import quotas are eliminated will be progressively expanded. Importing countries are free to determine which products will be included in each stage of the integration process as long as they include products from each of the four groupings: tops and yarns; fabrics; made up textile products; and clothing. At the conclusion of the transition period, all quotas on textiles and clothing will be eliminated between WTO members.

Operating within the rules of the ATC, the US has chosen not to integrate products with the highest barriers to imports until toward the end of the transition period. These products are dominated by clothing. With clothing left until last in this sequencing and with imported inputs to clothing manufacture (yarns, fabrics, etc.) becoming cheaper through earlier liberalisation, incentives to expand domestic clothing production will increase. US manufacturers of textiles and clothing face the prospect of significant disruption to their business in the last year of the adjustment period — which could be avoided with a smoother transition path. And by delaying and compressing the adjustment there is a real danger that political pressures, driven by protectionist forces within the US, will lead to abandonment of the textile and clothing import liberalisation program with
adverse consequences for US consumers and retailers of clothing and textiles, developing country exporters and fibre producers.

This study

The focus of this study is on the impact of the ATC phase out on wool, cotton and other fibre textile and clothing production, consumption and imports in the US and the implications for wool, cotton and other fibre producers. The US is the largest importer of wool apparel. US policies toward wool apparel imports are therefore likely to be important in shaping prospects for wool producers and processors, and retailers of wool based clothing and textiles in the US and throughout the world.

Our study is concerned with:

- the costs to US consumers of a continuation of barriers to imports of clothing and textiles;
- the effects of these barriers on the global wool market;
- the impact of the US phase out program under the ATC on sales of wool based clothing in the US;
- the extent to which the US phase out program discriminates between wool and other fibres; and
- the benefits to US consumers and retailers – and Australian wool and cotton growers – from a faster rate of liberalisation than that currently proposed by the US Government.
How barriers to US imports of textiles and clothing will change as the ATC is implemented

THE ATC’S FOUR STAGE PHASE OUT requires that a specified share of total 1990 imports covered (but not necessarily restricted) by the ATC are to be integrated into GATT 1994 (i.e. have their import quotas and other restrictions removed) at each stage (table 2.1). However, importing restraining countries can include on the list for integration imports which have never been subject to MFA import quotas. Canada, the EU and the US all watered down the first stage of adjustment on 1 January 1995 by employing this tactic. In the case of the US, imports previously unrestricted by quota which have been included on the list represent about 37 per cent of 1990 textile and clothing imports (estimate by Bagchi 1994). In stage 1, the US did not integrate any apparel products that were subject to quota and in stage 2 only 4 per cent were integrated. A further 7 per cent will be integrated in stage 3. The remaining 89 per cent will not be integrated until 1 January 2005.

It was assumed that China and Taiwan become members of the WTO in 2000 and that they enter the stages and phase out terms of the ATC at the same point as other suppliers in that year.

2.1 The ATC phase out program

<table>
<thead>
<tr>
<th>Stage</th>
<th>Integration: minimum share of total 1990 import volume of products covered by the ATC</th>
<th>Minimum rate of expansion of residual quotas relative to base quota expansion rate agreed under last MFA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Share</td>
<td>Cumulative</td>
</tr>
<tr>
<td>Stage I (1 January 1995)</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Stage II (1 January 1998)</td>
<td>17</td>
<td>33</td>
</tr>
<tr>
<td>Stage III (1 January 2002)</td>
<td>18</td>
<td>51</td>
</tr>
<tr>
<td>Completion (1 January 2005)</td>
<td>49</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Francois, McDonald and Nordström (1995).
It is clear from table 2.1 that many US textile and clothing imports will be subject to import quotas for most of the transition period. In order to calculate the likely cost of these quotas to US consumers and retailers of textiles and clothing, we first need to establish the degree to which the quotas will continue to restrict each category of imports over the life of the ATC. The degree to which the quota restricts imports can be measured by its tariff equivalent — the extent to which the quota causes the domestic price of imports to increase above the cif import price. This in turn will depend on the size of the import quota relative to the demand for imports at the start of the period and the rate at which the import quota is expanding relative to the rate of increase in consumer demand for the product.

For example, if the import quota for a particular product is expanding more rapidly than the growth in demand by US consumers for that imported product, then the restrictive effect of the quota will decline. This will be reflected in a falling gap between the domestic price of imports and the cif import price, as the imported product becomes less scarce. If, by contrast, the growth in demand for the product exceeds the rate of expansion in quota, then the restrictive effect of the quota will increase. This will be reflected in a rising local price of imports relative to the price at the border in order to ration sales to consumers.

**Measuring the size of the barriers**

A key issue for our analysis is how the size of the barrier to imports of different types of clothing and textiles into the US will change as the ATC phase out proceeds. The size of the barrier to imports represents the tariff equivalent of the quota plus the tariff. The influence of quotas will wane during the transition period as products are integrated into GATT 1994. By 1 January 2005 the only protective barrier will be the tariff.

We have estimated for yarns, fabrics and apparel, on a fibre specific basis, the size of the barrier to imports in each year of the transition period. Details of the methodology are set out in appendix A. In brief, it involves the following steps.

- Determine whether the quotas restrict trade in the base year 1996. If quotas are not restrictive (that is, the import quota exceeds the desired volume of imports), then the quota is having no effect on the price of imports — the only barrier is the tariff. (This involved analysis of data on import quotas and imports for each of 147 three digit textile and apparel commodity classifications.)
Compare the rate of growth of import quota over the transition period relative to the projected rate of growth in demand for the imported product into the US. A formal economic model is used to determine import demand growth. This model takes into account production conditions in the US and exporting countries (which determine how relative prices between goods sourced overseas and goods produced in the US are likely to change over the period) and the extent to which US consumers will switch their purchases between US produced and imported textiles and clothing as the relative prices between them change. The demand growth projections for each type of yarn, fabric and apparel are shown in appendix B.

We consider in turn the US barriers for yarns (table 2.2), fabrics (table 2.3) and apparel (table 2.4). Each table contains four columns of tariff equivalent estimates for each commodity and year as follows.

- Tariff equivalent of quota on target imports — the protection provided by the quantitative restrictions on target countries (those assigned an import quota) only.
- Tariff equivalent of quota across all imports — the protection provided by the quantitative restrictions across all countries, that is the weighted sum across quota and non-quota countries (say, a).
- Trade weighted average tariff — the weighted sum of the ad valorem equivalent of duty payable across all countries (say, b).
- Total barrier to imports. This is calculated by multiplying the power of the tariff equivalent of the quota by the power of the tariff \((1+a/100)(1+b/100)\).

The barriers for yarns

For the three categories of yarns distinguished — cotton yarn, wool yarn, other yarn — quotas were not restrictive. In all cases, quota volumes greatly exceeded desired imports. And, in all cases, quota is expected to grow at a faster pace than demand for these products. For quotas to become restrictive, imports would have to surge by several multiples of their current levels. The barrier to imports of yarns into the US over the term of the ATC is therefore the projected tariff rate. This is shown in table 2.2.
The total barrier facing imports is similar for each type of yarn. Small reductions in tariffs on yarns, fabrics and apparel were agreed to in the Uruguay Round of trade negotiations. The tariff for cotton yarn is projected to move from 7.6 to 6.8 per cent over the period. For wool and wool blend yarn the movement is from 8.2 per cent to 5.8 per cent compared with 8.7 to 7.3 per cent for the other yarn category.

### 2.2 Projected barriers for yarns

<table>
<thead>
<tr>
<th>Year</th>
<th>Tariff equivalent of quota on</th>
<th>Tariff equivalent of quota across</th>
<th>Trade weighted average tariff</th>
<th>Total barrier to imports</th>
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<td>%</td>
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<td>Cotton yarn</td>
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Source: The Trade Partnership.
The barriers for fabrics

The story for fabrics is similar to that for yarns. Import quotas are underfilled on each category as a whole and quota volumes are expected to grow faster than demand for imports. This results in the tariff barriers shown in table 2.3.

The barrier to imports of wool and wool blend fabric (the tariff) is more than double the barrier to imports of cotton fabric and other fibre fabric.

2.3 Projected barriers for fabrics

<table>
<thead>
<tr>
<th>Year</th>
<th>Tariff equivalent of quota on target imports</th>
<th>Tariff equivalent of quota across all imports</th>
<th>Trade weighted average tariff</th>
<th>Total barrier to imports</th>
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<tr>
<td></td>
<td>%</td>
<td>%</td>
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<tr>
<td>Cotton fabric</td>
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Source: The Trade Partnership.
The barriers for apparel

Cotton, wool, wool blend and other fibre apparel quotas were all restrictive in 1996 and are likely to remain so over the term of the ATC. The estimated tariff equivalent of these quotas in 1996 across all imports is 26.4 per cent (cotton apparel), 12.8 per cent (wool apparel) and 40.1 per cent (other apparel). The tariff equivalent for all apparel imports into the US is estimated at 30.4 per cent.

2.4 Projected barriers for apparel

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<th>Tariff equivalent of quota on target imports</th>
<th>Tariff equivalent of quota across all imports</th>
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</table>
These results are consistent with estimates made by others. For example, Hufbauer and Elliott (1994) estimated the tariff equivalent of US apparel quotas in 1990 to be 29 per cent. Cline (1987) calculated a tariff equivalent of US apparel quotas in 1986 of 30 per cent. The tariff equivalents reported above for 1996 reflect just one year of ATC liberalisation — no integration benefits because the US integrated no products subject to quota in stage 1 and just one year of accelerated growth rates. It is not surprising that the overall tariff equivalent for 1996 — 30.4 per cent — is so similar to tariff equivalents estimated by others for earlier years in which no quota liberalisation occurred. It is likely that demand growth was strong enough in 1996 to outweigh any liberalisation of apparel quotas that came from the accelerated growth rates of the quotas in that year.

Table 2.4 shows how the barriers to imports of apparel to the US are likely to change during the period of ATC liberalisation.

The ATC starting point import barriers are highest for other fibre apparel, followed by wool apparel then cotton apparel. Over the ATC liberalisation period those barriers are projected to fall from 47 to 15 per cent for cotton apparel, from 33 to 15 per cent for wool and wool blend apparel and from 70 to 20 per cent for other fibre apparel. For cotton and other fibre apparel, there is some progress on reducing barriers to 2004. But for wool apparel, the protective barrier increases slightly until 2004.
THE NEXT STEP IS TO ANALYSE the effects of removing barriers to US imports of textiles and clothing on US consumers and on Australian wool producers. To do this requires a framework that tracks the fibre content of apparel back to fibre producers and recognises that the United States is linked to other regions by trade. Box 3.1 summarises the features of the MFA model especially developed for this analysis.

Our approach

We have taken a two step modelling approach involving:

- using a framework developed by the Trade Partnership to forecast the tariff equivalents of current and future barriers to US textile and clothing imports over the ATC phase out period — as detailed in chapter 2 and appendixes A and B; and

- simulating with the MFA model the effects of removing these tariff equivalents — which is the focus of this chapter.

The strength of our two step modelling approach is that it permits the maximum detail to be incorporated into the forecasts of tariff equivalents for the US. These are important information in their own right as well as key inputs into our second step MFA model used to analyse effects. The potential weakness of a two step approach is that the two models may not be entirely consistent.

A theoretically more appealing approach would involve conducting the forecasting of future tariff equivalents and the effects of their removal within an internally consistent framework. This approach is, however, impractical. It would involve the development of an extremely detailed forecasting model together with a scenario describing the dynamics of demographic changes, income changes, changes in fashion and tastes, and changes in production technologies and input requirements for each level of activity throughout the textile and clothing chain in each of the three regions distinguished.
3 EFFECTS OF US LIBERALISATION OPTIONS

3.1 The MFA model

The MFA model is an Armington style input–output model of production, consumption and trade in fibres, textiles and apparel. The model covers:

- Australia, the US and the rest of the world
- apparel wool fibre and cotton fibre
- wool, cotton and other yarns
- wool, cotton and other fabrics
- wool, cotton and other apparel.

The ‘other’ activity includes both synthetic fibres and other natural fibres such as silk, jute and flax.

The model is based on an integrated set of input–output accounts, which shows how fibre producers are linked to final users of apparel through each stage of the value added chain.

Other features of the model are:

- its comparative–static nature — it analyses the effects of a policy change while holding constant all other factors;
- its partial equilibrium nature — focusing only on each fibre specific yarn, fabric and apparel chain; and
- its differentiated product nature — goods from different regions are recognised as imperfect substitutes for each other so that farm or factory prices can move independently between regions.

The structure of the model is detailed in full in appendix A. The model is non-linear and solved using GEMPACK software.

We took a number of steps to minimise inconsistency between the two models — by using the same base data for 1996 and using similar elasticity estimates for the US region of the MFA model as the Trade Partnership. However, some differences remain between the two models. In particular, in its forecasting framework the Trade Partnership distinguishes quota and non-quota suppliers into the US, whereas the MFA model aggregates these suppliers into the rest of the world region — which in turn supplies the US.

Simulations

We have undertaken four groups of simulations with the MFA model as follows.

- Simulation A: complete liberalisation now — the US removes in 1999 all quotas and tariffs on its imports of yarns, fabrics and apparel.
3 Effects of US Liberalisation Options

- Simulation B: US quota liberalisation now — all quotas on US imports of yarns, fabrics and apparel are removed in 1999, but tariffs on imports of these items remain.

- Simulation C: US quota liberalisation according to the agreed phase out schedule in each of the years 1999-2000, 2000-01, 2001-02, 2002-03 and 2003-04.

- Simulation D: US quota liberalisation after 2003-04 — the US removes all remaining quotas on imports of yarns, fabrics and apparel according to the ATC schedule.

Simulations C and D together encompass the ATC whereby the US phases out its quotas on textile and clothing imports to achieve their complete removal by January 2005.

The MFA model has a variable depicting the total barrier to imports — which includes both the duty component and the tariff equivalent of the quota restriction. This variable is represented in the model as the power of the total barrier. That is, if the tariff plus tariff equivalent of the quota is 30 per cent, then the starting value for this variable is 1+30/100=1.3. Each simulation involves a change in the value of this variable to include one or both components of the total barrier as appropriate.

Understanding the results

Results of model simulations are shown in table 3.2 (percentage change from base) and table 3.3 (change in values from base). They represent annual changes in model variables as a result of the changes in barriers to imports. The results concentrate on the effects on:

- US consumption of fibres, yarns, fabrics and apparel by type of fibre;
- US imports of fibres, yarns, fabrics and apparel by type of fibre;
- US production of fibres, yarns, fabrics and apparel by type of fibre;
- US expenditure on textiles and clothing; and
- Australia’s wool and cotton production, wool exports to the US and Australian wool and cotton industry income.
### Key results for some US textile and clothing liberalisation scenarios (Percentage change from base)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Units</th>
<th>Base value</th>
<th>Simulation A: complete liberalisation (quotas and tariffs) in 1999</th>
<th>Simulation B: quota liberalisation in 1999</th>
<th>Simulation C: Phase out of quotas year by year</th>
<th>Simulation D: quota liberalisation in 2004</th>
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<td>-0.6</td>
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</table>

Use of imports by US apparel chain

| Fibres | | | | | | | | | | | | | | |
| • Wool | kt | 34.2 | -9.5 | -2.4 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -2.1 | -0.8 | -0.5 |
| • Cotton | kt | 176.1 | -4.2 | -1.9 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -1.3 | -0.9 | -0.6 |
| Yarns | | | | | | | | | | | | | | |
| • Wool | kt fibre eq. | 7.2 | -4.4 | -5.7 | 0.0 | 0.0 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -5.1 | -0.8 | -0.5 |
| • Cotton | kt fibre eq. | 53.7 | 8.3 | -4.3 | -0.2 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -2.9 | -0.5 | -0.3 |
| • Other | kt fibre eq. | 204.9 | 12.1 | -3.0 | -0.1 | -0.1 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -2.0 | -0.5 | -0.3 |
| Fabrics | | | | | | | | | | | | | | |
| • Wool | kt fibre eq. | 10.9 | 16.1 | -10.8 | 0.0 | 0.0 | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -9.6 | -0.8 | -0.5 |
| • Cotton | kt fibre eq. | 241.5 | -0.2 | -9.5 | -0.4 | -0.4 | -0.6 | -0.7 | -0.6 | -0.6 | -0.6 | -6.5 | -0.5 | -0.3 |
| • Other | kt fibre eq. | 315.7 | 10.3 | -6.4 | -0.2 | -0.2 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -4.3 | -0.5 | -0.3 |
| Final consumption of apparel | | | | | | | | | | | | | | |
| • Wool | kt fibre eq. | 58.9 | 20.6 | 6.4 | -0.9 | -0.9 | -1.0 | -1.0 | -1.0 | -1.0 | -11.8 | -1.0 | -0.7 | -0.5 |
| • Cotton | kt fibre eq. | 613.6 | 40.4 | 22.9 | 0.8 | 1.0 | 1.5 | 1.8 | 1.6 | 1.6 | -15.3 | 1.5 | 1.3 | 0.9 |
| • Other | kt fibre eq. | 612.7 | 80.6 | 46.0 | 1.5 | 1.5 | 2.2 | 2.3 | 2.4 | 2.4 | 29.6 | 2.4 | 2.2 | 1.8 |

(Continued on next page)
## 3.2 Key results for some US textile and clothing liberalisation scenarios (Percentage change from base)

(continued)

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<tr>
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<th>Simulation B: quota liberalisation in 1999&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Simulation C: Phase out of quotas year by year&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Simulation D: quota liberalisation in 2004&lt;sup&gt;a&lt;/sup&gt;</th>
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<sup>a</sup> Remove tariff equivalent of the quota arrangements.<br>
<sup>b</sup> Remove tariff equivalent of the quota arrangements and duty payable.

Source: MFA model.
### 3.3 Key results for some US textile and clothing liberalisation scenarios (change in values from base)

<table>
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<tr>
<th>Variable</th>
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<th>Simulation A: complete liberalisation (quotas and tariffs) in 1999</th>
<th>Simulation B: quota liberalisation in 1999</th>
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(Continued on next page)
### 3.3 Key results for some US textile and clothing liberalisation scenarios (change in values from base) (continued)

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<th>Simulation C: Phase out of quotas year by year&lt;sup&gt;a&lt;/sup&gt;</th>
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<sup>a</sup> Remove tariff equivalent of the quota arrangements. <sup>b</sup> Remove tariff equivalent of the quota arrangements and duty payable.

Source: MFA model.
Key factors shaping the results in tables 3.2 and 3.3 are:

- the changes in import prices into the US of yarns, fabrics and apparel under quota phase out and removal, and removal of quotas and tariffs — in particular, the import price relativities between each fibre category of yarns, fabrics and apparel (see table 3.4);
- the importance of US consumption of each fibre category in world fibre markets (see table 3.5); and

### 3.4 Changes in import prices under various US liberalisation scenarios

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*Power of the tariff is defined as one plus the tariff rate \( t \), that is, \( 1 + \frac{t}{100} \).
how US total fabric and apparel consumption is shared between consumption of wool fabrics and apparel, cotton fabrics and apparel, and other (mainly man-made) fabrics and apparel (see chart 3.6).

### 3.5 Importance of the US market in the world fibre market

<table>
<thead>
<tr>
<th>Fibre type</th>
<th>World consumption</th>
<th>US consumption</th>
<th>US share</th>
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<td></td>
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<td>kt fibre equivalent</td>
<td>%</td>
</tr>
<tr>
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<td>17 280.1</td>
<td>2 740.6</td>
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<tr>
<td>Other</td>
<td>21 308.0</td>
<td>3 834.4</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Source: CIE estimates.

### 3.6 Fibre composition of US apparel consumption

Consider, for example, simulation A (complete liberalisation in 1999). Table 3.4 shows that this will result in reductions in US import prices of apparel of 30.3 per cent for cotton apparel, 25 per cent for wool and wool blend apparel and 38.7 per cent for other fibre apparel. Thus, while all imported apparel into the US will be substantially cheaper, cotton and man-made fibre apparel will be cheaper still relative to wool apparel. This is because, although tariffs on woollen apparel in 1999 are slightly higher than on cotton and other fibre apparel, the tariff equivalent of the quota on wool based apparel imports is lower.

Table 3.5 shows that US final consumption of wool fibre in fabrics and apparel accounts for 12 per cent of world consumption. In the case of cotton and man-made fibres, US consumption by fibre is significantly higher (16 per cent for cotton and 18 per cent for other). Changes in the demand for
EFFECTS OF US LIBERALISATION OPTIONS

apparel in the US are therefore likely to have a greater influence on world apparel demand in the case of cotton than in the case of wool.

Chart 3.6 shows that, on a fibre equivalent basis, US apparel consumption is dominated by cotton (48 per cent) and man-made fibres (47.7 per cent). Wool accounts for only 4.3 per cent of US apparel consumption. Hence, increases in US apparel consumption through cheaper imports will lead to much bigger increases in the demand for cotton and man-made fibres by the US than is the case for wool.

Simulation A: complete liberalisation now

The results show how much current US barriers to imports of yarns, fabrics and apparel penalise US textile and clothing consumers, and raw fibre producers. They provide a measure of the maximum gains achievable for US consumers and for Australian wool producers from US liberalisation.

Key points to note are as follows.

- US consumers increase their apparel consumption significantly but switch strongly from domestically produced to imported apparel — imports of wool based apparel increase by 21 per cent, imports of cotton apparel increase by 40 per cent and imports of other apparel increase by 81 per cent.

- Expenditure by US consumers on textiles and clothing falls by US$20 billion. This provides a guide to how much better off US consumers would be if current restrictions on US imports of textiles and clothing were to be removed. Import liberalisation would allow US consumers to consume more of the now much cheaper textiles and clothing and still have US$20 billion left over to spend on other goods and services.

- US production of apparel falls substantially — by 15 per cent (wool), 18 per cent (cotton) and 19 per cent (other).

- As a result of the switch from domestic apparel production to apparel imports US imports of yarns and fabrics decrease substantially. Imports of woollen yarns and woollen fabrics are projected to fall by 19 and 22 per cent respectively.

- Australia’s raw apparel wool exports to the US are projected to fall by 9 per cent because of the contraction in US production of wool-based yarns, fabrics and apparel. The US obtains its increased requirements for Australian wool through its imports of wool fabrics and apparel. Australia’s wool production is projected to increase by about 0.3 per cent (an additional 1.4 kilotonnes) and Australian wool industry
income improves by A$17 million per year. Both in absolute and percentage terms, the increase in Australia's cotton production is nearly three times that for wool.

Simulation B: US quota liberalisation now

Relative to simulation A, the reductions in US import prices are considerably lower. Consider, for example, imports of apparel. The import price of cotton apparel is projected to fall by 19 per cent (compared with 30 per cent in A). For wool apparel the import price is projected to fall by 12 per cent (compared with 25 per cent in A) while the price fall for other fibre apparel is 26 per cent (compared with 39 per cent in A). The increase in US consumption of apparel and the degree of switching from domestically produced to imported apparel are also smaller, though still substantial.

The savings for US consumers are less — US expenditure on textiles and clothing falls by about US$12 billion, which is about 60 per cent of the expenditure reduction in simulation A. The gain in Australian wool industry income is about half of the gain from complete import liberalisation now.

Simulations C and D: Step by step quota liberalisation with all quotas eliminated by the end of 2004

The phase out between 1999-2000 and 2003-04 slightly worsens the position of wool apparel relative to cotton and other fibre apparel in the US market because of a faster rate of decline in the tariff equivalent of quotas on cotton and other fibre apparel relative to wool apparel. Imports of cotton and other apparel increase slightly each year between 1999-2000 and 2003-04, while imports of wool apparel decline slightly. As a consequence, there is a very small decline in Australian wool industry income over this period.

US consumers make steady gains over this period through being able to satisfy their clothing and textile demands with less expenditure. US production of apparel declines by small amounts each year.

But the phase out from 1999-2000 to 2003-04 comes only a fraction of the way to complete liberalisation of quotas at the end of 2005. Most of the action is in the final year (simulation D). About 70 per cent of the total reduction in US expenditure on textiles and clothing from quota liberalisation occurs through liberalisation planned for 2004-05.
All of the gains to the Australian wool industry occur from quota liberalisation during 2004-05. This result highlights the importance to the Australian wool industry of achieving complete removal of US import quotas by the end of the ATC.
Sensitivity analysis
THE MFA MODEL INCORPORATES considerable detail about economic behaviour in fibre specific textile and clothing chains and the trade flows between each region at each level in the chain. This calls for a large number of behavioural parameters and elasticities. A complete list of parameters and elasticities required by the model is documented in appendix C along with sources. Values for these parameters and elasticities are not known with certainty. In this chapter we look at the sensitivity of results to changes in values assigned to a selection of parameters.

**Parameters tested**

We use as our base reference point simulation A, complete liberalisation of US import barriers (removal of tariffs and the tariff equivalent of the quantitative restriction). Changes in parameters and elasticities investigated include:

- setting the domestic-import substitution parameter for all commodities in the US to zero (base value of parameter was 2.5);
- setting the domestic-import substitution parameter for all commodities in the US to 5.0 (base value of parameter was 2.5);
- doubling substitution possibilities between apparel of different fibre types in the US (base values were own price elasticities of around 1.0);
- doubling supply elasticities in the US textiles and apparel industries (base elasticities of 1.0);
- doubling supply elasticities of wool and cotton in Australia (base elasticities of 0.8 and 1.0).

**Results**

Selected results are shown in table 4.7. They show that the gains to US consumers (measured in terms of reduction in expenditure on textiles and
4.1 Selected results of the sensitivity analysis (percentage changes from base)

<table>
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<tr>
<th>Units</th>
<th>Reference simulation A (standard parameter set)</th>
<th>US domestic import parameter equals 0.0</th>
<th>US domestic import parameter equals 5.0</th>
<th>Double cross-price elasticities in US apparel consumption</th>
<th>Double US textiles and apparel supply elasticities</th>
<th>Double Australian wool and cotton supply elasticities</th>
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</thead>
<tbody>
<tr>
<td>Complete US liberalisation from 1999</td>
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<td></td>
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<td>1.1</td>
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</table>

Source: MFA model.
clothing), the adjustment burden on US apparel producers (measured in terms of the degree of switching from domestically produced to imported apparel) and the gains to Australian wool producers are most sensitive to changes in the domestic-import substitution parameter for yarns, fabric and apparel.

Under the assumption of no substitution between domestic and imported yarns, fabrics and apparel in the US, the US textile and clothing industry benefits from liberalisation as consumers increase their total apparel consumption in response to cheaper imports. Because consumers cannot switch between sources, consumption of domestically produced apparel increases by the same percentage as consumption of imported apparel. Whereas in the reference simulation US consumption of domestically produced apparel declines by 15 to 19 per cent as consumers switch to cheaper imports, with no substitution possible US consumption of domestically produced apparel expands by between 5 and 8 per cent. Increased US production of wool apparel also leads to bigger demands by the US for Australian raw wool. However, a zero value for domestic-import substitution is extreme. It implies that quota restrictions would not be binding.

Increasing the import-domestic substitution elasticity from 2.5 to 5.0 results in a greater reduction in US consumption of US produced apparel and a bigger increase in US consumption of imported apparel. The gains to US consumers in terms of reduced expenditure on textiles and clothing are a little higher than in the reference simulation. The gains to Australian wool growers remain unchanged.

Doubling cross-price elasticities in US apparel consumption has a small effect on US production, imports, expenditure, and Australian wool production. Doubling US textile and apparel supply elasticities also has only a small effect on these outcomes, as does doubling Australian wool and cotton supply elasticities.
Appendixes
Estimated tariff equivalents of textile and apparel quotas, 1996–2006

Laura M. Baughman
The Trade Partnership

The Centre for International Economics in Canberra asked The Trade Partnership to estimate the tariff equivalents of US yarn, fabric and apparel quotas from 1996-2006, disaggregated as follows: cotton yarn, fabric and apparel; wool yarn, fabric and apparel; wool blend yarn, fabric and apparel; and other yarn, fabric and apparel. These estimates provide a measure of the degree to which quota protection can be expected to continue to restrict imports over the term of the ATC (that is, through 2004), followed by tariff protection in 2005 and 2006. Said differently, they measure how much the US plan for implementing the ATC in fact liberalises quotas relative to growing market demand.

The results, shown in table A.1, reveal that — Agreement on Textiles and Clothing liberalisation notwithstanding — US apparel producers are likely to continue to benefit from significant apparel quota protection through the end of 2004, and relatively high tariffs thereafter. In the cases of wool and wool blend apparel, in particular, this protection could actually increase because US quota growth does not keep pace with growth in market demand over the term of the ATC. Fabric and yarn protection is expected to be confined to the effects of prevailing tariffs, which decline only marginally.

1 The ATC permits importing countries to accelerate textile and apparel liberalisation at any time during the phase-out. Thus, the United States could help its producers avoid these ‘cliffs’ of protection in 2004 by preparing them better in advance for a quota-free trading environment. One obvious way to do this would be to integrate more quota-covered trade into the GATT during Stages 2 and 3 than the United States has already provided for.
### A.1 Summary results: tariff equivalents of US textiles and apparel quotas, 1996–2006

<table>
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<tr>
<th>Year</th>
<th>Trade weighted average tariff</th>
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<th>Tariff equivalent – total imports</th>
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(Continued on next page)
### A.1 Summary results: tariff equivalents of US textiles and apparel quotas, 1996–2006

**Per cent (continued)**

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<th>Trade weighted average tariff</th>
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<th>Tariff equivalent – total imports</th>
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<td>1997</td>
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<td><strong>Wool and wool blend apparel</strong></td>
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<tr>
<td>2006</td>
<td>15.4</td>
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</tr>
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</table>

(Continued on next page)
The Trade Partnership collected quota and target import data for each of 147 three-digit textile and apparel commodity classifications. The calculation of variables in boldface type is described in detail at the end of this section.) Imports from countries subject to quota (target imports) for each individual category were compared with quota for that category. For most individual apparel categories, quotas were restrictive and, consequently, quotas were restrictive at the aggregated level of cotton apparel, wool apparel and other apparel.

2 The trade generally considers a quota filled (or restrictive) when imports reach 85 per cent or more of available quota.

3 1996 was selected as the base year because at the time the project was begun it was the most recent year for which US production data were available.

4 The United States assesses quotas on the basis of a three-digit category structure. It assigns each textile and apparel harmonised tariff system number to one of 147 categories, segregated for the most part by fibre (some 200 series categories cover both cotton and man-made fibre products).

5 The US quotas applicable to wool cover wool blends as well as pure wool. Therefore, it was not possible to disaggregate the quota data, and, consequently,
Yarns and fabrics told a different story. In some instances, quotas were restrictive for individual three-digit categories of yarns or fabrics. For example, the polyester filament and other synthetic filament fibre fabric quota (category 619/620) was 100 per cent filled in 1996, and cotton and man-made fibre pile and tufted fabric quota (category 224) was 92 per cent filled. In contrast, woven man-made fibre (MMF) and wool blend fabric quota (category 624) was only 4 per cent filled, cotton and MMF special weave quota (category 220) only 2 per cent filled. But, because underfilled quota generally vastly outweighed filled quota, the overall weighted average quota premia for the broader classifications (cotton yarn, wool yarn, other yarn, cotton fabric, wool fabric and other fabric) are therefore probably very small and assumed to be zero. Moreover, one would not expect the quotas to become restrictive over the term of the ATC because, as the charts and data in appendix B show, in all cases quota is expected to grow at a faster pace than demand for these products. For non-restrictive quotas to become restrictive, imports would have to surge by several multiples of their current levels. Therefore, the tariff equivalent facing US imports of yarns and fabrics over the term of the ATC is the relevant projected tariff rate. Table A.1 reports the results.

To estimate the tariff equivalents of US cotton, wool, wool blend and other apparel quotas (all of which, again, were restrictive in 1996) over the term of the ATC, The Trade Partnership used a partial equilibrium model developed by the US International Trade Commission (ITC). Two country groups were included in the model: target imports (all countries subject to quota) and non-target imports (all countries not subject to quota). The model is a quota-variant of the Commercial Policy Analysis System (COMPAS) model developed by Joseph Francois and Keith Hall at the ITC to measure the effects on various US industries and consumers of tariffs. Based on Armington (1969), it posits that imported and domestically-produced goods are imperfect substitutes for each other. It is a log-linear model incorporating constant own- and cross-price elasticities of demand.

---

6 The analysis thus assumes that most individual yarn and fabric quotas remain non-binding over the course of the ATC.
7 Similarly, the analysis assumes that the apparel quotas remain binding over the term of the ATC.
8 For the specific equations used, see chapter 5 of Francois, JF and Hall, KH 1995, ‘Partial Equilibrium Modeling,’ in Francois, JF and Reinert, KA (eds), Applied Methods for Trade Policy Modeling, Cambridge University Press.
The model requires the following data, all exclusive of the distorting effects of existing quotas:

- Elasticities of substitution between target imports and domestic production, non-target imports and domestic production, and target and non-target imports, an elasticity of aggregate demand, and elasticities of domestic and import supply.

Thus, before the model could be used, tariff equivalents needed to be estimated for 1996 so that 1996 production and import data (and, consequently, all data projected from it) could be ‘purged’ of the influence of the quotas.

Calculating base year tariff equivalents

The Trade Partnership used an indirect method for calculating apparel tariff equivalents for 1996, first developed by Morkre (1984) and Hamilton (1986) and modified later by Yang (1994). Basically, the price of imports (tariff and tariff equivalent inclusive) in a given country is equal to the foreign cost of production multiplied by the tariff rate and the tariff equivalent. Morkre used Hong Kong quota prices as a starting point for estimating tariff equivalents. Hamilton postulated that with perfect competition in the import market, if tariff equivalents for one country are known (for example, Hong Kong), those for other can be inferred given ratios of supply prices, tariffs and import prices:

\[
\frac{C_a}{C_b} \times \frac{1+TE_a}{1+TE_b} \times \frac{1+t_a}{1+t_b} = \frac{P_a}{P_b}
\]

where \(C_a\) and \(C_b\) are supply prices of restricted products in exporting countries ‘a’ and ‘b,’ respectively, \(TE_a\) and \(TE_b\) are tariff equivalents of quotas for the two exporting countries, respectively, in the same export market, \(t_a\) and \(t_b\) are tariffs facing the two countries in the same export market, and \(P_a\) and \(P_b\) are prices (tariff and tariff equivalent inclusive) of imports from the two exporting countries at the border of the same importing country.

Since the tariffs facing various exporting countries to the same import market are the same, \(t_a\) and \(t_b\) can be dropped from the above equation. He
then suggests that the ratio of apparel supply prices be calculated from import prices in the Japanese market. Yang argues that, since Japan does not impose quotas on apparel imports, relative unit values of apparel imports into Japan provide reasonable estimates of relative supply prices at the margin across exporting countries.

Consequently, any differences between the restricted (United States) and unrestricted (Japanese) markets with respect to relative import prices (tariff equivalent inclusive) among exporters result from the different tariff equivalents of (Multifibre Arrangement) quotas they face, assuming that the same tariffs are applied to all exporters. (Yang 1994, p. 898)

The Trade Partnership used the Morkre, Hamilton and Yang approaches to calculate the US tariff equivalents of apparel quotas by fibre for 1996. Because Hong Kong quota premia for the US apparel market (TEa in equation (1)) are available, all of the variables in equation (1) are known except TEb, the tariff equivalent in the US market for all countries subject to quota other than Hong Kong. Foreign cost (Ca/Cb) was calculated as the ratio of the unit value of Japan's 1996 imports from Hong Kong to the unit value of imports from a sample of other countries. The US import price (Pa/Pb) was calculated as the ratio of the unit value of US imports from Hong Kong in 1996 to the unit value of total imports from a sample of countries subject to quota. The tariff equivalent facing Hong Kong (TEa) was calculated from disaggregated quota price data for 1996.

The equation was then solved for TEb, the tariff equivalent for all sample exporters to the United States subject to quota. A weighted average was computed between TEa and TEb to get the total tariff equivalent facing all imports subject to quota in 1996. This process was conducted separately for cotton apparel, wool apparel, and other apparel. The results for 1996 are shown in table A.2.

### A.2 Estimated tariff equivalents for apparel, 1996

<table>
<thead>
<tr>
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<th>Per cent</th>
<th>Total imports</th>
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</thead>
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<td><strong>Target imports</strong></td>
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<tr>
<td>Cotton apparel</td>
<td>41.7</td>
<td>26.4</td>
</tr>
<tr>
<td>Wool apparel</td>
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<td>40.1</td>
</tr>
<tr>
<td>Total apparel</td>
<td>48.7</td>
<td>30.4</td>
</tr>
</tbody>
</table>

*Target imports tariff equivalent weighted by customs value.

Source: The Trade Partnership.

The analysis necessitated a few simplifying assumptions, none of which is believed to bias the results to any significant degree. As Yang notes, the approach assumes that tastes and other non-price factors play an insignificant role in the determination of relative prices of imports from various exporting countries. And the use of the particular Japanese data available,
which provides import values inflated by insurance and freight charges, could distort the relative cost comparisons \((C_a/C_b)\). However, the countries chosen for \(C_b\) were all approximately as far from Japan as Hong Kong \((C_A)\) so differences in insurance and freight charges should not unduly distort the results, if at all. In addition, the use of Japan as the surrogate quota free economy assumes that no other non-tariff barriers limit imports in any way that would distort relative cost comparisons.

The results are consistent with estimates made by others. For example, Hufbauer and Elliott (1994) estimated the tariff equivalent of US apparel quotas in 1990 to be 29.0 per cent. Cline (1987) calculated a tariff equivalent of US apparel quotas in 1986 of 30.0 per cent. The tariff equivalents reported in table A.2 reflect only one year of ATC liberalisation -- no integration benefits because the United States integrated no products subject to quota in Stage 1, and only one year of accelerated growth rates. It is not surprising that the overall tariff equivalent for 1996 -- 30.4 per cent -- is so similar to tariff equivalents estimated by others for earlier years in which no quota liberalisation occurred. It is likely that demand growth was strong enough in 1996 to outweigh any liberalisation of apparel quotas that came from the accelerated growth rates of the quotas in that year.

Revising 1996 base year data — projecting future data

Using these 1996 tariff equivalents, the base 1996 values for production and imports were ‘purged’ of the effects of 1996 quotas as follows. An Armington model similar to the COMPAS model was benchmarked using data for 1996 and the elasticity values specified earlier. This model was then used to solve for the counterfactual 1996 values for imports and domestic production that would have been observed absent the quotas.

The resulting values were projected through 2004 by first projecting market demand through 2004 and then deriving production and imports from projected market demand on the basis of those variables' shares of 1996 market demand. The Trade Partnership relied on earlier research conducted for the International Textiles and Clothing Bureau by Baughman (1997), in which market demand was projected for individual textile and apparel products relying on expected changes in US demographics and other factors that would influence demand. The results are reported in appendix B. Once the market demand projections were calculated, target and non-target imports and US production were projected using their 1996 market shares. Using 1996 market shares holds relative technology, productivity, and quality constant. Of course, over time producers in, say, China would be expected to upgrade product and shift more heavily into the production of higher-
grade products. However, attempting to incorporate some estimate of these relative shifts between suppliers would have required assumptions too arbitrary to justify.

Calculating projected tariff equivalents

The resulting projected data, plus projected quota volume over the term of the ATC, was then inputted year by year into the ITC model to obtain the estimated tariff equivalents through 2004. Quotas are scheduled to be eliminated on 1 January 2005, so from 2005 on the relevant restraint is the tariff. The results are shown in table A.1 above.

Detailed data descriptions (listed alphabetically)

Elasticities

The Trade Partnership obtained all required apparel elasticities from Cline (1987). Cline (and others\(^9\)) suggests a domestic supply elasticity of 1 and an infinite import elasticity of supply; elasticities of substitution between target imports and domestic production, between non-target imports and domestic production, and between target and non-target imports of -2.5; and an aggregate demand elasticity of -0.5.\(^{10}\)

Foreign cost

The calculations of relative supply prices -- Hong Kong to other target countries -- used a Laspeyres-type index. To calculate the relative cost of imported cotton, wool and other apparel in the Japanese market in 1996, nine digit HTS import data from the Japan Tariff Association (Japan Exports and Imports: Commodity by Country, 1996) were allocated to the relevant three digit US apparel category classification using a 1996 correlation published by the US Department of Commerce, Office of Textiles and Apparel.\(^{11}\) The differing category volume data (some in

\(^9\) Hufbauer, Berliner and Elliott (1986).

\(^{10}\) Cline, WR 1987, The Future of World Trade in Textiles and Apparel, Institute for International Economics, Washington DC. See pages 307 and 308 for his analysis of why these elasticities are appropriate.

\(^{11}\) The Japanese data are only provided at a comparable level to US data at the six digit HTS level, and the US concordance is at the ten digit level, so for some categories the matching is not as precise as the US concordance would require. There would be some overlap between categories, resulting in distorted unit
dozens, some in kilograms) were converted to square meter equivalents using US conversion factors designed for this purpose so they could be aggregated to the broader commodity groupings. Value data in yen were converted into US dollars using a 1996 exchange rate published by the International Monetary Fund. Data in 200 series categories (cotton and/or man-made fibres) were divided equally between cotton and other apparel.

Unit values were calculated for selected HTS items within a given category classification for Hong Kong and each of five sample countries: Korea, China, Taiwan, the Philippines and Indonesia. The goal was to calculate relative unit values for products and countries that were as representative of the broader category as possible. For each category, a representative sample of six digit HS items was selected (attempting to choose HTS items that most closely represented, in both volume and unit value terms) the overall US category. For example, US category 237, ‘play suits and sunsets’, is largely composed of children’s wear (although there are significant amounts of children’s wear included in other categories as well). But Japanese import data do not break out children’s wear in any way. Therefore, to calculate representative unit values for imports into Japan in category 237, The Trade Partnership chose those HTS items within that category that yielded unit values most consistent with children’s clothing.

Unit values were calculated for each HTS selected for the five countries as a group. The total unit values for sample group and for Hong Kong were calculated by weighting the individual unit values for each category by the quantity of imports from Hong Kong for that category into the United States (the Laspeyres weights). In all cases unit values were converted into US dollars per square meter equivalent.

**Import price (US)**

US customs value and quantity data for imports for consumption were used to calculate the unit value of imports from Hong Kong and ‘other’ target countries into the US market for each of the three digit category groupings within the broader apparel group. The overall unit value for Hong Kong is the sum of the values of these categories divided by the sum values relative to unit values calculated for US imports (some will be too high; others too low).

12 It was assumed that cif charges included in the Japanese import values did not distort unduly the unit values because the five countries chosen are relatively close to Japan relative to Hong Kong (thus reducing the cif bias). (The exercise was also done for just Korea, China and Taiwan, on the theory that cif charges mattered more for the Philippines and Indonesia, to see if there was indeed a bias, and there was no difference in the results.)
of the volumes (again, converted into square meter equivalents). The overall unit value of the ‘other’ target countries is the individual unit values weighted by the quantity of imports from Hong Kong into the US market. It should be noted that the definition of ‘other’ target countries here is broader than above: it includes all countries subject to quota (a specific limit or SL) in 1996 for a given category, not just the five sample countries selected above for foreign costs calculations.

**Market demand**

**1996 data**

The volume and value of market demand were calculated by adding production, target and non-target imports. Unfortunately, because adequate data in most cases do not exist, exports could not be subtracted, but this does not distort the results because market demand data were used solely to derive future production and import data.

**1997-2004 data**

In a study for the International Textiles and Clothing Bureau, Baughman (1997) projected market demand through 2004 for individual textile and apparel products largely on the basis of trends in the volume of US consumption of these products between 1987 and 1995, adjusted as necessary by expected changes in US demographics over the 1995-2005 period. A linear ‘least squares fit’ regression trend line was calculated for available historical data for each product, future annual demand levels and growth rates were calculated using an equation derived from the trend line.

In this study, as many individual projections as possible from the ITCB study were aggregated into the cotton apparel, wool apparel and other apparel classifications. In most cases, the number of projections at the individual category level represented the bulk of categories within the broader fibre grouping. Year-to-year growth of the resulting aggregations was computed. These growth rates were applied to the base market data for 1996, projecting future market demand through 2005. The results are shown in appendix B.
Non-target imports

1996 data

The value of non-target imports (both customs value and value including duties and cif charges) and the volumes of these imports were calculated as the difference between total imports of the relevant textile or apparel category and target imports. ‘Non-target imports’ includes trade subject to guaranteed access levels. Data sources included the US International Trade Commission and the US Department of Commerce, International Trade Administration, Office of Textiles and Apparel, Major Shippers (both by volume and by value). Information from these sources was collected at the individual category level, by individual country supplier; volume data were converted from category units to square meter equivalents. Data in the 200 category series (cotton and/or man-made fibres) were divided equally between ‘cotton’ and ‘other’ yarn, fabric and apparel. The category data were then aggregated to the broader category classifications.

1997-2004 data

The 1996 market share for non-target imports at the broader product grouping level with the effects of the quotas deleted was calculated and then applied to projected market demand over the period to yield projected non-target import volume and value.

Production

1996 data

Data for the volume of US production came from two sources: (1) US Department of Commerce, Bureau of the Census, Current Industrial Reports: Apparel (M 023A), 1996 (issued July 9, 1997), and (2) US Department of Commerce, International Trade Administration, Office of Textiles and Apparel (OTEXA), US Imports, Production, Markets, Import Production Ratios and Domestic Market Shares for Textile and Apparel Product Categories, Quarterly Report (September 1998). Data at the three digit category level were converted from category units to square meter equivalents and aggregated to the broader product groupings. However, because the OTEXA publication covers most but not all categories making up cotton apparel, wool apparel and other apparel, these totals were compared with similar estimates derived from the Current Industrial Report and adjustments, if necessary, were made to ensure as complete coverage as possible.
The value of US production by fibre is not available from any source. Therefore, The Trade Partnership estimated production value using US production volume data and the unit value of US imports from a country with apparel production similar to the United States: the United Kingdom. The customs value and volume of US imports from the United Kingdom, by three digit category, were used to calculate unit values by three digit category for 1996. Those unit values were multiplied by US production volume for the same three digit categories to estimate production value, and the results aggregated to the broader category groupings.

Production data in the 200 category series (cotton and/or man-made fibres) were divided equally between cotton and other apparel.

1997-2004 data

The 1996 market share for US production with the effects of the quotas deleted was calculated, and then applied to projected market demand over the period.

Quota

Using 1996 as the base year (and quota prevailing in 1996), The Trade Partnership applied the ATC’s accelerated quota growth rates for each individual country subject to quota (a Specific Limit only) within a given category -- country by country, category by category. Small suppliers received extra growth (advanced stage growth, per the ATC). We assumed that China and Taiwan become World Trade Organization (WTO) members in the year 2000 and receive whatever accelerated growth factor prevails for other major suppliers in that and subsequent years. If China and Taiwan do not become WTO members until sometime after 2000, the tariff equivalents presented in this study would be understated for those years from 2000 on during which China and Taiwan remained outside the WTO. The Trade Partnership assumed that several countries do not become WTO members over the period, and their quota grows annually by the base growth rate only: Oman, Nepal, Laos and the United Arab Emirates (they either have not yet applied for WTO membership at all, or applications are dormant).

To simplify the analysis, The Trade Partnership ignored all quotas facing Mexico, the tariff preference levels facing Canada, any three year quotas imposed as a result of calls and integration of products over the ATC term. It would have been too arbitrary to project trade changes resulting from the elimination of these quotas during the phase out period. Ignoring integration does not unduly bias the results because very little US apparel is
scheduled to be integrated into the GATT before 2005. In addition, The Trade Partnership ignored guaranteed access levels (the ‘807A’ quotas) as they are not restrictive.

The resulting quota volumes in category units (again, by country, by category) were converted to square meter equivalents and aggregated to the broader product groupings. In instances where quota is merged across fibres, the full amount of the quota was allocated to each fibre grouping, downward biasing the results. In other words, if one quota volume covered imports of cotton and man-made fibre underwear (category 352/652), 100 per cent of that volume was allocated to cotton underwear (category 352) and 100 per cent to man-made fibre underwear (category 652) before the aggregations to cotton apparel and other apparel were calculated. Also, quota in 200 series categories (cotton and/or man-made fibres) was allocated in its entirety to both cotton apparel and other apparel.

Because the resulting quota levels in 1996 were much higher than the actual level of target imports (again, because 100 per cent of cross-fibre quota was attributed to each fibre product group), and it was known (because of the existence of tariff equivalents for 1996) that the apparel quotas were restrictive, the actual level of target apparel imports was assumed to be the ‘quota level’ for 1996. The ratio of target imports in 1996 to 1996 quota was applied to projected quota through 2004 to get the quota level inputted into the ITC model.

Target imports

1996 data

Target import data reflect only that trade for which a ‘specific limit’ applied. Thus, if a given country faced US quotas in one three digit category but not in another, its trade was included among the target import total in the former case but in the non-target total in the latter case. Trade subject to guaranteed access level limits is not included as target imports.14

13 Many US quotas cover merged categories, both within a given fibre or across fibres. For example, cotton knit shirts are combined with man-made fibre knit shirts. Exporting countries can ship either one under the same quota category limit. Thus, to fairly distribute the quota by fibre, 100 per cent of such a merged quota should be allocated to each fibre.

14 The United States operates a special import program for countries in the Caribbean generally known in the trade as ‘807A’ after its classification in the old tariff schedule of the United States. (The new official designation is ‘9082’ trade). Briefly, this program permits relatively large quantities of selected apparel products to be exported to the United States from these countries only essentially
The Trade Partnership used data from the US International Trade Commission and the US Department of Commerce, International Trade Administration, Office of Textiles and Apparel, Major Shippers (both by volume and by value). Information from these sources was collected at the individual category level, by individual country supplier. Data in the 200 category series (cotton and/or man-made fibres) were divided equally between ‘cotton’ and ‘other’ yarn, fabric and apparel. The individual data were converted to square meter equivalents (in the case of volumes) and then aggregated to the broader category classifications.

1997-2004 data

The 1996 market share for target imports with the effects of the quotas deleted was calculated, and then applied to projected market demand over the period to estimate projected target imports over the 1997-2004 period.

**Tariff equivalent facing Hong Kong**

The Federation of Hong Kong Garment Manufacturers provided monthly prices for US apparel quota by three digit category classification for 1996 (in Hong Kong dollars per category unit). The Trade Partnership averaged the monthly data to get an annual average, then weighted each category’s premium expressed in US dollars per square meters by the US customs value of imports from Hong Kong (absent the quota premium) to get a total for each apparel fibre category.

**Tariff rates**

Projected tariff rates were obtained from an unpublished US Department of Commerce, Office of Textiles and Apparel, table of US textile and apparel tariff cuts, 1994 to 2005 (prepared by the Trade Data Division, 4 January, 1994). The table provides 1994 and projected 2005 tariff rates by product grouping by fibre. Year-to-year changes were calculated and reported in table A.1 as the tariff equivalent expected to face yarns and fabrics over the term of the ATC (through 2004), plus the additional two years requested by the Centre for International Economics.

*quota free — the ‘807A’ quotas, called ‘guaranteed access levels’ (GALs), are as their name implies meant to be non-restrictive. Thus, for example, while the Dominican Republic may be subject to quotas on some products and therefore a quota covered country, if it had no quotas relevant to a particular category or those quotas were only GALs, the Dominican Republic was included in the non-target import classification for the relevant category. Thus, the list of target and non-target countries varies by category.*
Projected market and quota results

This appendix reports market demand projections relative to projected quota over the term of the ATC.

It covers cotton and other (non-wool) fibre yarns (wool yarns are not reported because the US imposes no quotas (specific limits) on wool yarns for which tariff equivalents were estimated); cotton, wool and man-made fibre fabric; and cotton, wool and man-made fibre apparel.

Cotton Yarn Market

*Actual Average Annual Growth: 4.80%*

*Projected Average Annual Growth: 4.04%*
Cotton Yarn Quota Relative to Cotton Yarn Market

Cotton yarn: projected market demand and quota (Millions of kilograms)

<table>
<thead>
<tr>
<th>Year</th>
<th>Market</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1,961.8</td>
<td>45.2</td>
</tr>
<tr>
<td>1997</td>
<td>2,165.5</td>
<td>47.8</td>
</tr>
<tr>
<td>1998</td>
<td>2,261.9</td>
<td>51.3</td>
</tr>
<tr>
<td>1999</td>
<td>2,358.3</td>
<td>55.1</td>
</tr>
<tr>
<td>2000</td>
<td>2,454.8</td>
<td>59.3</td>
</tr>
<tr>
<td>2001</td>
<td>2,551.2</td>
<td>63.8</td>
</tr>
<tr>
<td>2002</td>
<td>2,647.7</td>
<td>69.9</td>
</tr>
<tr>
<td>2003</td>
<td>2,744.1</td>
<td>76.7</td>
</tr>
<tr>
<td>2004</td>
<td>2,840.5</td>
<td>84.3</td>
</tr>
</tbody>
</table>

Special notes to cotton yarn charts and table.

1. Market demand was projected on the basis of actual demand trends from 1987-96 (as reported by the Bureau of the Census in various Current Industrial Report issues for cotton yarns). The cotton yarn market (the volume of production less exports plus imports) grew at an average annual rate of 4.8 per cent over this period.

2. Cotton quota includes 100 per cent of quota that will be available in all 200-series yarn categories (cotton and man-made fibres combined). It thus assumes that all available quota in these categories is used to export cotton yarn to the United States. Potentially, this is possible; however, it is more likely that this quota will be shared with man-made fibre yarns.
Other fibre yarn: projected market demand and quota

<table>
<thead>
<tr>
<th>Year</th>
<th>Market (Millions of kilograms)</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>2,968.2</td>
<td>30.8</td>
</tr>
<tr>
<td>1997</td>
<td>3,072.8</td>
<td>32.5</td>
</tr>
<tr>
<td>1998</td>
<td>3,114.6</td>
<td>34.6</td>
</tr>
<tr>
<td>1999</td>
<td>3,156.4</td>
<td>36.9</td>
</tr>
<tr>
<td>2000</td>
<td>3,198.3</td>
<td>39.4</td>
</tr>
<tr>
<td>2001</td>
<td>3,240.1</td>
<td>42.2</td>
</tr>
<tr>
<td>2002</td>
<td>3,281.9</td>
<td>26.7</td>
</tr>
<tr>
<td>2003</td>
<td>3,323.7</td>
<td>29.2</td>
</tr>
<tr>
<td>2004</td>
<td>3,365.5</td>
<td>31.9</td>
</tr>
</tbody>
</table>
3. Market demand was projected on the basis of actual demand trends from 1987-96 (as reported by the Bureau of the Census in various Current Industrial Report issues for man-made fibre yarns). The man-made fibre yarn market (the volumes of production less exports plus imports) grew at an average annual rate of 1.5 per cent over this period.

4. Other fibre quota includes 100 per cent of quota that will be available in all 200-series yarn categories (cotton and man-made fibres combined). It thus assumes that all available quota in these categories is used to export other (non-cotton, non-wool) fibre yarn to the United States. Potentially, this is possible; however, it is more likely that this quota will be shared with cotton fibre yarns.

5. The drop in quota in 2002 is due to the integration in that year of US quotas on ‘other man-made fibre staple yarns’ (Category 607).
Wool fabric: projected market demand and quota (Millions of square meters)

<table>
<thead>
<tr>
<th>Year</th>
<th>Market</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>156</td>
<td>48</td>
</tr>
<tr>
<td>1997</td>
<td>155</td>
<td>50</td>
</tr>
<tr>
<td>1998</td>
<td>165</td>
<td>53</td>
</tr>
<tr>
<td>1999</td>
<td>164</td>
<td>55</td>
</tr>
<tr>
<td>2000</td>
<td>163</td>
<td>58</td>
</tr>
<tr>
<td>2001</td>
<td>162</td>
<td>62</td>
</tr>
<tr>
<td>2002</td>
<td>162</td>
<td>66</td>
</tr>
<tr>
<td>2003</td>
<td>161</td>
<td>71</td>
</tr>
<tr>
<td>2004</td>
<td>160</td>
<td>77</td>
</tr>
</tbody>
</table>

Special notes to wool fabric charts and table.

1. Market demand was projected on the basis of actual demand trends from 1991-97 (as reported by the Bureau of the Census in various Current Industrial Report issues for wool fabric). This was the longest time series available that included US production of both chiefly-wool and wool blend fabrics. The wool fabric market (the volumes of production less exports plus imports) grew at an average annual rate of 1.5 per cent over this period.

6. Wool quota includes Categories 410 (woven fabrics of wool and wool-blends) and Category 624 (woven fabrics, 15-36 per cent wool).
## B. Projected Market and Quota Results

### Cotton Fabric Market

<table>
<thead>
<tr>
<th>Year</th>
<th>Market</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>5,530</td>
<td>2,371</td>
</tr>
<tr>
<td>1997</td>
<td>6,125</td>
<td>2,498</td>
</tr>
<tr>
<td>1998</td>
<td>5,902</td>
<td>2,657</td>
</tr>
<tr>
<td>1999</td>
<td>5,983</td>
<td>2,829</td>
</tr>
<tr>
<td>2000</td>
<td>6,064</td>
<td>3,019</td>
</tr>
<tr>
<td>2001</td>
<td>6,145</td>
<td>3,223</td>
</tr>
<tr>
<td>2002</td>
<td>6,226</td>
<td>3,498</td>
</tr>
<tr>
<td>2003</td>
<td>6,307</td>
<td>3,800</td>
</tr>
<tr>
<td>2004</td>
<td>6,388</td>
<td>4,137</td>
</tr>
</tbody>
</table>

### Cotton Fabric Quota Relative to Cotton Fabric Market

Actual Average Annual Growth: 2.59%
Projected Average Annual Growth: 1.33%
Special notes to cotton fabric charts and table.

1. Market demand was projected on the basis of actual demand trends from 1990–97 (as reported by the American Textile Manufacturers Institute, Textile Highlights, various issues). This was the longest time series available. The cotton fabric market (the volumes of production plus imports) grew at an average annual rate of 2.6 per cent over this period.

2. Cotton fabric quota includes 100 per cent of quota that will be available in all 200-series fabric categories (cotton and man-made fibres combined). It thus assumes that all available quota in these categories is used to export cotton fabric to the United States. Potentially, this is possible; however, it is more likely that this quota will be shared with man-made fibre fabric.
Other fibre fabric: projected market demand and quota (Millions of square meters)

<table>
<thead>
<tr>
<th>Year</th>
<th>Market</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>12 141</td>
<td>1 898</td>
</tr>
<tr>
<td>1997</td>
<td>13 259</td>
<td>1 999</td>
</tr>
<tr>
<td>1998</td>
<td>13 450</td>
<td>2 129</td>
</tr>
<tr>
<td>1999</td>
<td>13 797</td>
<td>2 269</td>
</tr>
<tr>
<td>2000</td>
<td>14 143</td>
<td>2 422</td>
</tr>
<tr>
<td>2001</td>
<td>14 489</td>
<td>2 588</td>
</tr>
<tr>
<td>2002</td>
<td>14 836</td>
<td>2 813</td>
</tr>
<tr>
<td>2003</td>
<td>15 182</td>
<td>3 060</td>
</tr>
<tr>
<td>2004</td>
<td>15 529</td>
<td>3 335</td>
</tr>
</tbody>
</table>

Special notes to other fibre fabric charts and table.

1. Market demand was projected on the basis of actual demand trends from 1990–97 (as reported by the American Textile Manufacturers Institute, Textile Hilights, various issues). This was the longest time series available. The other fabric market (the volumes of production plus imports) grew at an average annual rate of 3.4 per cent over this period.

2. Other fibre fabric quota includes 100 per cent of quota that will be available in all 200-series fabric categories (cotton and man-made fibres combined). It thus assumes that all available quota in these categories is used to export man-made fibre fabric to the United States. Potentially, this is possible; however, it is more likely that this quota will be shared with cotton fibre fabric.
BARRIERS TO WOOL FIBRE PRODUCTS TRADE

Cotton Apparel Quota’s Share of Cotton

<table>
<thead>
<tr>
<th>Year</th>
<th>Market</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>10,778</td>
<td>4,737</td>
</tr>
<tr>
<td>1997</td>
<td>11,186</td>
<td>4,963</td>
</tr>
<tr>
<td>1998</td>
<td>11,610</td>
<td>5,247</td>
</tr>
<tr>
<td>1999</td>
<td>12,060</td>
<td>5,553</td>
</tr>
<tr>
<td>2000</td>
<td>12,499</td>
<td>5,888</td>
</tr>
<tr>
<td>2001</td>
<td>12,940</td>
<td>6,248</td>
</tr>
<tr>
<td>2002</td>
<td>13,382</td>
<td>6,736</td>
</tr>
<tr>
<td>2003</td>
<td>13,827</td>
<td>7,273</td>
</tr>
<tr>
<td>2004</td>
<td>14,274</td>
<td>7,836</td>
</tr>
</tbody>
</table>

Special notes to cotton apparel charts and table.

1. Market demand for cotton apparel was projected largely on the basis of trends in the volume of US consumption of these products between 1987 and 1995, adjusted as necessary by expected changes in US demographics over the 1995-2005 period. A linear ‘least squares fit’ regression trend line was projected through the year 2005 for each product, and future annual demand levels and growth rates were calculated using an equation derived from the trend line. As many individual cotton apparel product projections as possible were aggregated. Year-to-year growth of the resulting aggregations was computed. These growth rates were applied to the base market data for 1996, projecting future market demand through 2005.
2. Cotton apparel quota includes 100 per cent of quota that will be available in all 200-series fabric categories (cotton and man-made fibres combined). It thus assumes that all available quota in these categories is used to export cotton apparel to the United States. Potentially, this is possible; however, it is more likely that this quota will be shared with man-made fibre fabric.
4.3 Wool apparel: projected market demand and quota (Millions of square meter equivalents)

<table>
<thead>
<tr>
<th>Year</th>
<th>Market</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>380.9</td>
<td>103.6</td>
</tr>
<tr>
<td>1997</td>
<td>390.7</td>
<td>104.6</td>
</tr>
<tr>
<td>1998</td>
<td>400.7</td>
<td>105.6</td>
</tr>
<tr>
<td>1999</td>
<td>410.8</td>
<td>106.6</td>
</tr>
<tr>
<td>2000</td>
<td>420.9</td>
<td>107.7</td>
</tr>
<tr>
<td>2001</td>
<td>431.1</td>
<td>108.7</td>
</tr>
<tr>
<td>2002</td>
<td>441.3</td>
<td>110.1</td>
</tr>
<tr>
<td>2003</td>
<td>451.4</td>
<td>111.5</td>
</tr>
<tr>
<td>2004</td>
<td>461.7</td>
<td>112.9</td>
</tr>
</tbody>
</table>

Special note to wool apparel charts and table.

1. Market demand for wool apparel was projected largely on the basis of trends in the volume of US consumption of these products between 1987 and 1995, adjusted as necessary by expected changes in US demographics over the 1995–2005 period. A linear ‘least squares fit’ regression trend line was projected through the year 2005 for each product, and future annual demand levels and growth rates were calculated using an equation derived from the trend line. As many individual wool apparel product projections as possible were aggregated. Year-to-year growth of the resulting aggregations was computed. These growth rates were applied to the base market data for 1996, projecting future market demand through 2005.
4.4 Other fibre apparel: projected market demand and quota (Millions of square meters)

<table>
<thead>
<tr>
<th>Year</th>
<th>Market</th>
<th>Quota</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>9 603</td>
<td>5 592</td>
</tr>
<tr>
<td>1997</td>
<td>9 783</td>
<td>5 815</td>
</tr>
<tr>
<td>1998</td>
<td>9 967</td>
<td>6 096</td>
</tr>
<tr>
<td>1999</td>
<td>10 176</td>
<td>6 399</td>
</tr>
<tr>
<td>2000</td>
<td>10 374</td>
<td>6 731</td>
</tr>
<tr>
<td>2001</td>
<td>10 575</td>
<td>7 086</td>
</tr>
<tr>
<td>2002</td>
<td>10 777</td>
<td>7 568</td>
</tr>
<tr>
<td>2003</td>
<td>10 981</td>
<td>8 097</td>
</tr>
<tr>
<td>2004</td>
<td>11 187</td>
<td>8 652</td>
</tr>
</tbody>
</table>

Special notes to other fibre apparel charts and table.

1. Market demand for other fibre apparel was projected largely on the basis of trends in the volume of US consumption of these products between 1987 and 1995, adjusted as necessary by expected changes in US demographics over the 1995-2005 period. A linear ‘least squares fit’ regression trend line was projected through the year 2005 for each product, and future annual demand levels and growth rates were calculated using an equation derived from the trend line. As many individual other fibre apparel product projections as possible were aggregated. Year-to-year growth of the resulting aggregations was computed. These growth rates were applied to the base market data for 1996, projecting future market demand through 2005.
2. Other fibre apparel quota includes 100 per cent of quota that will be available in all 200-series fabric categories (cotton and man-made fibres combined). It thus assumes that all available quota in these categories is used to export other fibre apparel to the United States. Potentially, this is possible; however, it is more likely that this quota will be shared with cotton fibre fabric.
CHAPTER C

MFA model

THIS APPENDIX DESCRIBES THE STRUCTURE OF THE MODEL of production, consumption and trade between Australia, the United States and the rest of the world for raw fibres, yarns, fabrics and apparel. The model has two key components. The first is an integrated set of input-output accounts which shows how fibre producers (wool, cotton) in Australia and other countries are linked through downstream processing and trade across regions and across stages of processing to intermediate users and consumers of fibre specific yarns, fabrics and apparel in the US. The second component addresses how economic decisions are made. To provide this, we use conventional economic theory to explain the behaviour of firms, markets and consumers.

First, we look at the general features of the model. Then we consider the detailed structure of the model.

General features of the model

Features of the model are:

- its capacity to track how quota arrangements in the US for yarns, fabrics and apparel can affect consumers in the US and producers back down the textile chain and clothing in the US and the rest of the world;
- its 'what if' focus — it analyses the effects of a policy change while holding constant all other factors that shape the outcomes for the fibre producing and downstream textiles and clothing industries; and
- its partial equilibrium nature — it tells a story about production demand and trade for raw fibres, fibre processing, and fabrics and apparel on a fibre specific basis, but does not consider production demand and trade for other activities in each region.

Comparative-statics

The model is comparative-static. This means that it compares two different situations at the same point in time, not how they evolve over time. The way in which comparative-static models work is illustrated in chart C.1. Path AB shows the underlying time path of a particular variable, say total imports of apparel by the US, that results from a range of evolving
economic conditions over time. Suppose that at time 0, a shock is introduced, which leads to an increase in US imports. Then at time t, after model industries have fully adjusted to this change, imports would have reached C. Comparative analysis is concerned only with the size of the gap between B and C, and not the time dependent paths AB and AC.

Not a forecasting model

Forecasting the path of the model variables in a multiregional model would be a complex task. We would need to make projections concerning a range of model variables that are typically exogenous. For example, the level of US imports would depend on relative changes in US demand and supply. Changes in US demand over time would depend on demographics, incomes, fashion and taste changes in additional to changes in relative prices. On the supply side, relative changes in productivity between the United States and overseas could have a large impact on imports in addition to such factors as upgrading of the quality mix from quota suppliers. The time dynamics of the ATC phase out is imposed through changes in the tariff equivalent of the quota calculated by The Trade Partnership. These tariff equivalents were calculated using a model that made assumptions about changes in these exogenous factors.

Commodity and regional detail

C.1 Interpretation of comparative–static
The model covers:

- three regions (Australia, US, rest of world);
- two categories of raw fibre in each region (apparel wool, cotton);
- three categories of yarns in each region (apparel wool, cotton, other);
- three categories of fabrics in each region (wool, cotton, other); and
- three categories of final consumption of apparel in each region (wool and wool blends, cotton and other).

The model therefore identifies 11 activities (cotton fibres, apparel wool, cotton yarns, wool yarns, other yarns, cotton fabrics, wool fabrics, other fabrics, cotton apparel, wool and wool blend apparel, other apparel) through the four stages of the value added chain (fibre production, yarn production, fabric-textile production, apparel-clothing production) in the three regions. Final consumption of fibres takes place through the consumption of the various categories of clothing and textile products.

In the commodity detail, the ‘other’ activity includes both synthetic and other natural fibres, which include silk, jute and flax. Synthetic fibres dominate world production and trade of this fibre group. We adopted this convention primarily to be consistent with the classification used in the calculation of the US tariff equivalents by The Trade Partnership.

We have not identified an activity for synthetic and other at the raw fibre level. This is because of the significant data restrictions on differentiation between synthetic top and yarn in production. Synthetic fibre production is most often reported on a yarn basis because of the close integration between synthetic fibre production (extrusion) and spinning of yarn. Because of factors such as high levels of productivity and excess capacity in the synthetic fibre industry, aggregation of both steps appears reasonable as shifts in demand for the other yarns category is unlikely to affect the price of synthetic fibres. The situation is different in the case of production of wool and cotton. Both are land-based industries. Because of the land constraint, supply elasticities for these fibres are relatively low and different between wool and cotton. Shifts in demand can therefore result in changes in relative prices between stages of the fibre chain.

**Model theory**

The model uses conventional microeconomic theory to represent industries and consumers making choices as they pursue maximising behaviour. The model also includes fundamental accounting relationships that ensure that total demand for a commodity in each region is equal to total supply —
which determines a regional price for each commodity. Other equations ensure that prices between regions are linked and differentiated by transport costs and trade barriers.

A feature of the model is that it is a differentiated product or Armington style model. That is, a commodity sourced from different producing regions is recognised by users as different products — landed at different prices. Because we break the assumption of homogeneity, farm or factory prices can move independently between regions.

The theoretical structure of the model is explained in detail later in this appendix.

**Information requirements**

The database is expressed in terms of quantities, prices and values. The database captures the linkages between commodities and industries identified in the value chain. For example, it shows the cost linkage between cotton yarn and the production of cotton fabrics for apparel. It also recognises that cotton yarn can also be exported, imported or consumed by users outside of the apparel industry. The model uses this information to compute cost and sales shares and is combined with model parameters to form coefficients in the equation system.

Input-output database

A schematic representation of the model’s input-output database is given in chart C.2 for a particular region \( r \). This specifies most of the data matrices required for the model. Elements of each matrix are typically value flows represented in millions of US dollars for the 1996 calendar year. Matrices A and E contain the value of domestically sourced and imported intermediate inputs to production for the 11 activities-industries. For example, it describes the domestic input of cotton fibre into the processing industry that manufactures cotton yarns. Because we assume all industries produce one product only, total sales will equal the total output for each commodity and industry in region \( r \).
The database has important adding up properties. The sum across matrices A to D is equal to total sales of domestic production in region \( r \). Row sums of matrices E to G are equal to total imports by region \( r \) on a landed duty paid basis.

Values for primary factors and costs of other inputs are represented in matrices H and I for each industry in region \( r \). The column sum of matrices A, E, H and I give total production costs which equals the value of output for each industry.

### C.2 Schematic database for fibre, textiles and clothing in each region

<table>
<thead>
<tr>
<th>Industry inputs</th>
<th>Final consumption</th>
<th>Change in stocks</th>
<th>Exports</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Imported</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Other inputs</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour Capital</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total costs     | Total domestic production | Total final consumption | Total change in stocks | Total exports | Total value of output |

<table>
<thead>
<tr>
<th>Imports by region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
</tr>
<tr>
<td>US</td>
</tr>
<tr>
<td>Rest of world</td>
</tr>
</tbody>
</table>

Total imports
Finally, matrices $M_1$ to $M_3$ identify imports by source country on a landed duty paid basis for each commodity category.

Descriptions of the data sources and database methodology are provided later in this appendix.

**Theoretical structure**

The model consists of a set of equations to explain production, processing and consumption of each fibre and apparel type in each region and the links between regions through trade. These equations can be classified into eight broad groups.

- Demands for inputs by industry (for fibre, other inputs and primary factors).
- Final demands by commodity.
- Outputs by industry.
- Trade equations.
- Price relationships.
- Zero pure profits.
- Market clearance.
- Other equations.

The model is solved using the GEMPACK suite of programs described in Harrison and Pearson (1996). In box C.3 we present an exhaustive listing of GEMPACK code required to run the MFA model. This input is split into seven sections, which are:

- model defaults and set or range definitions for model variables;
- variable definitions and descriptions;
- reads of selected model variables from the database;
- model parameters and elasticities definitions and descriptions;
- formulae initialising variables not read in from the database;
- calculation of shares and other coefficients used in the model’s equation system; and
- equations of the MFA model.
C.3 MFA model equations

MFA model
Prepared by Centre for International Economics
Canberra
For Woolmark Australia
August 1999

! Section 1 - Set and model declarations

---

equation(default=levels);
variable(default=levels);
formula(default=always);
coefficient(default=non_parameter);

File input # this file contains base data #;

set regions # primary demand regions #
(Au, Us, Rw);
set com # all model commodities #
(c1-c11);
set raw # raw fibre level includes ESP for wool #
(c1-c2);
set yarns # yarns #
(c3-c5);
set fabrics # fabrics #
(c6-c8);
set final # apparel #
(c9-c11);
set otherfin # commodities other than apparel #
(c1-c8);
subset raw is subset of com;
subset yarns is subset of com;
subset fabrics is subset of com;
subset final is subset of com;
subset otherfin is subset of com;
set factors # primary factors #
(fixed, lab);

! Section 2 - Variables

variable (linear) (all,j,com)(all,r,regions) z(j,r)
# % change in industry activity levels #;
variable (all,i,com)(all,j,com)(all,r,regions) INVD(i,j,r)
# value of inputs used by industry - domestic #;
variable (all,i,com)(all,j,com)(all,r,regions) INQD(i,j,r)
# quantity of inputs used by industry - domestic #;
variable (all,i,com)(all,j,com)(all,r,regions) INVI(i,j,r)
# value of inputs used by industry - imported #;
variable (all,i,com)(all,j,com)(all,r,regions) INQI(i,j,r)
# quantity of inputs used by industry - imported #;

(Continued on next page)
C.3 MFA model equations (continued)

variable (all, i, com)(all, j, com)(all, r, regions)  INPD(i, j, r)
  # price of inputs used by industry - domestic #;
variable (all, i, com)(all, j, com)(all, r, regions)  INPI(i, j, r)
  # price of inputs used by industry - imported #;
variable (linear) (all, i, com)(all, j, com)(all, r, regions)  inpa(i, j, r)
  # % change in average price of inputs - domestic and imported #;
variable (all, v, factors)(all, j, com)(all, r, regions)  PRFV(v, j, r)
  # value of primary factors by industry and region #;
variable (all, v, factors)(all, j, com)(all, r, regions)  PRFQ(v, j, r)
  # quantity of primary factors by regions #;
variable (all, v, factors)(all, j, com)(all, r, regions)  PP(v, j, r)
  # price of primary factors by regions #;
variable (all, j, com)(all, r, regions)  OTHV(j, r)
  # value of other cost items #;
variable (all, j, com)(all, r, regions)  OTHQ(j, r)
  # quantity demanded of other cost items #;
variable (all, j, com)(all, r, regions)  PO(j, r)
  # prices of other cost items #;
variable (all, i, com)(all, r, regions)  OUTV(i, r)
  # value of commodity outputs by region #;
variable (all, i, com)(all, r, regions)  OUTQ(i, r)
  # quantities of commodity output by region #;
variable (all, i, com)(all, r, regions)  OUTP(i, r)
  # farm or factory price by region #;
variable (linear) (all, i, com)(all, r, regions)  p_PM(i, r)
  # % change in average of import price over sources #;
variable (linear) (all, i, com)(all, r, regions)  p_TQI(i, r)
  # % change in total quantity of imports #;
variable (all, i, com)(all, r, regions)  TQE(i, r)
  # total quantity of exports #;
variable (linear) (all, i, com)(all, r, regions)  duty1(i, r)
  # % change in general import duty #;
variable (all, i, com)(all, r, regions)(all, s, regions)  EXPV(i, r, s)
  # value of exports by region by destination #;
variable (all, i, com)(all, r, regions)(all, s, regions)  EXPQ(i, r, s)
  # quantity of exports by region by destination #;
variable (all, i, com)(all, r, regions)(all, s, regions)  EXPP(i, r, s)
  # export fob price by region by destination #;
variable (linear) (all, i, com)(all, r, regions)  cont(i, r)
  # % change in total consumption by commodity by region #;

(Continued on next page)
C.3 MFA model equations (continued)

variable (linear) (all,r,regions) ry(r)  
# %change in real income by region #;
variable (linear) (all,r,regions) pop(r)  
# %change in population by region #;
variable (linear) (all,i,com)(all,r,regions) tcon(i,r)  
# %change in taste shifter by commodity by region #;
variable (all,i,com)(all,r,regions) RTVD(i,r)  
# value of final consumption - domestic #;
variable (all,i,com)(all,r,regions) RTQD(i,r)  
# quantity of final consumption - domestic #;
variable (all,i,com)(all,r,regions) RTVI(i,r)  
# value of final consumption - imported #;
variable (all,i,com)(all,r,regions) RTQI(i,r)  
# quantity of final consumption - imported #;
variable (all,i,com)(all,r,regions) RTPD(i,r)  
# price of final consumption - domestic #;
variable (all,i,com)(all,r,regions) RTPI(i,r)  
# price of final consumption - imported #;
variable (all,i,com)(all,r,regions) STKS(i,r)  
# change in stocks #;
variable (linear) (all,i,com)(all,r,regions) rtpa(i,r)  
# %change in average price of final consumption - domestic and imported #;
variable (linear) (all,r,regions) rtg(r)  
# %change in average retail price of all apparel #;
variable (linear) (all,r,regions) comgart(r)  
# %change in total demands for all apparel #;
variable (all,j,com)(all,r,regions) curcap(j,r)  
# industry capital stocks #;
variable (linear) (all,r,regions) fwage(r)  
# % change in the cost of labour by region #;
variable (all,j,com)(all,r,regions) VADDED(j,r)  
# value-added by industry #;

! Section 3 - Model reads
!
read OUTV from file input header "OUTV";
read OUTQ from file input header "OUTQ";
read INVD from file input header "INVD";
read INQD from file input header "INQD";
read INVI from file input header "INVI";
read INQI from file input header "INQI";

(Continued on next page)
C.3 MFA model equations (continued)

read PRFV from file input header "PRFV";
read OTHV from file input header "OTHV";
read EXPV from file input header "EXPV";
read EXPQ from file input header "EXPQ";
read RTVD from file input header "RTVD";
read RTQD from file input header "RTQD";
read RTVI from file input header "RTVI";
read RTQI from file input header "RTQI";
read STKS from file input header "STKS";

!______________________________________________________________________________
! Section 4 – Model parameters
!______________________________________________________________________________

Coefficient (parameter)(all,i,com)(all,r,regions)                      SIGM(i,r)                      # domestic-import CES substitution parameter #;
read SIGM from file input header "P001";
Coefficient (parameter)(all,i,com)(all,r,regions)                      SIGS(i,r)                      # import-source CES substitution parameter#;
read SIGS from file input header "P002";
Coefficient (parameter)(all,j,com)(all,r,regions)                      SIGP(j,r)                      # primary factor CES substitution parameter #;
read SIGP from file input header "P010";
Coefficient (parameter)(all,i,com)(all,r,regions)                      GAMM(i,r)                      # income elasticity of consumption by region #;
read GAMM from file input header "GAMM";
Coefficient (parameter)(all,i,com)(all,r,regions)                      THET(i,r)                      # price elasticity of consumption by region #;
read THET from file input header "THET";
Coefficient (parameter) (all,r,regions)                                Tgarms(r)                      # general price elasticity for consumption of apparel #;
Read Tgarms from file input header "P011";
Coefficient (parameter)all,i,final)(all,k,final)(all,r,regions)  Siggarms(i,k,r)  # substitution parameters between apparel #;
read Siggarms from file input header "P012";

!______________________________________________________________________________
! Section 5 - Formulas and Formulas&equations
!______________________________________________________________________________

! Initialise starting prices !
Formula (initial) (all,v,factors)(all,j,com)(all,r,regions)       PP(v,j,r)=1.0;
Formula (initial) (all,j,com)(all,r,regions)                        PO(j,r)=1.0;
!Initialise starting quantities!
formula&equation OUTQUAN
# initial commodity prices by region 

(Continued on next page)
C MFA MODEL

C.3 MFA model equations (continued)

\[(\text{all,}i,\text{com})(\text{all,}r,\text{regions})\]
\[\text{OUTP}(i,r) = \text{OUTV}(i,r)/\text{OUTQ}(i,r);\]
Formula & Equation fact_quan

\# initial quantity of primary factors \#

\[(\text{all,}v,\text{factors})(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{PRFQ}(v,j,r) = \text{PRFV}(v,j,r) / \text{PP}(v,j,r);\]
Formula & Equation other_costs

\# initial quantity of other costs \#

\[(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{OTHQ}(j,r) = \text{OTHV}(j,r) / \text{PO}(j,r);\]
Formula & Equation INTQDCAL

\# initial price of inputs by industry - domestic \#

\[(\text{all,}i,\text{com})(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{INPD}(i,j,r) = \text{INVD}(i,j,r) / \text{INQD}(i,j,r);\]
Formula & Equation INTQICAL

\# initial price of inputs by industry - imported \#

\[(\text{all,}i,\text{com})(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{INPI}(i,j,r) = \text{INVI}(i,j,r) / \text{INQI}(i,j,r);\]
Formula & Equation RTQDCAL

\# initial price of final consumption - domestic \#

\[(\text{all,}i,\text{com})(\text{all,}r,\text{regions})\]
\[\text{RTPD}(i,r) = \text{RTVD}(i,r) / \text{RTQD}(i,r);\]
Formula & Equation RTQICAL

\# initial price of final consumption - imported \#

\[(\text{all,}i,\text{com})(\text{all,}r,\text{regions})\]
\[\text{RTPI}(i,r) = \text{RTVI}(i,r) / \text{RTQI}(i,r);\]
Formula & Equation EXPQICAL

\# price of exports by region and destination \#

\[(\text{all,}i,\text{com})(\text{all,}r,\text{regions})(\text{all,}s,\text{regions})\]
\[\text{EXPP}(i,r,s) = \text{EXPV}(i,r,s)/ \text{EXPQ}(i,r,s);\]

!______________________________________________________________________________
! Section 6 - Shares and coefficient calculations
!______________________________________________________________________________

Coefficient \[(\text{all,}i,\text{com})(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{SIND}(i,j,r)\]
# share of domestic inputs in total cost of input i for industry j#
Formula \[(\text{all,}i,\text{com})(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{SIND}(i,j,r) = \text{INVD}(i,j,r) / [\text{INVD}(i,j,r)+\text{INVI}(i,j,r)];\]
Coefficient \[(\text{all,}i,\text{com})(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{SINI}(i,j,r)\]
# share of imported inputs in total cost of input i for industry j#
Formula \[(\text{all,}i,\text{com})(\text{all,}j,\text{com})(\text{all,}r,\text{regions})\]
\[\text{SINI}(i,j,r) = \text{INVI}(i,j,r) / [\text{INVD}(i,j,r)+\text{INVI}(i,j,r)];\]
zerodivide default 0.5;

(Continued on next page)
C.3 MFA model equations (continued)

Coefficient (all,v,factors)(all,j,com)(all,r,regions) SP(v,j,r)
# share of factors in total primary factor cost by industry #;
Formula (all,v,factors)(all,j,com)(all,r,regions)
   SP(v,j,r) = PRFV(v,j,r) / sum(u,factors,PRFV(u,j,r));
zerodivide off;
Coefficient (all,i,com)(all,r,regions) SRTD(i,r)
# Share of domestic goods in total value of final demands #;
Formula (all,i,com)(all,r,regions)
   SRTD(i,r) = RTVD(i,r) / [RTVD(i,r)+RTVI(i,r)];
Coefficient (all,i,com)(all,r,regions) SRTI(i,r)
# Share of imported goods in total value of final demands #;
Formula (all,i,com)(all,r,regions)
   SRTI(i,r) = RTVI(i,r) / [RTVD(i,r)+RTVI(i,r)];
zerodivide default 0.3333;
coefficient (all,i,com)(all,r,regions)(all,s,regions) SEBD(i,r,s)
# Share of value of imports by source by region #;
formula (all,i,com)(all,r,regions)(all,s,regions)
   SEBD(i,r,s) = EXPV(i,r,s)/sum(k,regions,EXPV(i,r,k));
zerodivide (nonzero_by_zero) default 0.0;
coefficient (all,i,com)(all,j,com)(all,r,regions) SINQI(i,j,r)
# share of input i in value of total imports of commodity i #;
Formula (all,i,com)(all,j,com)(all,r,regions)
   SINQI(i,j,r) = INQI(i,j,r) / [sum(k,com,INQI(i,k,r)) + RTQI(i,r)];
Coefficient (all,i,com)(all,r,regions) SRTQI(i,r)
# share of final good i in value of total imports of commodity i #;
Formula (all,i,com)(all,r,regions)
   SRTQI(i,r) = RTQI(i,r) / [sum(k,com,INQI(i,k,r)) + RTQI(i,r)];
zerodivide (nonzero_by_zero) off;
Coefficient (all,i,com)(all,r,regions) RTVT(i,r)
# Retail value of final demands across sources by region #;
Formula (all,i,com)(all,r,regions)
   RTVT(i,r) = RTVD(i,r) + RTVI(i,r);
Coefficient (all,i,final)(all,r,regions) SRTVT(i,r)
# Retail budget share by region #;
Formula (all,i,final)(all,r,regions)
   SRTVT(i,r) = RTVT(i,r) / sum(k,final,RTVT(k,r));
Coefficient (all,i,final)(all,k,final)(all,r,regions) Elasgarms(i,k,r)
# elasticity matrix for apparel by region #;
Formula (all,i,final)(all,k,final)(all,r,regions)
   Elasgarms(i,k,r) = Siggarms(i,k,r)/SRTVT(i,r);

(Continued on next page)
C.3 MFA model equations (continued)

! Section 7 - Equations
!

! Demands for inputs by industries
!---------------------------------

! Equation 1!
equation (linear) dem_imp_inputs  
# demand for imports - inputs #
(all,i,com)(all,j,com)(all,r,regions)
p_INQI(i,j,r) = z(j,r) - SIGM(i,r) * [ p_INPI(i,j,r) - inpa(i,j,r)];

! Equation 2!
equation (linear) dem_dom_inputs  
# demand for domestic - inputs #
(all,i,com)(all,j,com)(all,r,regions)
p_INQD(i,j,r) = z(j,r) - SIGM(i,r) * [ p_INPD(i,j,r) - inpa(i,j,r)];

! Equation 3!
equation (linear) prim_fac_dem  
# demand for primary factors #
(all,v,factors)(all,j,com)(all,r,regions)
p_PRFQ(v,j,r) = z(j,r) + a1(j,r) - SIGP(j,r) * (p_PP(v,j,r) - sum(u,factors, SP(u,j,r)*p_PP(u,j,r)));

! Equation 4!
equation (linear) oth_cost_dem  
# demands for other costs #
(all,j,com)(all,r,regions)
p_OTHQ(j,r) = z(j,r);

! Final demands by commodity
!----------------------------

! Equation 5!
equation (linear) agg_dem_apparel  
# demand for apparel in total #
(all,r,regions)
comgart(r) = pop(r) = GAMMG(r)*(ry(r)-pop(r)) + Tgarms(r)*rtg(r);

! Equation 6!
equation (linear) dem_apparel  
# final demands for apparel #
(all,i,final)(all,r,regions)
cont(i,r) = comgart(r) + sum(k,final,Elasgarms(i,k,r)*rtpa(k,r));

(Continued on next page)
C.3 MFA model equations (continued)

!Equation 7!
equation (linear) ave_gar_price
# average retail price of apparel #
(all,r,regions)
rtg(r) = sum(i,final,SRTVT(i,r)*rtpa(i,r));

!Equation 8!
equation (linear) agg_dem_otherfinal
# final demands for commodities other than apparel #
(all,i,otherfin)(all,r,regions)
cont(i,r) - pop(r) = GAMM(i,r)* ( ry(r) - pop(r) ) +
THET(i,r)* rtpa(i,r) + tcon(i,r);

!Equation 9!
equation (linear) dem_imp_rt
# change in imported price of final consumption #
(all,i,com)(all,r,regions)
p_RTQI(i,r) = cont(i,r) -
SIGM(i,r)* [ p_RTPI(i,r) - rtpa(i,r)];

!Equation 10!
equation (linear) dem_dom_rt
# change in domestic price of final consumption #
(all,i,com)(all,r,regions)
p_RTPD(i,r) = cont(i,r) -
SIGM(i,r)* [ p_RTPD(i,r) - rtpa(i,r)];

! Output by industry
!-------------------
!Equation 11!
equation (linear) out_ind
# output by commodity #
(all,i,com)(all,r,regions)
p_OUTQ(i,r) = z(i,r);

! Trade equations
!-----------------
!Equation 12!
equation (linear) tot_imp
# change in total imports of inputs #
(all,i,com)(all,r,regions)
p_TQI(i,r) = sum(j,com,SINQI(i,j,r)* p_INQI(i,j,r)) +
SRTQI(i,r)*p_RTQI(i,r);

!Equation 13!
equation (linear) dem_imp_sous
# demand for imports by source #
(all,i,com)(all,r,regions)(all,s,regions)

(Continued on next page)
C.3 MFA model equations (continued)

\[
p_{\text{EXPQ}}(i,r,s) = p_{\text{TQI}}(i,r) - \\
\text{SIGS}(i,r) \times \left( p_{\text{EXPP}}(i,r,s) - p_{\text{PM}}(i,r) \right);
\]

**Equation 14**

\[
\text{formula \& equation total_exps} \\
\text{# total exports by region #} \\
(a_{l},i,\text{com})(a_{l},r,\text{regions}) \\
TQE(I,r) = \sum(s,\text{regions},\text{EXPQ}(i,s,r));
\]

! Price linkages
!----------------

**Equation 15**

\[
\text{equation (linear) DOM_FOB} \\
\text{# domestic - fob link #} \\
(a_{l},i,\text{com})(a_{l},r,\text{regions})(a_{l},s,\text{regions}) \\
p_{\text{EXPP}}(i,r,s) = p_{\text{OUTP}}(i,s);
\]

**Equation 16**

\[
\text{equation (linear) AVE_CIF} \\
\text{# average import price before duty #} \\
(a_{l},i,\text{com})(a_{l},r,\text{regions}) \\
p_{\text{PM}}(i,r) = \sum(s,\text{regions},\text{SEBD}(i,r,s) \times p_{\text{EXPP}}(i,r,s));
\]

**Equation 17**

\[
\text{equation (linear) PDINLINK} \\
\text{# link between domestic and user price #} \\
(a_{l},i,\text{com})(a_{l},j,\text{com})(a_{l},r,\text{regions}) \\
p_{\text{INPD}}(i,j,r) = p_{\text{OUTP}}(i,r);
\]

**Equation 18**

\[
\text{equation (linear) PIINLINK} \\
\text{# landed price equals cif price plus duty #} \\
(a_{l},i,\text{com})(a_{l},j,\text{com})(a_{l},r,\text{regions}) \\
p_{\text{INPI}}(i,j,r) = p_{\text{PM}}(i,r) + \text{duty1}(i,r);
\]

**Equation 19**

\[
\text{equation (linear) av_pr_IN} \\
\text{# average price of inputs #} \\
(a_{l},i,\text{com})(a_{l},j,\text{com})(a_{l},r,\text{regions}) \\
inpa(i,j,r) = \\
\text{SIND}(i,j,r) \times p_{\text{INPD}}(i,j,r) + \text{SINI}(i,j,r) \times p_{\text{INPI}}(i,j,r);
\]

**Equation 20**

\[
\text{equation (linear) AVRETPRD} \\
\text{# change in price - domestic #} \\
(a_{l},i,\text{com})(a_{l},r,\text{regions}) \\
p_{\text{RTPD}}(i,r) = p_{\text{OUTP}}(i,r);
\]

(Continued on next page)
C.3 MFA model equations (continued)

!Equation 21!
equation (linear) AVRETPRI
  # change in price - imported #
  (all,i,com)(all,r,regions)
  p_RTPR(i,r) = p_PM(i,r) + duty1(i,r);

!Equation 22!
equation (linear) av_pr_rt
  # average price of inputs #
  (all,i,com)(all,r,regions)
  rtpa(i,r) = SRTD(i,r)*p_RTPD(i,r)  + SRTI(i,r)*p_RTPI(i,r);

! Zero pure profits, revenue = costs
!--------------------------------------
!Equation 23!
equation zero_pure_profits
  # zero pure profits #
  (all,j,com)(all,r,regions)
  OUTV(j,r) = sum(i,com,INVD(i,j,r) + INVI(i,j,r)) +
             sum(v,factors,PRFV(v,j,r)) + OTHV(j,r);

! Market clearance for commodities
!-----------------------------------
!Equation 24!
equation mkcl_eq_goods
  # market clearance by commodity and region #
  (all,i,com)(all,r,regions)
  OUTQ(i,r) = sum(j,com,INQD(i,j,r)) + RTQD(i,r) + TQE(i,r) + STKS(i,r);

!Equation 25!
formula&equation mkcl_eq_capital
  # market clearance for capital #
  (all,j,com)(all,r,regions)
curcap(j,r)=PRFQ("fixed",j,r);

! Other equations
!-----------------
!Equation 26!
equation (linear) wage_rates
  # wage rates by region #
  (all,j,com)(all,r,regions)
p_PP("lab",j,r) = fwage(r);

!Equation 27!
formula&equation value_added
  # value added by region #
  (all,j,com)(all,r,regions)
VADDED(j,r) = sum(v,factors, PRFV(v,j,r));
The model's equations are listed in section 7 of box C.3. The model is represented as a series of equations in both levels and percentage change form that explain the various flows outlined in chart C.2. The model forms a system of simultaneous, non-linear equations. While there are a number of ways of solving such systems, we take advantage of the GEMPACK modelling package to do so. GEMPACK allows equations to be expressed either in non-linear form, or in percentage change linearisation, or as a mixture of both. In each case, GEMPACK uses multistep techniques to solve the underlying non-linear system. Generally, behavioural equations are more easily represented and understood in percentage change form, while identities and market clearing relationships are more easily expressed in the underlying levels form.

In understanding the model’s notation, we observe the following conventions.

First, a system of variable identifiers is used to specify the dimensions over which the variable ranges. For example, consider the levels variable \( \text{INQI}_i(j,r) \) — which represents the quantity of imported input \( i \) into production process of industry \( j \) in region \( r \). A typical example of this flow would be the input of imported woollen yarns into the fabric industry in the US.

Second, we make a distinction between levels and percentage change variables. We use lowercase variables or the prefix ‘p_’ to represent the percentage change in the corresponding upper case or levels variables. The percentage change representation of this variable on the GEMPACK system of equations would be \( p_{\text{INQI}}(i,j,r) \). In some instances, percentage change variables are defined with no corresponding levels variables defined from the database and so are identified in all lowercase. For example, \( \text{cont}(i,r) \) represents the percentage change in the total consumption of apparel \( i \) in region \( r \).

**Demands for inputs by industry**

These demands are described by equations to 1 to 4 in box C.3. An important ingredient in the model structure is the assumed production technology employed by model industries. Industries are assumed to maximise profits by adjusting outputs subject to the relationships represented schematically in chart C.4.
C.4 Representation of industry cost structure

To produce a unit of output, each model industry must combine inputs (fibre or textile inputs and other inputs) with primary factors (capital and labour) in a fixed (or Leontief) relationship with output. The starting cost share for each industry is determined by the database. Having determined demand for each aggregate input bundle, the industry can then substitute between inputs to maximise profits. The industry chooses between domestic and import fibre or textile inputs on the basis of relative prices and a substitution parameter. Similarly, the industry can adjust output by substituting labour for capital according to relative prices — namely, the wage rate and the rental or return to capital — and substitution parameters. For spinning industries, we modify the generalised structure to permit substitution between inputs within the fibre and textile input bundle — namely, to permit substitution between different fibres.

Equations 1 and 2 model the flows in matrices A and E of chart C.2. Demand for input i by industry j in region r is represented by a constant elasticity of substitution function (CES) expressed in percentage change form (see box C.5). Demand for domestically produced and imported inputs depends on two effects. The first is the percentage change in the level of output by industry j in region r (the scale effect). The second is choosing between domestic (p_INQD) and imported inputs (p_INQI) according to relative prices (the substitution effect). This equation contains parameters — shown as SIGM(i,r) describing the degree of substitution possible between domestic and imported inputs.
C.5 The CES functional form

In the construction of the MFA model, we have made extensive use of the constant elasticity of substitution (CES) functional form. This form is typical of an Armington style model. This particular representation has two advantages:

- it reduces the parameter input significantly over a generalised functional form; and
- it is easily represented in model equations in percentage change form.

The CES function is comprised of two components:

- a shift or scale effect
- a substitution effect.

This functional form describes the degree of substitution possible, through a price elasticity, which is determined by a substitution parameter and value shares calculated from the database. This form has the following characteristics.

- The higher the substitution parameter, the greater the substitution possibility:
  - if the CES parameter is set to 1.0 then the equation reduces to a Cobb–Douglas relationship; and
  - if the CES parameter is set to 0.0 then the equation reduces to a Leontief or fixed relationship.
- The higher the value share, given a substitution parameter, the more inelastic will be the resulting elasticity.

Equation 3 models the flows of the value-added component of costs (matrix I of chart C.2). Demands for primary factor \( v \), namely labour and capital, by industry \( j \) in region \( r \) are also represented by CES functions in percentage change form. As with equations 1 and 2, the change in demand for primary factors depends on changes in industry output \( z(j,r) \) (the scale effect) and changes in the relative prices of the primary factors (the substitution effect). The change in the primary factor price \( PP(v,j,r) \), for labour is the wage rate and for capital is the rate of return or payment to capital. This equation also contains CES parameters specifying the rate of substitution between labour and capital possible. When capital stocks are fixed, then the rate at which it is possible to add hired labour to increase output will determine the industry’s supply response to changes in profitability.

Equation 4 models the demand for ‘other inputs’ (matrix H of chart C.2), which are those inputs whose price is not explicitly determined by the model. Equation 4 states that, in percentage change terms, changes in the quantity demanded of other inputs will vary in proportion to changes in industry output levels.
Final demands by commodity

These demands are described by equations 5 to 7 of box C.3 and represent the flows in matrices B and F in chart C.2.

The assumed structure of final demands by commodity is critical to the outcome of any MFA phase out. The distinction between apparel and other fibre and textiles is necessary to understand the model theory. Final demands for fibre and textiles include household consumption and demands for inputs by industries outside of the apparel chain — this reflects that not all textiles are consumed by the apparel chain, such as production of bed and bath wear. Final demands for apparel are assumed to be all consumed by households and it is assumed that households can substitute between apparel of different fibre types on the basis of relative prices. The structure of the household decision for apparel is summarised in chart C.6 below.

C.6 Structure of final demands for apparel

At the first level of the decision by households, total demand for apparel depends on changes in population, incomes and changes in the average retail price of all apparel. Once this is decided, households can substitute between apparel of different fibres based on changes in relative prices. Preferences and ease of substitution between apparel types will be dictated by a matrix of own and cross price elasticities. At the final level of the
consumer’s choice, demand for apparel by fibre is allocated between domestic suppliers and imports on the basis of relative price.

In percentage change terms, equation 5 explains aggregate demand for apparel by region as a function of changes in per person income and a general expenditure elasticity for all clothing, and changes in the average retail price of clothing and a general price elasticity. At the second level of the decision nest in box C.6, total demand for clothing is allocated to apparel by fibre. Equation 6, in percentage change terms, states that the demand for apparel by fibre type will be dependent on changes in demand for all clothing and changes in relative prices by a matrix of own and cross price elasticities. Equation 7 calculates the percentage change in the average retail price of all apparel as a share weighted sum of changes in prices of apparel by fibre — which is used in equation 5.

Equation 8 calculates the percentage change in final demands for commodities other than apparel as a function of changes in per capita income and retail prices. Key elasticities here are income and own price elasticities — we assume no cross price effects outside of the apparel group.

Finally, equations 9 and 10 describe decisions at the bottom of the nest in chart C.6, which allocates purchases of apparel by fibre type between domestically produced and imported sources. These equations use the CES functional form. The percentage change in demand by source depends on changes in total demand by fibre based apparel and changes in relative prices of domestic and imported product.

**Output by industry**

Equation 11 describes the supply of products by each industry in each region in percentage change terms. Each industry is assumed to produce a single output that changes in proportion with that industry’s activity level.

**Trade equations**

This set of equations contains largely accounting identities that link trade volumes between regions. Equation 12 calculates total demand for imports for commodity i by region r. The percentage change in total demand for imports of commodity i in region r is equal to the share weighted sum of changes in demands by each industry and by final users. Equation 13 then determines demands for imports by source region using a CES function. The variable \( p_{\text{EXPQ}}(i,r,s) \) can be interpreted as the percentage change in demand for commodity i by region r from source country s. Demand by
source depends on changes in total demands for imports (the shift effect) and changes in relative landed prices (substitution effect). The variable \( p_{EXPP}(i,r,s) \) represents changes in the landed cost insurance freight (cif) price of imports to region \( r \) from source \( s \). The variable \( p_{PM}(i,r) \) represents the change in the average cif price across supplying regions. The model parameter \( SIGS(i,r) \) determines the degree to which the importing country can switch between import sources. Equation 14 is an accounting identity in levels that calculates total exports by region as the sum of demand for exports by each destination.

**Price linkages**

Equations 15 to 22 identify price linkages within and between regions in the model. Equation 15 links \( p_{EXPP}(i,r,s) \) the free on board (fob) export price in percentage change terms for commodity \( i \) sold to region \( r \) from source country \( s \) to the farm or factory gate price. We assume constant ad valorem margins and taxes between the domestic and fob price. Equation 16 calculates \( p_{PM}(i,r) \), the percentage change in the average landed price of commodity \( i \) in region \( r \) across all sources as a share weighted sum of component cost insurance freight (cif) prices.

Equation 17, in percentage changes terms, links the purchaser price of inputs sourced domestically by industry to the local farm or factory gate price. Equation 18, in percentage changes terms, links the purchaser price of imported inputs to the import price cif basis plus tariff or tariff equivalent payable.

Equation 19 calculates the percentage change in the average price of input \( i \) to industry \( j \) in region \( r \) as the share weighted sum of changes in domestic and imported cost of those inputs. This variable is used in the input demand equations 1 and 2.

Equations 20 and 21 link the percentage change in the purchaser’s price of goods to satisfy final demands to the respective domestic and imported prices. Finally equation 22, calculates the percentage change in the average price of commodity \( i \) to final consumers in region \( r \) as the share weighted sum across domestic and imported goods.

**Zero pure profits**

Following from the assumption of competitive behaviour and constant returns to scale production technology, profits can only accrue to factors of production. Equation 23 equates, in levels terms, the total value of output
of industry $j$ in region $r$ to the costs of its production. Total costs of production equal the sum of intermediate input costs — fibre, yarns, fabrics and other inputs costs — and payment to primary factors which are capital and labour. This set of equations determines changes in industry output levels by region in response to changes in each industry’s relative cost-price situation. There are no pure profits in the sense that every factor is allocated a return — profits can be thought of as a return to or payment to capital.

**Market clearance**

Equation 24 determines the prices of each commodity in each region at the farm or factory level by equating supply and demand. In levels form, total demand is equal to that consumed domestically, the sum of export demands across all destinations and any changes in stocks.

Equation 25 identifies the market clearance equation for fixed primary factors of production for each industry. For agricultural industries, namely wool and cotton growing, fixed primary factors of production include payments to land, capital and owner-operator labour. For the manufacturing industries, fixed factors include capital only. This equation determines the price or payment to the fixed factors and is the residual after all other costs have been accounted for.

**Other equations**

Equation 26 links the cost of labour of industry $j$ in region $r$ to the general wage rate for that region. This equation is purely to make the model easier to handle. The implicit assume is that the fibre, fabrics and apparel industries cannot affect the labour market in each region so that the cost of labour is exogenous. Finally, equation 27 is an adding up equation that calculates changes in value added by industry as the result of changes in MFA quotas.

**Model parameters**

The model’s theory identifies a number of parameters and elasticities that are required to represent the maximising behaviour of consumers and firms. The choice of parameters is a key factor to model outcomes. These parameters also dictate the implied length of run of the simulation. In this case, we have a medium term focus of around three to five years. Table C.7 provides details for the main parameters and elasticities used in the MFA
C.7 MFA model parameters and elasticities

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>US</th>
<th>Rest of world</th>
<th>Australia</th>
<th>US</th>
<th>Rest of world</th>
</tr>
</thead>
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<tr>
<td><strong>Import substitution parameter</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>2.5</td>
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<td>0.8</td>
<td>0.8</td>
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<td>2.5</td>
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<td>1.0</td>
<td>1.0</td>
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<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
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<td>2.5</td>
<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
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<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Wool fabrics</td>
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<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
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<td>2.5</td>
<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
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<tr>
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<td>2.5</td>
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<td>2.0</td>
<td>2.0</td>
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<td>2.5</td>
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<td>2.0</td>
<td>2.0</td>
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<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
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<tr>
<td>Other – apparel</td>
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<td>2.5</td>
<td>2.0</td>
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<td>2.0</td>
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<tr>
<td><strong>Supply elasticities</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Cotton – fibre</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<td>-0.3</td>
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<tr>
<td>Cotton – yarns</td>
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<td>0.3</td>
<td>0.3</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>Other – yarns</td>
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<td>0.3</td>
<td>0.3</td>
<td>-0.3</td>
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<tr>
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<td>0.3</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>Cotton – fabrics</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>Other – fabrics</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.3</td>
</tr>
</tbody>
</table>

Source: Cline (1987) and CIE estimates.

Following the lead of The Trade Partnership, textile and apparel elasticities taken from Cline (1987) provide a starting point for assigning model parameters.

**Trade elasticities**

The key trade parameters identified in the model theory are the import substitution parameters and the substitution parameter between alternative sources of supply. The import substitution parameter describes the ease of substitution between domestically produced and imported products. This parameter should reflect the degree of differentiation between sources. That is, if a commodity has little differentiation between sources, then the parameter would be set to a high value. Over the past 30 years, significant studies, based on either econometric or synthetic approaches, have attempted to estimate Armington elasticities for a range of commodities. One of the most extensive research programs was undertaken in Australia to supply parameters for the ORANI model of the Australian economy. Dixon et al. (1982) report high substitution possibilities for man-made fibres and yarns (2.4), cotton fibres and yarns (2.4), knitting mills (2.9) and clothing (3.4). Another comprehensive source of this type of information is the GTAP database, which reports domestic–import substitution elasticities invariant of region. For textiles, McDougall et al. (1998) uses a value of 2.2
for textiles, and for wearing apparel a value of 4.4. Following Cline (1987), we have set the import substitution parameters to 2.5, which is conservative against the available literature.

The CES substitution parameter between source reflects the degree of differentiation for each commodity between imported sources. The literature on such parameters is very small, but common sense would dictate that, if the domestic-import substitution parameter was high, then substitution possibilities between sources would also be high. GTAP follows the convention that the parameters reflecting the sourcing of imports are twice the domestic-import parameter. Here we follow a similar convention and adopt a parameter of 5.0, reflecting that commodities from different regions are close substitutes.

Supply elasticities

The theory listed above does not explicitly identify a supply elasticity for each industry by region but implies a supply response through the interaction of a number of equations. Key equations required to derive the implied supply elasticity are the primary factor demand equation and the zero pure profits equations. With capital stocks fixed, the key components needed to derive the response are the cost shares of labour and the fixed factors in total costs and the CES primary factor substitution parameter.

Two general rules are useful in understanding the model's supply response. The higher the share of the payment to capital in total costs, the lower is the supply response. Also, the lower the substitution parameter between labour and capital, the lower the supply response because it is difficult to add more labour to the capital base to increase output. If the substitution parameter is set to zero, then the supply response of the industry will be zero in the presence of a fixed factor.

Our approach was to calibrate the CES primary factor substitution elasticity with cost shares from the database to imply supply elasticities reported in table C.7. Econometric evidence of supply elasticities for textile and apparel industries is difficult to find. The Trade Partnership, in their analysis of tariff equivalents of MFA quotas, followed Cline (1987), which assumed supply elasticities of 1.0 for textiles and apparel industries in the US. Casual observation of these industries indicates that they can adjust output quickly in response to changing economic conditions — even in the short term. We have assumed supply elasticities of 2.0 for textile and apparel industries by region as summarised in table C.7. For wool and cotton industries, reflecting a medium term supply response, we have assumed elasticities of 0.8 and 1.0 respectively.
Final demand elasticities

Table C.7 lists the own price and income-expenditure elasticities used in the MFA model for fibre, yarns and textiles. Following Cline (1987) we use an own price elasticity of -0.3 for all textiles in the United States. The same estimates have been used for Australia and the rest of the world.

The issue of substitution between apparel of different fibre types was identified as significant. In previous studies of this type, consumer behaviour was usually represented by an own price elasticity of demand by fibre — cross price effects were assumed to be negligible. However, many in the industry have recognised that consumers are sensitive to changes in relative prices between apparel of different fibre types at the retail level.

In appendix B we summarise the results from a study by Short and Beare (1990) of retail fibre substitution possibilities in the United States. Formally using the results in the MFA model is very difficult because of the following.

- The study by Short and Beare (1990) identifies substitution possibilities only between those products with which wool competes directly — namely, suits, coats, jackets, and knitwear. It excludes important items included in the MFA analysis including trousers, shirts and nightwear that make up a significant part of apparel demand.
- Short and Beare (1990) base their study on a consumer survey — the correct weights for aggregation of elasticities by category are not available.
- It is not clear if the elasticities presented are compensated or uncompensated and, being estimated by a different model structure, they are not readily compatible with the MFA model.

Rather, we use the results in an informal way, particularly the findings from the study that:

- the own price elasticity of demand for wool and synthetics in various categories of apparel is higher than that for cotton; and
- for various categories of apparel at the retail level, wool and cotton, and wool and synthetics are substitutes, but cotton and synthetics are complements.

Table C.8 lists the consumption elasticities used in the model. In the medium term, consumers are considered to be quite price inelastic for all apparel, with reasonably strong substitution permitted between apparel of
different fibre content. We source the aggregate price and income elasticities for apparel from Dewbre, Vlastuin and Ridley (1986).

**Model closure**

To solve any set of simultaneous equations, the number of endogenous variables must equal the number of equations. To do this we need to assign model variables as either endogenous or exogenous — this is known as the model closure. In addition to the mathematical requirements of solving the model, the model closure can be interpreted to tell us about the economic environment in which the simulation is conducted.

C.8 *Medium term demand elasticities used*

<table>
<thead>
<tr>
<th></th>
<th><strong>Own price</strong></th>
<th><strong>Income elasticity</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All apparel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>-0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>United States</td>
<td>-0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Rest of world</td>
<td>-0.4</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Wool</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cotton</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fibre demand elasticities</strong></td>
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</tr>
<tr>
<td><strong>Australia</strong></td>
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<tr>
<td>Wool</td>
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<tr>
<td>Wool</td>
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<td>Other</td>
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<td><strong>Rest of world</strong></td>
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<td></td>
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<tr>
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<td>Cotton</td>
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<tr>
<td>Other</td>
<td>0.13</td>
<td>0.56</td>
</tr>
</tbody>
</table>

*Source: CIE estimates.*

Table C.9 lists variables that are typically exogenous.

The model variable duty1(i,r) is an important policy variable for this study. It represents the tariff or tariff equivalent of an import restriction. To simulate the removal of the quota restriction of the MFA, we reduce the tariff equivalent of the total distortion down to the tariff rate.

Because the model is partial equilibrium, we have to make a number of assumptions about linkages with other sectors of the economy. Principally, we assume that the fibre, fabric and apparel sector is a small part of each economy and is therefore a price taker in the market for labour and other
inputs. Therefore the prices of these inputs, \( p_{po}(j,r) \) and \( fwage(r) \) are held exogenous.

### C.9 Exogenous variables of the MFA model

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( duty1(i,r) )</td>
<td>Power of the tariff or equivalent for commodity ( i ) in region ( r )</td>
</tr>
<tr>
<td>( p_{po}(j,r) )</td>
<td>Price of other inputs for industry ( j ) in region ( r )</td>
</tr>
<tr>
<td>( ry(r) )</td>
<td>Real income in region ( r )</td>
</tr>
<tr>
<td>( pop(r) )</td>
<td>Population in region ( r )</td>
</tr>
<tr>
<td>( p_{CURCAP}(j,r) )</td>
<td>Capital stock of industry ( j ) in region ( r )</td>
</tr>
<tr>
<td>( p_{STKS}(i,r) )</td>
<td>Changes in stocks of commodity ( i ) in region ( r )</td>
</tr>
<tr>
<td>( tcon(i,r) )</td>
<td>Preference shifter for consumption of commodity ( i ) in region ( r )</td>
</tr>
<tr>
<td>( fwage(r) )</td>
<td>Wage rate in region ( r )</td>
</tr>
</tbody>
</table>

Industry capital stocks by region are exogenous. This implies an adjustment environment where industries cannot expand output by investment in additional capacity.

Preference shifts and changes in stocks are also treated as exogenous.

### Model database

In principle, the database for each model region is structured as shown in chart C.2. However, there is no single source of information that presents data consistently in this manner, so the database was assembled from a number of disparate sources. We now summarise the primary data sources from which the database was collated. To be consistent with the work completed by The Trade Partnership, data was collected for the base year 1996 where possible.

This section should give the reader an overview of the methodology behind the construction of the database. The text also identifies key difficulties and deficiencies in the database, but provides a robust framework for any further work. Due to their size and complexity, the computer files in spreadsheet format are available on request. These files detail sources of and calculations behind each element of the database.
Trade data

The core trade data set used in the construction of the database was the import and export data reported at six digit from the Harmonised System (HS) trade classification. The data obtained identified three regions — Australia, the United States and the rest of the world, and was reported in US$ millions. Although Australian and US trade data is available at the ten digit level of detail, data for the remainder of the world is only available at the six digit level of detail. This is because countries report their trade at different levels of detail — six digit is the highest detail available that is common across all countries.

A key requirement to use this trade data was to develop a concordance that categorises yarns, fabrics, apparel and other textiles by fibre. For consistency with the work completed by the Trade Partnership, we have used the US Textile and Apparel Category System concordance developed by the US Department of Commerce, Office of Textiles and Apparel (OTEXA). Using this concordance as a starting point, we made modifications to ensure consistency with the 800 or so applicable HS items at the six digit level. A complete listing of the concordance used is presented in appendix E. This concordance permitted the aggregation of trade data values for exports and imports by region.

Another requirement of the concordance was the aggregation of volumes reported in the trade data. This concordance needed to account for the fact that within HS chapters and between regions, the reporting units by HS6 item are not the same. For example, fabric data can be reported in square metres, tonnes, lineal metres and another category. Similarly, trade in apparel could be reported in a variety of units — tonnes, number/dozens of items. The US Textile and Apparel Category System provides a detailed set of conversion factors for these units back to square metre equivalents of fabric — that are based on the US 10 digit HS system. These factors could not be universally applied to the trade data because of the mix of units reported by each region. Therefore judgements were made on appropriate conversion ratios by comparison between regions and with available US ratios where possible. Other sources of conversion factors for textiles and clothing were also identified during the course of the study. The USDA uses a detailed concordance and set of conversion factors to calculate the net domestic availability of the major fibres within the US. However, this concordance has a different classification system to that used by OTEXA and the Trade Partnership and the USDA would not make the information available. The other source of such information is export conversion factors, back to a virgin wool basis, for eight major wool producing and consuming countries. These factors, available at HS6, are used by The Woolmark
Company to calculate net domestic availability of wool by region. Again, there was limited compatibility between these factors and the base OTEXA classification, and these factors were not used extensively.

United States

C.10 Input–output relationships for United States textiles and clothing chain

<table>
<thead>
<tr>
<th>Units</th>
<th>Wool</th>
<th>Cotton</th>
<th>Man-made</th>
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<td>Production</td>
<td>SME's</td>
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<td>3394.4</td>
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<td>$m</td>
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<td>Input of fabrics</td>
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<td>4.24</td>
</tr>
<tr>
<td>Imports</td>
<td>$/SME</td>
<td>8.47</td>
<td>0.97</td>
<td>1.22</td>
</tr>
<tr>
<td>Weighted price</td>
<td>$/SME</td>
<td>10.45</td>
<td>2.13</td>
<td>3.89</td>
</tr>
<tr>
<td>Fabric cost</td>
<td>$m</td>
<td>1357.3</td>
<td>8990.9</td>
<td>13193.6</td>
</tr>
<tr>
<td>Cost share in output</td>
<td>%</td>
<td>55.30</td>
<td>21.96</td>
<td>32.73</td>
</tr>
<tr>
<td>Textiles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>SME's</td>
<td>0</td>
<td>249.1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$m</td>
<td>0</td>
<td>2980.0</td>
<td>0</td>
</tr>
<tr>
<td>Input of fabrics</td>
<td>SME's</td>
<td>0</td>
<td>249.1</td>
<td>0</td>
</tr>
<tr>
<td>Input prices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>$/SME</td>
<td>0</td>
<td>2.42</td>
<td>0</td>
</tr>
<tr>
<td>Imports</td>
<td>$/SME</td>
<td>0</td>
<td>0.97</td>
<td>0</td>
</tr>
<tr>
<td>Weighted price</td>
<td>$/SME</td>
<td>0</td>
<td>2.13</td>
<td>0</td>
</tr>
<tr>
<td>Input of fabrics</td>
<td>$m</td>
<td>0</td>
<td>531.2</td>
<td>0</td>
</tr>
<tr>
<td>Cost share in output</td>
<td>%</td>
<td>0</td>
<td>17.8</td>
<td>0</td>
</tr>
<tr>
<td>Fabrics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>SME's</td>
<td>138.4</td>
<td>8388.2</td>
<td>16402.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$m</td>
<td>1526.8</td>
<td>20271.3</td>
<td>69550.5</td>
</tr>
<tr>
<td>Input of yarns</td>
<td>SME's</td>
<td>138.4</td>
<td>8388.2</td>
<td>16402.0</td>
</tr>
<tr>
<td>Input prices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>$/SME</td>
<td>2.59</td>
<td>0.89</td>
<td>0.77</td>
</tr>
<tr>
<td>Imports</td>
<td>$/SME</td>
<td>3.32</td>
<td>0.65</td>
<td>0.47</td>
</tr>
<tr>
<td>Weighted price</td>
<td>$/SME</td>
<td>2.68</td>
<td>0.89</td>
<td>0.75</td>
</tr>
<tr>
<td>Input of yarns</td>
<td>$m</td>
<td>371.1</td>
<td>7432.0</td>
<td>12318.7</td>
</tr>
<tr>
<td>Cost share</td>
<td>%</td>
<td>24.3</td>
<td>36.7</td>
<td>17.7</td>
</tr>
<tr>
<td>Yarns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>SME's</td>
<td>190.2</td>
<td>16741.5</td>
<td>22747.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Grams/m²</td>
<td>270</td>
<td>117.6</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>kt</td>
<td>51.4</td>
<td>1969.6</td>
<td>3298.3</td>
</tr>
<tr>
<td></td>
<td>$m</td>
<td>493.2</td>
<td>14940.5</td>
<td>17475.1</td>
</tr>
<tr>
<td>Input of fibre</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assumed loss to yarns</td>
<td>%</td>
<td>0.90</td>
<td>0.90</td>
<td>0.96</td>
</tr>
<tr>
<td>Raw fibre demand</td>
<td>kt</td>
<td>57.1</td>
<td>2188.4</td>
<td>3435.7</td>
</tr>
<tr>
<td>Input prices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>$/kg</td>
<td>3.60</td>
<td>2.08</td>
<td>1.75</td>
</tr>
<tr>
<td>Imports</td>
<td>$/SME</td>
<td>4.00</td>
<td>1.70</td>
<td>1.50</td>
</tr>
<tr>
<td>Weighted price</td>
<td>$/SME</td>
<td>3.80</td>
<td>1.70</td>
<td>1.63</td>
</tr>
<tr>
<td>Input of fibres</td>
<td>$m</td>
<td>216.9</td>
<td>3720.3</td>
<td>5583.1</td>
</tr>
<tr>
<td>Cost share</td>
<td>%</td>
<td>44.0</td>
<td>24.9</td>
<td>31.9</td>
</tr>
</tbody>
</table>

Source: The Trade Partnership.
As part of their calculation of nominal rates of protection for 1996, The Trade Partnership collected detailed production and import data for yarns, fabrics and apparel by fibre for 1996 on a quantity and value basis. This involved the aggregation of US trade data, available at ten digit HS level of detail and detailed production data. These data were aggregated to a fibre basis using the US Textile and Apparel Category System developed by the US Department of Commerce, Office of Textiles and Apparel (OTEXA). The objective of this classification system was to calculate total import volumes and production using the common units of millions of square metre equivalents (SME) using OTEXA conversion ratios. This concordance, and conversion ratios, covers yarns (including tops), fabrics, apparel and the majority of textile products identified in the HS classification system. In the US, production of and trade in textile products, outside of the apparel sector, are concentrated in cotton based products such as bed and bathroom wear.

Because all quantities are calculated on an SME base, it is possible to establish cost linkages between each processing stage. These cost relationships for the US are summarised in table C.10. Because Trade Partnership data did not identify raw fibre use, it was necessary to make assumptions about fibre loss from the raw fibre to the yarn stage and the average weight of each type of fabric per square metre. Data on production by raw fibre for wool, cotton and synthetics was readily obtained from the USDA and the Fiber Organon.

Australia

Primary data sources for the Australian database were the Australian Bureau of Statistics (ABS), ABARE and The Woolmark Company. Up to date data for production and net trade in wool and cotton up to the early processing stage was readily available and easily incorporated. Data for later stage processing was not readily available for later years due to the relatively small size of the Australian industry and consequent confidentiality problems. ABS data for 1993-94 (the latest year for which the publication was produced) identified production volumes by fibre for yarns and some fabrics reported in a combination of SME’s and tonnes. Data is not available on apparel production on a fibre basis. Data is only available on the basis of broad classification of article produced (for example, menswear). We therefore adopted a synthetic approach. Using fabric and trade data quantities, we calculated availability of fabric for apparel manufacture on a square metre equivalent basis. Using unit prices of apparel, primarily from trade data, we calculated the total value of
production of apparel and knitwear to be equal to the total value of production reported in the ABS manufacturing survey.

C.11 Fibre composition of apparel categories

An important component of this study is identifying the raw fibre contribution to each apparel category identified in the model. These categories are:

- wool and wool blends
- cotton
- other — mainly synthetics, but including other natural fibres.

In the construction of the database, a key simplifying assumption made was that there is a one-to-one correspondence between each part of the fibre–textile–apparel chain in each region. That is, we do not allow industries to combine different fibres, which may be important at the spinning stage. It is not possible to model fibre substitution for the following reasons:

- the available concordance and conversion factors were not sufficient to establish raw fibre equivalents of pure and blend apparel;
- if these conversion ratios were available, they could only be applied to trade data — because detailed information on production does not exist, estimation of equivalent data for production by region would not be possible; and
- little other information was available.

The International Wool Textile Organisation (IWTO) conducts an annual survey of materials consumed in the wool textile industries of certain countries. This survey covers processors who use wool as an import at the spinning stage. This survey reveals, on a quantity basis, that wool (and noils) accounts for 30 per cent of fibre input, which also includes hair and synthetics. The USDA also collects information for US wool and cotton sectors on fibres consumed — both principally use synthetics in the production of yarns. However, for both of these sources, there was not corresponding information on the composition of these firms’ output — how much was predominantly wool and wool blend, and how much yarn would have been synthetic yarns. With more information or the use of a stylised production technology and cost input, fibre substitution could be included into the framework.

Rest of the world

Lack of consistent data beyond the raw fibre level was a significant constraint to the construction of the model database for this region. Again, we use a synthetic approach while ensuring consistency with known data.

Production quantities for wool, cotton and other fibres were readily available from the International Wool Textile Organisation (IWTO), the International Cotton Advisory Committee (ICAC) and the Fiber Organon. However, production of yarns, fabrics and apparel by fibre were made on the basis of a net domestic availability approach after adjusting for trade
volumes (exports and imports with Australia and the United States). Unit values from trade data were then used to calculate relevant values in production and consumption. The net availability approach has a significant disadvantage in calculation of fibres and fabrics used in the apparel chain. This is because we do not know what percentage of fibres and fabrics are used outside of the apparel chain — for example, the production of bathwear represents a significant use of cotton. For this analysis, we have recognised that carpet wool is a significantly different product to apparel wool and so production of carpets from broad wools has been excluded. Therefore for wool, we have assumed that it was sufficient to take a net availability approach.

One source of information for other fibres is ICAC who estimate total global production of cotton yarns and fabrics. These estimates less production in Australia and the United States, were used in production and input usage calculations for the rest of the world for cotton. However, no corresponding estimates for synthetic fibres were available and so the proportion of synthetic fibres used outside of the apparel chain is cannot be estimated. Therefore we have assumed that the ratio of synthetic fibres and yarns that enter the apparel chain for the rest of the world was the same as for cotton, for which we have data.

Another significant problem in the construction of the database for this region was the estimation of total apparel production in the rest of the world. As noted, the net availability approach is a guide but of limited use because of non-apparel uses. To obtain a final estimate of the value and volume of garment production in the rest of the world, we used available GTAP data for the value of global apparel production recorded in US$ million. Using unit values and consumption shares from the available trade data — which aggregates total trade in each commodity within the countries of the rest of the world region — we allocated the total value of the rest of the world production between commodity by fibre.
Fibre substitution in apparel consumption

FIBRE SUBSTITUTION IN RESPONSE to relative price changes can take place at two stages in the apparel pipeline. Consumers choose between apparel with different fibre compositions on the basis of a range of price and non-price attributes. The spinning stage, where raw fibres are spun into yarns, is the other stage at which fibre mix decisions are made. To some extent, the derived demand for fibre is constrained by the consumer’s preferences for fibre composition in the final garment. Substitution at the yarn stage depends on the extent to which different fibres can be spun into yarns with similar end-use characteristics.

The degree of fibre substitution possible is a key ingredient in determining the effects of changes in the relative price of fibres that arise from changes in trade barriers. The model’s theory identifies the scope for final consumers to substitute between apparel of different fibre types based on changes in relative prices. In addition, fibre substitution is also possible at the yarn level of processing. In this appendix we briefly review the available literature to establish the nature and size of these substitution possibilities.

Empirical estimates

A number of studies have examined fibre substitution at various stages of the fibre-apparel chain. Dewbre, Vlastuin and Ridley (1986) used a two-stage estimation process where aggregate demand for final apparel products was determined at the first stage. Final demand was specified in two parts comprising a short run demand equation, a function of retail prices and incomes, and a stock-depreciation equation. Aggregate apparel fibre demand was then allocated between wool, cotton and synthetics in the second stage as a function of relative prices and cost minimising behaviour. The model used data for 1970 to 1983 from the eight major OECD wool consuming countries and produced short run (one year) and medium term (five years) elasticities. At the retail level, medium term elasticities were found to be lower than in the short term reflecting the asset characteristics of clothing. In the medium term for apparel, using a model that restricts depreciation to five years, elasticities for price and income
were estimated to be 0.41 and 0.6. At the fibre level, wool, cotton and synthetics were found to have own-price elasticities of around –0.2, indicating little scope for substitution in the medium term. Strongest possibilities were between wool and synthetics (table D.1).

### D.1 Medium term fibre substitution estimates, 1973–83
Mean values

<table>
<thead>
<tr>
<th>Demand for:</th>
<th>With respect to the price:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wool</td>
<td>Cotton</td>
</tr>
<tr>
<td>Wool</td>
<td>-0.23</td>
<td>0.09</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.05</td>
<td>-0.24</td>
</tr>
<tr>
<td>Synthetics</td>
<td>0.16</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Source: Dewbre, Vlastuin and Ridley (1986).

Ball, Beare and Harris (1989) estimated fibre substitution using a translog approach from a cost minimisation model. As these represent derived demands from retail level consumption, the results (table D.2) are useful for the MFA model.

### D.2 Long run fibre demand elasticities, 1960–87
Mean values

<table>
<thead>
<tr>
<th>Demand for:</th>
<th>With respect to the price:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wool</td>
<td>Cotton</td>
</tr>
<tr>
<td>Wool</td>
<td>-0.70</td>
<td>0.31</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.34</td>
<td>-0.77</td>
</tr>
<tr>
<td>Polyester</td>
<td>0.31</td>
<td>0.22</td>
</tr>
<tr>
<td>Rayon</td>
<td>-0.12</td>
<td>0.53</td>
</tr>
</tbody>
</table>

Source: Ball, Beare and Harris (1989).

Short and Beare (1990) estimated fibre substitution possibilities at the retail level of demand between wool, cotton and synthetics, rather than at the raw fibre level. The study used household survey data across several end uses for the United States over the years 1974 to 1986. The end uses selected for men were: jackets, coats and knitwear, and for women: skirts, jackets, suits with pants and knitwear. Results indicated that, within end uses, own-price estimates of wool and synthetics were found to be elastic with cotton being inelastic, with the exception of knitwear (table D.3). Cross price elasticities indicated that apparel of different fibres were fairly strong substitutes in consumption - except between cotton and synthetics due to the high level of blending between these fibres.
D.3 Medium term apparel substitution estimates, 1974–86  Mean values

<table>
<thead>
<tr>
<th>Demand for:</th>
<th>With respect to the price:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wool</td>
</tr>
<tr>
<td><strong>Men's jackets</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-1.15</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.90</td>
</tr>
<tr>
<td>Synthetics</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>Men's coats</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-1.96</td>
</tr>
<tr>
<td>Cotton</td>
<td>1.35</td>
</tr>
<tr>
<td>Synthetics</td>
<td>0.82</td>
</tr>
<tr>
<td><strong>Men's suits</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-1.11</td>
</tr>
<tr>
<td>Cotton</td>
<td>1.54</td>
</tr>
<tr>
<td>Synthetics</td>
<td>0.82</td>
</tr>
<tr>
<td><strong>Men's knitwear</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-1.53</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.89</td>
</tr>
<tr>
<td>Synthetics</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Women's skirts</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-0.82</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.22</td>
</tr>
<tr>
<td>Synthetics</td>
<td>-0.36</td>
</tr>
<tr>
<td><strong>Women's jackets</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-0.78</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.41</td>
</tr>
<tr>
<td>Synthetics</td>
<td>-0.62</td>
</tr>
<tr>
<td><strong>Women's pant-suits</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-0.78</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.08</td>
</tr>
<tr>
<td>Synthetics</td>
<td>-0.10</td>
</tr>
<tr>
<td><strong>Women's knitwear</strong></td>
<td></td>
</tr>
<tr>
<td>Wool</td>
<td>-0.88</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.23</td>
</tr>
<tr>
<td>Synthetics</td>
<td>-0.16</td>
</tr>
</tbody>
</table>

Source: Short and Beare (1990)

Swan Consultants (1992) analysed a range of factors, including fibre substitution, which affect wool demand in the United Kingdom. Mill level data was used for the United Kingdom worsted spinning sector – whose output is principally used to produce apparel. Fibre substitution at the spinning stage was examined using a cost function methodology incorporating the following fibres: crossbred and merino wool, three synthetic types and fine animal hair.

Table D.4 summarises the results from Swan Consultants (1992) for mean conventional input demand elasticities. The own price elasticities for crossbred and merino wools are −0.8 to −0.4 with reasonable cross substitution elasticities. A significant find was that demand for crossbred and merino wool is relatively unaffected by changes in prices of the four other fibres.
However, decreases in wool prices significantly reduce the demand for some synthetics. The conclusion was that major fibre substitution possibilities exist between merino and crossbred wools, and between the synthetic fibre types.

### D.4 Mean fibre input demand elasticities for the UK Worsted spinning sector, 1971–90

<table>
<thead>
<tr>
<th>Demand for:</th>
<th>Crossbred</th>
<th>Merino</th>
<th>Hair</th>
<th>Acrylic</th>
<th>Polyester</th>
<th>Nylon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossbred</td>
<td>-0.762</td>
<td>0.603</td>
<td>0.058</td>
<td>0.011</td>
<td>0.022</td>
<td>0.067</td>
</tr>
<tr>
<td>Merino</td>
<td>0.455</td>
<td>-0.441</td>
<td>-0.005</td>
<td>0.040</td>
<td>0.017</td>
<td>-0.066</td>
</tr>
<tr>
<td>Hair</td>
<td>0.097</td>
<td>-0.011</td>
<td>-0.044</td>
<td>-0.014</td>
<td>-0.027</td>
<td>-0.001</td>
</tr>
<tr>
<td>Acrylic</td>
<td>0.028</td>
<td>0.128</td>
<td>-0.020</td>
<td>-0.254</td>
<td>-0.068</td>
<td>0.187</td>
</tr>
<tr>
<td>Polyester</td>
<td>0.360</td>
<td>0.380</td>
<td>-0.307</td>
<td>-0.457</td>
<td>-0.392</td>
<td>0.419</td>
</tr>
<tr>
<td>Nylon</td>
<td>0.657</td>
<td>-0.932</td>
<td>0.040</td>
<td>0.841</td>
<td>0.250</td>
<td>-0.856</td>
</tr>
</tbody>
</table>


Consistency between studies

The four studies summarised above address basically the same issue — fibre substitution either at the spinning stage or at the retail level — using different approaches and data sets. The evidence from these studies suggests that substitution between fibres is more significant at the retail level than at the spinning stage. At both levels of the processing chain, wool is a greater substitute for synthetics than for cotton.

As noted in appendix A, we have used the key findings that:

- the own price elasticity of demand for wool in apparel is higher than that for cotton; and
- wool and cotton, and wool and synthetics are substitutes, but cotton and synthetics are complements.
Concordance between HS codes on yarns, fabrics and garments and model categories

### E.1 Concordance between six digit HS codes and model categories

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>500100</td>
<td>Silkworm cocoons suitable for reeling</td>
<td>AMN</td>
</tr>
<tr>
<td>500200</td>
<td>Raw silk (not thrown)</td>
<td>AMN</td>
</tr>
<tr>
<td>500310</td>
<td>Silk waste, not carded or combed</td>
<td>AMN</td>
</tr>
<tr>
<td>500390</td>
<td>Silk wste inc cocoon nsut rel yrn wste garn stk oth</td>
<td>AMN</td>
</tr>
<tr>
<td>500400</td>
<td>Silk ym oth than spun fr silk wste nfor retail sale</td>
<td>YMN</td>
</tr>
<tr>
<td>500500</td>
<td>Yarn spun from silk waste not put up retail sale</td>
<td>YMN</td>
</tr>
<tr>
<td>500600</td>
<td>Silk ym &amp; yrn sp sl wst rtl sale worm gut</td>
<td>YMN</td>
</tr>
<tr>
<td>500710</td>
<td>Woven fabrics of silk or silk waste - noil silk</td>
<td>YMN</td>
</tr>
<tr>
<td>500720</td>
<td>Wov fab ov 85% silk or silk waste except noil silk</td>
<td>YMN</td>
</tr>
<tr>
<td>500790</td>
<td>Woven fabrics of silk or silk waste - other nesoi</td>
<td>YMN</td>
</tr>
</tbody>
</table>

### Chapter 50: Silk including yarns and woven fabric

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>510111</td>
<td>Wool, not carded or combed, greasy, shorn</td>
<td>AW</td>
</tr>
<tr>
<td>510119</td>
<td>Wool n crd/cmb grsy inc fleece-wshd wool other</td>
<td>AW</td>
</tr>
<tr>
<td>510121</td>
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<td>Fine or coarse animal hair not crd/cmb coarse hair</td>
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<td>Waste of wool noils of wool or of fine animal hair</td>
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<td>Waste of wool or of fine animal, nesoi</td>
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<td>Waste of coarse animal hair, including yarn waste</td>
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<td>Garnetted stock of wool/line or coarse animal hair</td>
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<td>Wool tops including combed wool in fragment carded wool</td>
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<td>Wool tops, combed, in fragments</td>
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<td>Wool tops and other combed wool: other</td>
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<td>Fine animal hair, carded or combed</td>
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<td>Coarse animal hair, carded or combed</td>
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<td>510610</td>
<td>Yarn carded wool not retail sale &gt; 85% by wt wool</td>
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<td>Yarn, carded wool, not retail, under 85% wt wool</td>
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### E.1 Concordance between six digit HS codes and model categories (Continued)

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<td>Yarn &amp; fine an hair, retail pk, not un 85% wl or h</td>
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<td>510990</td>
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<td>511000</td>
<td>Yarn coarse animal hair put up or not retail sale</td>
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<td>Wov fab crded wool/fah oth mixed m/s man-made flt</td>
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<tr>
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<td>Wov fab comb mixed mm staple fib wool/animal hair</td>
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<td>511300</td>
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**Chapter 52: Cotton including yarns and woven fabric+A26**

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<td>Cot yarn, 85% cot, no retail, ov 43nm not ov 52nm</td>
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E.1 Concordance between six digit HS codes and model categories (Continued)

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<td>520848</td>
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</tr>
<tr>
<td>520849</td>
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</tr>
<tr>
<td>520850</td>
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(Continued on next page)
## E.1 Concordance between six digit HS codes and model categories (Continued)

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<th>Code^a</th>
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<tr>
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<td>Wov cot fab, pr pl wv nun 85% cot ov100nov200g/m2</td>
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<tr>
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</tr>
<tr>
<td>520859</td>
<td>Wov cot fab, pr wea nesoi nun 85% cot nov 200 g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>520911</td>
<td>Wov cot fab, unbl pl wv nun 85% cot ov 200 g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>520912</td>
<td>Wov cot fab, 85% cot, unb 3-or4-th twill ov200g/m2</td>
<td>FC</td>
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<tr>
<td>520919</td>
<td>Wov cot fab, unbl wea nesoi nu 85% cot ov 200 g/m2</td>
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<tr>
<td>520921</td>
<td>Wov cot fab, bl pl wv nun 85% cot ov 200 g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>520922</td>
<td>Wov cot fab, 85% cot, bl 3-or4-th twill ov 200g/m2</td>
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</tr>
<tr>
<td>520929</td>
<td>Wov cot fab, bl wea nesoi nun 85% cot ov 200 g/m2</td>
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</tr>
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<td>520931</td>
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<td>FC</td>
</tr>
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</tr>
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<td>520942</td>
<td>Wov cot fab, blue denim nun 85% cot ov 200 g/m2</td>
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</tr>
<tr>
<td>520943</td>
<td>Wov cot fab, 85% cot, yn dy 3-04-th twil ov200g/m2</td>
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<td>521032</td>
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<td>521041</td>
<td>Wov cot fab un85% cot mmf yndyed pLvW nov 200 g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>521042</td>
<td>Wov fab cot &lt;85% cot mx mmf &lt;=200g/m2 ydc 3-4th tw</td>
<td>FC</td>
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<td>521049</td>
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<td>521051</td>
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<tr>
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<td>521111</td>
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<td>521112</td>
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<td>521122</td>
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<td>521129</td>
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<td>521132</td>
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<tr>
<td>521139</td>
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(Continued on next page)
### E.1 Concordance between six digit HS codes and model categories

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<td>521142</td>
<td>Wov cot fab, blue denim un85% cot mmf ov200g/m2</td>
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</tr>
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<td>521143</td>
<td>Wov cot fab un85% cot mmf yn dy 3-4 thw ov200g/m2</td>
<td>FCM</td>
</tr>
<tr>
<td>521149</td>
<td>Wov cot fab &lt;85% cot m mmf ydc &gt;200g/m2 ot fabrics</td>
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<tr>
<td>521152</td>
<td>Wov cot fab un85% cot mmf pr 3-or4-th tw ov200g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>521159</td>
<td>Wov cot fab, pr wea nesoi un85% cot mmf ov200g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>521211</td>
<td>Wov cot fab un85% cot nesoi, unbl nov 200 g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>521212</td>
<td>Wov cot fab un85% cot nesoi, bl nov 200 g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>521213</td>
<td>Wov cot fab un85% cot nesoi, dyed nov 200 g/m2</td>
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<td>521214</td>
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<td>521215</td>
<td>Wov cot fab un85% cot nesoi, print, nov 200 g/m2</td>
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</tr>
<tr>
<td>521221</td>
<td>Wov cot fab un85% cot nesoi, unbl ov 200 g/m2</td>
<td>FC</td>
</tr>
<tr>
<td>521222</td>
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<td>521223</td>
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<td>521224</td>
<td>Wov cot fab un85% cot nesoi, yn dy ov 200 g/m2</td>
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</tr>
<tr>
<td>521225</td>
<td>Wov cot fab un85% cot nesoi, print ov 200 g/m2</td>
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**Chapter 53: Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn**

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<th>Description</th>
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<td>530110</td>
<td>Flax, raw or retted</td>
<td>AMN</td>
</tr>
<tr>
<td>530121</td>
<td>Flax, broken, scutched, hackled other proc n spun</td>
<td>AMN</td>
</tr>
<tr>
<td>530129</td>
<td>Flax, hackled etc., not spun</td>
<td>AMN</td>
</tr>
<tr>
<td>530130</td>
<td>Flax tow and waste yarn waste and garnetted stock</td>
<td>AMN</td>
</tr>
<tr>
<td>530210</td>
<td>True hemp raw/process nt spun; tow &amp; wst raw/rett</td>
<td>AMN</td>
</tr>
<tr>
<td>530290</td>
<td>True hemp processed not spun, tow &amp; yarn waste</td>
<td>AMN</td>
</tr>
<tr>
<td>530310</td>
<td>Jute other textile bast fib ex flx hem raw retted</td>
<td>AMN</td>
</tr>
<tr>
<td>530390</td>
<td>Jute other tex bast fib tow wast proc nt sp other</td>
<td>AMN</td>
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<td>530410</td>
<td>Sisal other textile fibers of the genus agave raw</td>
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<td>530490</td>
<td>Sisal oth text fib gen agave tow waste nt sp other</td>
<td>AMN</td>
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<tr>
<td>530511</td>
<td>Coconut textile fibers, raw</td>
<td>AMN</td>
</tr>
<tr>
<td>530519</td>
<td>Coconut, tow, noils and yarn waste garnet stk other</td>
<td>AMN</td>
</tr>
<tr>
<td>530521</td>
<td>Abaca textile fibers, raw</td>
<td>AMN</td>
</tr>
<tr>
<td>530529</td>
<td>Abaca, tow, noils and yarn waste garnett stk other</td>
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<td>530591</td>
<td>Ramie &amp; other vegetable textile fibers nesoi, raw</td>
<td>AMN</td>
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<td>530599</td>
<td>Ramie oth veg fib tow yn wast ex coco abaca, other</td>
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<td>530610</td>
<td>Flax yarn, single</td>
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</tr>
<tr>
<td>530620</td>
<td>Flax yarn, multiple (folded) or cabled</td>
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</tr>
<tr>
<td>530710</td>
<td>Yarn of jute oth tex bast fib ex fl hp ram single</td>
<td>YMN</td>
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<tr>
<td>530720</td>
<td>Yarn of jute oth tex bast fibr multiple or cabled</td>
<td>YMN</td>
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<tr>
<td>530810</td>
<td>Yarn of other vegetable textile fibers; coir yarn</td>
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<tr>
<td>530820</td>
<td>Yarn of true hemp</td>
<td>YMN</td>
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<tr>
<td>530830</td>
<td>Yarn of other textile fibers; paper yarn</td>
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</tr>
<tr>
<td>530890</td>
<td>Yarn of vegetable textile fibers nesoi</td>
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### E.1 Concordance between six digit HS codes and model categories (Continued)

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<tr>
<td>530919</td>
<td>Woven fabrics &gt;=85% by weight of flax other</td>
<td>FMN</td>
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<tr>
<td>530921</td>
<td>Woven fabrics &lt;85% by weight of flax unbl/bleached</td>
<td>FMN</td>
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<tr>
<td>530929</td>
<td>Woven fabrics &lt;85% by weight of flax other</td>
<td>FMN</td>
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<td>531010</td>
<td>Wov fb jute/o bx bast f ex flx tr hmp &amp; r rw/pns u</td>
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<tr>
<td>531090</td>
<td>Wov fab jute oth textile bast fiber exc ubl nesoi</td>
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<td>531100</td>
<td>Wov fab of ot veg textile fb wov fab of ppr yarn</td>
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#### Chapter 54: Manmade filaments, including yarns and woven fabrics

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<td>540120</td>
<td>Sewing thread artificial filaments, retail or not</td>
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<td>540210</td>
<td>Syn fil yarn ex sewing no retail, nylon etc</td>
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<tr>
<td>540220</td>
<td>Syn fil yarn ex sewing no retail, polyester</td>
<td>YMN</td>
</tr>
<tr>
<td>540231</td>
<td>Syn fil yn exs ew no rt tx nylon yn nov 500 decitex</td>
<td>YMN</td>
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<tr>
<td>540232</td>
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<td>Syn fil yn exs ew no rt tx polyester</td>
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<td>540239</td>
<td>Syn fil yn exs ew no rt text nesoi</td>
<td>YMN</td>
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<td>Syn fil yn, nosew noret oth sing nov50i nylon etc</td>
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<td>540242</td>
<td>Polyester part orient untwst/twst yn nt&gt;50 turns/m</td>
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<tr>
<td>540243</td>
<td>Syn fil yn, nosew noret othsing nov50i polyester etc</td>
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<td>540249</td>
<td>Syn fil yn, nosew noret othsing nov50i yarn nesoi</td>
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<td>540251</td>
<td>Nylon filament yn twist &gt;50 turns/m nt retail sale</td>
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<td>540252</td>
<td>Polyester fila yn twist &gt;50 turns/m nt retail sale</td>
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<td>540259</td>
<td>Syn fila yarn exc nylon/polyester twist &gt;50 turns/m</td>
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<td>Nylon filament yarn multiple/cabled nt retail sale</td>
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<td>540262</td>
<td>Polyesters filmt yn multiple/cabled nt retail sale</td>
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<td>540269</td>
<td>Syn fila yn exc nylon/polyesters multiple/cabled</td>
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<td>540310</td>
<td>Art fil yn ex sew no ret hi ten visc rayon</td>
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<td>540320</td>
<td>Art fil yarn exc sew no retail, text yarn</td>
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<td>540331</td>
<td>Art fil yarn exc sew no retail sing visc rayon</td>
<td>YMN</td>
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<td>Viscose rayon twist &gt;120 turns/m yn nt retail sale</td>
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<td>540333</td>
<td>Art fil yarn exc sew no retail sing cell acetate</td>
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<td>540339</td>
<td>Art fil yn exc sew no ret single yn nesoi</td>
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<td>Viscose rayon multiple/cabled not for retail sale</td>
<td>YMN</td>
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<td>540342</td>
<td>Cellulose acetate multiple/cabled not retail sale</td>
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<td>540349</td>
<td>Art fila exp viscose rayon/acetate multiple/cabled</td>
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<td>Synthetic strip width not &gt;5mm</td>
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<td>Art monof, nun67dec crs nov1mm, strip etc nov5mm wd</td>
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<td>Syn fil yn, exc sew thread, for retail sale</td>
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<td>Artificial filament yarn put up for retail sale</td>
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<td>Wov fab syn fil hi ten nylon etc and polyester</td>
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<td>Wov fab syn fil yn spec bonded in layers</td>
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### E.1 Concordance between six digit HS codes and model categories (Continued)

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<td>540742</td>
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<td>540743</td>
<td>Wov fab syn fil yn nesoi 85% nylon etc yarn dyed</td>
<td>FMN</td>
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<tr>
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**Chapter 55: Manmade staple fibres, including yarns and woven fabrics**

| 550110 | Synthetic filament tow of nylon or other polyamide                          | AMN   |
| 550120 | Synthetic filament tow of polyesters                                        | AMN   |
| 550130 | Synthetic filament tow acrylic or modacrylic                                | AMN   |
| 550190 | Synthetic filament tow, nesoi                                               | AMN   |
| 550200 | Artificial filament tow                                                     | AMN   |
| 550310 | Syn stp fib nt crd, cmb or prsd spng, nyl/ ot plym                           | AMN   |
| 550320 | Syn stp fib nt crd, cmb or prsd spng: of polyester                          | AMN   |
| 550330 | Syn stp fib nt crd, cmb or prsd spng, acry/modacry                          | AMN   |
| 550340 | Syn stp fib nt crd, cmb or prsd spng: polyproplene                          | AMN   |
| 550390 | Syn stp fib not card, cmb or prsd spng, nesoi                               | AMN   |
| 550410 | Artif stp fib nt crd, cmb or prsd spng, vis rayon                           | AMN   |
| 550490 | Art stp fib not crd, cmb or prsd spng: oth vis ryn                           | AMN   |

(Continued on next page)
## E.1 Concordance between six digit HS codes and model categories (Continued)

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### E.1 Concordance between six digit HS codes and model categories (Continued)

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### E.1 Concordance between six digit HS codes and model categories (Continued)

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<tr>
<td>551642</td>
<td>Dyed woven fabric, artificial staple fibres, not more than 85% by weight</td>
<td>FMN</td>
</tr>
<tr>
<td>551643</td>
<td>Wool fabric, artificial staple fibres, dyed, not more than 85% by weight, mixed with cotton</td>
<td>FMN</td>
</tr>
<tr>
<td>551644</td>
<td>Printed woven fabric, artificial staple fibres, not more than 85% by weight, mixed with cotton</td>
<td>FMN</td>
</tr>
<tr>
<td>551691</td>
<td>Other unbleached or bleached woven fabrics, artificial staple fibres, nesoi</td>
<td>TMN</td>
</tr>
<tr>
<td>551692</td>
<td>Other dyed woven fabrics, artificial staple fibres, nesoi</td>
<td>TMN</td>
</tr>
<tr>
<td>551693</td>
<td>Other woven fabrics, artificial staple fibres, yarns different colours, nesoi</td>
<td>TMN</td>
</tr>
<tr>
<td>551694</td>
<td>Other printed woven fabrics, artificial staple fibres, nesoi</td>
<td>TMN</td>
</tr>
</tbody>
</table>

---

**Chapter 56: Wadding, felt and nonwovens; special yarns, twine, cordage ropes and cables**

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Codea</th>
</tr>
</thead>
<tbody>
<tr>
<td>560110</td>
<td>Sanitary napkin, tampon, diaper &amp; similar arti wad</td>
<td>TC</td>
</tr>
<tr>
<td>560121</td>
<td>Wadding; other articles of wadding of cotton</td>
<td>TC</td>
</tr>
<tr>
<td>560122</td>
<td>Wadding; other articles of wadding of manmade fibres</td>
<td>TMN</td>
</tr>
<tr>
<td>560129</td>
<td>Wadding; other articles of wadding, nesoi</td>
<td>TMN</td>
</tr>
<tr>
<td>560130</td>
<td>Wadding of textile mat &amp; art thereof, textile fibres dust mill neps</td>
<td>TMN</td>
</tr>
<tr>
<td>560210</td>
<td>Needleloom felt and stitch-bonded fibre fabrics</td>
<td>FCM</td>
</tr>
<tr>
<td>560221</td>
<td>Other felt not impregnated, coated, covered or laminated wool or animal hair</td>
<td>FW</td>
</tr>
<tr>
<td>560229</td>
<td>Other felt not impregnated coated or laminated other textile material</td>
<td>FCM</td>
</tr>
<tr>
<td>560290</td>
<td>Felt, whether or not impregnated, coated, etc., nesoi</td>
<td>FCM</td>
</tr>
<tr>
<td>560300</td>
<td>Nonwovens, whether or not impregnated, coated, etc., nesoi</td>
<td>FCM</td>
</tr>
<tr>
<td>560410</td>
<td>Rub thread and cord textile covered</td>
<td>YCM</td>
</tr>
<tr>
<td>560420</td>
<td>Rub thread &amp; cord, high tenacity yarn polyethylene etc impregnated</td>
<td>YCM</td>
</tr>
<tr>
<td>560490</td>
<td>Rub thread &amp; cord, nesoi</td>
<td>YCM</td>
</tr>
<tr>
<td>560500</td>
<td>Metal yarn, whether or not gimped, texturised or strip-wound</td>
<td>YCM</td>
</tr>
<tr>
<td>560600</td>
<td>Gimped yarn &amp; strip, 5404/5405 chen yrn loop wale-yrn</td>
<td>YCM</td>
</tr>
<tr>
<td>560710</td>
<td>Twine cord rope &amp; cable of jute or other textile bast</td>
<td>TMN</td>
</tr>
<tr>
<td>560721</td>
<td>Twine cord rope cable of sisal binder or baler twine</td>
<td>TMN</td>
</tr>
<tr>
<td>560729</td>
<td>Twine, cord, rope &amp; cable, of sisal fibres, nesoi</td>
<td>TMN</td>
</tr>
<tr>
<td>560730</td>
<td>Twine whet/nt plaited/impreg w/rub abaca/oth hrd fib</td>
<td>TMN</td>
</tr>
<tr>
<td>560741</td>
<td>Twine whet/nt plaited/impreg w/rub polyethylene twine</td>
<td>YCM</td>
</tr>
<tr>
<td>560749</td>
<td>Twine whet/nt plaited/impreg w/rub polyethylene nesoi</td>
<td>YCM</td>
</tr>
<tr>
<td>560750</td>
<td>Twine, cord whet/nt plaited/impreg w/rub other synthetic fibres</td>
<td>YCM</td>
</tr>
<tr>
<td>560790</td>
<td>Twine, cord whet/nt plaited/impreg w/rub/plast nesoi</td>
<td>YCM</td>
</tr>
<tr>
<td>560811</td>
<td>Knotted nett of twine, made up fish net, m-mde mat</td>
<td>FCM</td>
</tr>
</tbody>
</table>

(Continued on next page)
## E.1 Concordance between six digit HS codes and model categories (Continued)

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>560819</td>
<td>Knot net of twine made-up fish net tex mat mmf nesoi</td>
<td>FCM</td>
</tr>
<tr>
<td>560890</td>
<td>Knot net of twine made-up fish net tex mat nesoi</td>
<td>FCM</td>
</tr>
<tr>
<td>560900</td>
<td>Art of yarn like of head 5404/5405 twine or cable nesoi</td>
<td>TMN</td>
</tr>
</tbody>
</table>

**Chapter 57: Carpets and other textile floor coverings**

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>570110</td>
<td>Carpets &amp; other tex floor covr, wool/fine animal hr, knotd</td>
<td>TW</td>
</tr>
<tr>
<td>570190</td>
<td>Carpets &amp; other tex floor covr, other tex materials, knotd</td>
<td>TMN</td>
</tr>
<tr>
<td>570210</td>
<td>Kelem, schumacks, karamanie, &amp; similar hand-woven rugs</td>
<td>TMN</td>
</tr>
<tr>
<td>570220</td>
<td>Floor coverings of coconut fibers (coir), woven</td>
<td>TMN</td>
</tr>
<tr>
<td>570231</td>
<td>Carpets, etc of wool/fine animal hr, pile, not made-up</td>
<td>TW</td>
</tr>
<tr>
<td>570232</td>
<td>Carpets, etc of mmf textile materials, pile, not made-up</td>
<td>TMN</td>
</tr>
<tr>
<td>570239</td>
<td>Carpets, etc of other textile materials, pile, not made-up</td>
<td>TC</td>
</tr>
<tr>
<td>570241</td>
<td>Carpets, etc of wool/fine animal hair, pile, made-up</td>
<td>TW</td>
</tr>
<tr>
<td>570242</td>
<td>Carpets, etc of mmf textile materials, pile, made-up</td>
<td>TMN</td>
</tr>
<tr>
<td>570249</td>
<td>Carpets, etc of other textile materials, pile, made-up, not tufted</td>
<td>TC</td>
</tr>
<tr>
<td>570251</td>
<td>Carpets, etc wool/fine animal hr, wool, not pile/made-up</td>
<td>TW</td>
</tr>
<tr>
<td>570252</td>
<td>Textile carpets, wool no pile, mmf, not made up</td>
<td>TMN</td>
</tr>
<tr>
<td>570259</td>
<td>Carpets, etc of other tex mat, wool, not pile/made-up/tuft</td>
<td>TC</td>
</tr>
<tr>
<td>570291</td>
<td>Carpets, etc wool/fine animal hr, wool, made-up, not pile</td>
<td>TW</td>
</tr>
<tr>
<td>570292</td>
<td>Textile carpets, wool no pile, mmf, made up</td>
<td>TMN</td>
</tr>
<tr>
<td>570299</td>
<td>Carpets, etc of other tex mat, wool, made-up, not pile/tuft</td>
<td>TC</td>
</tr>
<tr>
<td>570310</td>
<td>Textile carpets, tufted, of wool</td>
<td>TW</td>
</tr>
<tr>
<td>570320</td>
<td>Carpets, etc, nylon/other polyamides, tufted, w/n made-up</td>
<td>TMN</td>
</tr>
<tr>
<td>570330</td>
<td>Textile carpets, tufted, mmf except nylon etc</td>
<td>TMN</td>
</tr>
<tr>
<td>570390</td>
<td>Textile carpets, tufted, textile materials nesoi</td>
<td>TMN</td>
</tr>
<tr>
<td>570410</td>
<td>Textile carpets, felt, not tuft, tiles sur nov .3m2</td>
<td>TW</td>
</tr>
<tr>
<td>570490</td>
<td>Textile carpets, felt, not tufted etc. nesoi</td>
<td>TW</td>
</tr>
<tr>
<td>570500</td>
<td>Other carpets &amp; other tex floor cov, whether/not made-up</td>
<td>TC</td>
</tr>
</tbody>
</table>

**Chapter 58: Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings and embroidery**

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>580110</td>
<td>Wov pile &amp; chenille fabrics of wool/fine anim hair</td>
<td>FW</td>
</tr>
<tr>
<td>580121</td>
<td>Wov fabric of cot uncut weft pile</td>
<td>FCM</td>
</tr>
<tr>
<td>580122</td>
<td>Woven pile &amp; chenille fabric of cut corduroy</td>
<td>FCM</td>
</tr>
<tr>
<td>580123</td>
<td>Wov fabric of cot, cut other weft pile</td>
<td>FCM</td>
</tr>
<tr>
<td>580124</td>
<td>Wov pile &amp; chenille fab of cut warp epingle uncut</td>
<td>FCM</td>
</tr>
<tr>
<td>580125</td>
<td>Wov fab cot warp pile fab, cut</td>
<td>FCM</td>
</tr>
<tr>
<td>580126</td>
<td>Wov pile fab &amp; chenille fab cot chenille fabrics</td>
<td>FCM</td>
</tr>
<tr>
<td>580131</td>
<td>Wov fab of m-made fiber uncut pile</td>
<td>FCM</td>
</tr>
<tr>
<td>580132</td>
<td>Wov pile &amp; chenille fab of m-made fab cut corduroy</td>
<td>FCM</td>
</tr>
<tr>
<td>580133</td>
<td>Woven fab of m-made fibers, other weft pile</td>
<td>FCM</td>
</tr>
<tr>
<td>580134</td>
<td>Wov pile &amp; chenille warp pile fab epingle (uncut)</td>
<td>FCM</td>
</tr>
<tr>
<td>580135</td>
<td>Wov fab of m-made faber, cut warp pile</td>
<td>FCM</td>
</tr>
<tr>
<td>580136</td>
<td>Wov pile fab &amp; chenille fab mmf chenille fabrics</td>
<td>FCM</td>
</tr>
<tr>
<td>580190</td>
<td>Wov pile fab &amp; chenille fab other textile material</td>
<td>FMN</td>
</tr>
</tbody>
</table>
### E.1 Concordance between six digit HS codes and model categories (Continued)

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Codea</th>
</tr>
</thead>
<tbody>
<tr>
<td>580211</td>
<td>Terry towel &amp; similar wov fab nt narrow cot unblch</td>
<td>FCM</td>
</tr>
<tr>
<td>580219</td>
<td>Terry towel &amp; similar wov fab nt narrow cot, other</td>
<td>FCM</td>
</tr>
<tr>
<td>580220</td>
<td>Terry towel &amp; sim wov terry fab oth tex ov 30 cm</td>
<td>FCM</td>
</tr>
<tr>
<td>580230</td>
<td>Tufted textile fab, oth than products of head 5703</td>
<td>FCM</td>
</tr>
<tr>
<td>580310</td>
<td>Gauze, nt narrow fabrics of heading 5806: of cot</td>
<td>FCM</td>
</tr>
<tr>
<td>580390</td>
<td>Gauze, over 30 cm wide, textile materials nesoi</td>
<td>FCM</td>
</tr>
<tr>
<td>580410</td>
<td>Tulles &amp; oth net fab nt inc wov, knrt or crotchet fab</td>
<td>FCM</td>
</tr>
<tr>
<td>580421</td>
<td>Lace in pce, strip, motif mechanical made mmf</td>
<td>FCM</td>
</tr>
<tr>
<td>580429</td>
<td>Lace in piece, strips/motifs mech mde oth tex mat</td>
<td>FCM</td>
</tr>
<tr>
<td>580430</td>
<td>Lace in the piece, in strips/motifs handmade lace</td>
<td>FCM</td>
</tr>
<tr>
<td>580500</td>
<td>Hand-wov tapestries wall hang use only&gt;$251/sq mtr</td>
<td>FW</td>
</tr>
<tr>
<td>580610</td>
<td>Wov pile fab (inc terry towel &amp; sim) &amp; chenile fab</td>
<td>FCM</td>
</tr>
<tr>
<td>580620</td>
<td>Nar wov fab nesoi &gt;5% elastomeric yrn/rubber thrd</td>
<td>FCM</td>
</tr>
<tr>
<td>580631</td>
<td>Narrow woven fabrics, nesoi, of cotton</td>
<td>FCM</td>
</tr>
<tr>
<td>580632</td>
<td>Narrow woven fabrics, nesoi, of manmade fibers</td>
<td>FCM</td>
</tr>
<tr>
<td>580639</td>
<td>Other woven fabrics of nesoi textile materials</td>
<td>FCM</td>
</tr>
<tr>
<td>580640</td>
<td>Nar fab warp w/o weft assembled with an adhesive</td>
<td>FCM</td>
</tr>
<tr>
<td>580710</td>
<td>Textile labels, badges etc, not embroidered, woven</td>
<td>TC</td>
</tr>
<tr>
<td>580790</td>
<td>Textile labels, badges etc, not embroid, not woven</td>
<td>TC</td>
</tr>
<tr>
<td>580810</td>
<td>Braid in piece w/o embrod oth than knit/crocheted</td>
<td>FCM</td>
</tr>
<tr>
<td>580890</td>
<td>Orn trim pc w/o embrod n/kt croc, tasel, pom, etc</td>
<td>FCM</td>
</tr>
<tr>
<td>580900</td>
<td>Woven fabrics of metal thread &amp; metalized yarn nec</td>
<td>FCM</td>
</tr>
<tr>
<td>581010</td>
<td>Embroidery without visible ground</td>
<td>FCM</td>
</tr>
<tr>
<td>581091</td>
<td>Embrod in pe, strip or motifs: oth embrod of cot</td>
<td>FC</td>
</tr>
<tr>
<td>581092</td>
<td>Embrod in pc, strip or motifs of mmf</td>
<td>TMN</td>
</tr>
<tr>
<td>581099</td>
<td>Embrod pe, strip/motif: oth embrod nesoi tex mat</td>
<td>FW</td>
</tr>
<tr>
<td>581100</td>
<td>Quilt tex prod pe 1&gt; layr w/pad stch n/embr h 5810</td>
<td>FCM</td>
</tr>
</tbody>
</table>

### Chapter 59: Impregnated, coated, covered or laminated textile fabrics

| 590110 | Textl fabrc, coatd w-gum/amylic, outer cover of books | FCM |
| 590190 | Tracing cloth;preprd paintg canvas,buckram-hat fnd | FCM |
| 590210 | Tire cord fabric of high tenacity yarn, nylon etc | FCM |
| 590220 | Tire cord fabric of high tenacity yarn, polyesters | FCM |
| 590290 | Tire cord fabric of high tenacity yarn, visc rayon | FCM |
| 590310 | Textile fabrics, impregnated etc nesoi with pvc | FCM |
| 590320 | Textile fabrics, impregn etc nesoi, polyurethane | FCM |
| 590390 | Textile fabrics, impregn etc nesoi, plastics nesoi | FCM |
| 590410 | Linoleum, whether or not cut to shape | NA |
| 590491 | Floor coverings coated etc on a non woven base | NA |
| 590492 | Floor covering coated etc on a nonwoven base nesoi | NA |
| 590500 | Textile wall coverings | NA |
| 590610 | Adhesive tape not over 20 cm wide | NA |
| 590691 | Rubberized textile fabrics nesoi, knrt or crotchet | FCM |
| 590699 | Rubberized text fabric nesoi, not knrt or crotchet | FCM |

(Continued on next page)
### E.1 Concordance between six digit HS codes and model categories (Continued)

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Codea</th>
</tr>
</thead>
<tbody>
<tr>
<td>590700</td>
<td>Textile fabric, coatd, etc, theatrc scenery, back-cloths</td>
<td>FCM</td>
</tr>
<tr>
<td>590800</td>
<td>Textile wicks for lamps etc and gas mantles etc</td>
<td>NA</td>
</tr>
<tr>
<td>590900</td>
<td>Textile hosepiping and similar textile tubing</td>
<td>NA</td>
</tr>
<tr>
<td>591000</td>
<td>Transmssn/convyr belts, tex matri, whthr/not reinfrcd</td>
<td>NA</td>
</tr>
<tr>
<td>591110</td>
<td>Text fabric for card clothing &amp; other tech uses</td>
<td>NA</td>
</tr>
<tr>
<td>591120</td>
<td>Bolting cloth, whether or not made-up</td>
<td>FCM</td>
</tr>
<tr>
<td>591131</td>
<td>Textile fabrics etc, papermaking, under 650 g/m2</td>
<td>NA</td>
</tr>
<tr>
<td>591132</td>
<td>Textile fabrics etc, papermaking, 650 g/m2 or more</td>
<td>NA</td>
</tr>
<tr>
<td>591140</td>
<td>Textile straining cloth used in oil presses etc</td>
<td>NA</td>
</tr>
<tr>
<td>591190</td>
<td>Textile products etc for technical uses nesoi</td>
<td>NA</td>
</tr>
</tbody>
</table>

**Chapter 60: Knitted or crocheted fabrics**

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Codea</th>
</tr>
</thead>
<tbody>
<tr>
<td>600110</td>
<td>Long pile fabrics, knitted or crocheted</td>
<td>FCM</td>
</tr>
<tr>
<td>600121</td>
<td>Looped pile fabrics of cotton, knitted or crocheted</td>
<td>FCM</td>
</tr>
<tr>
<td>600122</td>
<td>Looped pile fabrics man-made fiber, knit or crochet</td>
<td>FCM</td>
</tr>
<tr>
<td>600129</td>
<td>Looped pile fabrics other tex mat, knit or crochet</td>
<td>FW</td>
</tr>
<tr>
<td>600191</td>
<td>Other pile fabrics of cotton, knitted or crocheted</td>
<td>FCM</td>
</tr>
<tr>
<td>600192</td>
<td>Oth pile fabrics, man-made fibers, knitted/crocheted</td>
<td>FCM</td>
</tr>
<tr>
<td>600199</td>
<td>Other pile fabric other textile matri knit/crochet</td>
<td>FW</td>
</tr>
<tr>
<td>600210</td>
<td>Knit or croch fab, nov30cm nun5% elast yn etc</td>
<td>FCM</td>
</tr>
<tr>
<td>600220</td>
<td>Knit or crochet fabric nesoi, not over 30 cm wide</td>
<td>FCM</td>
</tr>
<tr>
<td>600230</td>
<td>Oth kn/hchet fab &gt;5% elastomr yrn/rubr thrd</td>
<td>FCM</td>
</tr>
<tr>
<td>600241</td>
<td>Other warp knit fabric of wool or fine animal hair</td>
<td>FW</td>
</tr>
<tr>
<td>600242</td>
<td>Other warp knit fabrics(including galloon)of cotton</td>
<td>FCM</td>
</tr>
<tr>
<td>600243</td>
<td>Other warp knit fabric(incl galloon)man-made fiber</td>
<td>FCM</td>
</tr>
<tr>
<td>600249</td>
<td>Other warp knit fabrics (including galloon); other</td>
<td>TMN</td>
</tr>
<tr>
<td>600291</td>
<td>Oth knit/crochet fab, wool/fine animal hair nesoi</td>
<td>FW</td>
</tr>
<tr>
<td>600292</td>
<td>Other knitted or crocheted fabrics of cotton, nesoi</td>
<td>FCM</td>
</tr>
<tr>
<td>600293</td>
<td>Oth knit/croch fabric nesoi, manmade fibers</td>
<td>FCM</td>
</tr>
<tr>
<td>600299</td>
<td>Oth knit/crochet fabric oth textile materials, nesoi</td>
<td>TMN</td>
</tr>
</tbody>
</table>

**Chapter 61: Apparel articles and accessories, knitted or crocheted**

<table>
<thead>
<tr>
<th>HS6</th>
<th>Description</th>
<th>Codea</th>
</tr>
</thead>
<tbody>
<tr>
<td>610110</td>
<td>M/b overcoats, carcoats, etc of wool, knit</td>
<td>GW</td>
</tr>
<tr>
<td>610120</td>
<td>M/b overcoats carcoats &amp; similar art cotton, knit</td>
<td>GC</td>
</tr>
<tr>
<td>610130</td>
<td>M/b overcoats carcoats &amp; similar art mmf, knit</td>
<td>GMN</td>
</tr>
<tr>
<td>610190</td>
<td>M/b overcoats carcoats &amp; smlr art ot tex mat, knit</td>
<td>GMN</td>
</tr>
<tr>
<td>610210</td>
<td>W/g overcoats, carcoats, etc of wool, knit</td>
<td>GW</td>
</tr>
<tr>
<td>610220</td>
<td>W/g overcoat carcoat &amp; similar art cotton, knit</td>
<td>GC</td>
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<tr>
<td>610230</td>
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<td>Men's or boys' suits of wool, knit</td>
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<tr>
<td>610312</td>
<td>Men's or boys' suits of synthetic fibers, knitted</td>
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<td>610319</td>
<td>Men's or boys' suits, knit etc, textile mat nesoi</td>
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<td>610321</td>
<td>M/b ensembles of wool, knit</td>
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<tr>
<td>610322</td>
<td>Men's or boys' ensembles of cotton, knitted or cro</td>
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### E.1 Concordance between six digit HS codes and model categories

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<tr>
<td>610331</td>
<td>M/b suit-type jackets and blazers of wool, knit</td>
<td>GW</td>
</tr>
<tr>
<td>610332</td>
<td>M/b suit-type jackets and blazers of cotton, knit</td>
<td>GC</td>
</tr>
<tr>
<td>610333</td>
<td>M/b suit-type jacket &amp; blazer synthetic fiber, knit</td>
<td>GMN</td>
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<tr>
<td>610339</td>
<td>Men's or boys' suit-ty jac, knit etc, text nesoi</td>
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<tr>
<td>610341</td>
<td>M/b trouser_overalls shorts etc wool, knit</td>
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</tr>
<tr>
<td>610342</td>
<td>M/b trousers overalls shorts etc cotton, knit</td>
<td>GC</td>
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<tr>
<td>610343</td>
<td>M/b trousers overalls shorts etc syn fibers, knit</td>
<td>GMN</td>
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<td>610349</td>
<td>Men's or boys' trousers etc, knit etc, text nesoi</td>
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<td>W/g suits of wool, knit</td>
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<td>610412</td>
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<td>W/g ensembles of wool, knit</td>
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<td>610432</td>
<td>W/g suit-type jackets and blazers of cotton, knit</td>
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<td>W/g suit-type jackets/blazers synthetic fiber, knit</td>
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<td>610442</td>
<td>Women's or girls' dresses of cotton, knitted or cr</td>
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<td>Women's or girls' dresses synthetic fibers, knit</td>
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<td>Women's or girls' dresses artificial fibers, knit</td>
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<td>Women's or girls' dresses of text mtrl nesoi, knit</td>
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<td>W/g skirts and divided skirts of wool, knit</td>
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<td>610452</td>
<td>W/g skirts and divided skirts of cotton, knit</td>
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<tr>
<td>610453</td>
<td>W/g skirts &amp; divided skirts of synthetic fib, knit</td>
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<td>610459</td>
<td>Women's or girls' skirts etc knit etc, text nesoi</td>
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<td>610462</td>
<td>W/g trousers overalls breeches shorts cotton, knit</td>
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<tr>
<td>610463</td>
<td>W/g trouser overall breeches shorts syn fib, knit</td>
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<td>610469</td>
<td>Women's or girls' trousers etc knit etc, tex nesoi</td>
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<td>610510</td>
<td>Men's or boys' shirts of cotton, knitted or croche</td>
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<tr>
<td>610520</td>
<td>Men's or boys' shirts of manmade fibers, knitted o</td>
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<tr>
<td>610590</td>
<td>Men's/boys' shirts of textile material nesoi, knit</td>
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<td>610610</td>
<td>Women's or girls' blouses and shirts cotton, knit</td>
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<td>Women's or girls' blouses/shirts manmade fib, knit</td>
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<td>610711</td>
<td>Men's or boys' underpants and briefs cotton, knit</td>
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<tr>
<td>610712</td>
<td>Men's/boys' underpants &amp; briefs manmade fiber, knit</td>
<td>GMN</td>
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(Continued on next page)
### E.1 Concordance between six digit HS codes and model categories

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<th>Description</th>
<th>Code</th>
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<td>Men's or boys' nightshirt and pajamas cotton, knit</td>
<td>GC</td>
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<td>610722</td>
<td>Men's/boys' nightshirt and pajamas manmade fib, kt</td>
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<td>610729</td>
<td>M/b nightshirts &amp; pajamas of textile materials, kt</td>
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<td>Men's or boys' bathrobes and similar art cotton, kt</td>
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<td>610792</td>
<td>M/b bathrobes and similar article manmade fib, kt</td>
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<td>610799</td>
<td>M/b bathrobes &amp; similar art of text mat nesoi, kt</td>
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<tr>
<td>610811</td>
<td>Women's/girls' slips &amp; petticoats manmade fib, kt</td>
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<td>610819</td>
<td>W/g slips and petticoats of textile materials, kt</td>
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<td>Women's or girls' briefs and panties cotton, knit</td>
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<td>610822</td>
<td>Women's/girls' briefs &amp; panties manmade fiber, kt</td>
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<td>610829</td>
<td>W/g briefs &amp; panties of textile mat nesoi, knit</td>
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<td>610831</td>
<td>W/g nightdresses &amp; pajamas of cotton, knit</td>
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<td>W/g nightdresses &amp; pajamas manmade fibers, knit</td>
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<td>W/g negligees bathrobes &amp; similar art cotton, knit</td>
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<td>W/g negligees bathrobes &amp; similar art mmf, knit</td>
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<td>610910</td>
<td>T-shirts, singlets, tank tops etc, knit etc cotton</td>
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<tr>
<td>610990</td>
<td>T-shirts, singlets etc, knit etc, textiles nesoi</td>
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<td>611010</td>
<td>Sweaters, pullovers etc, knit etc, wool</td>
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<tr>
<td>611020</td>
<td>Sweaters, pullovers etc, knit etc, cotton</td>
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<tr>
<td>611030</td>
<td>Sweaters, pullovers etc, knit etc, manmade fibers</td>
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<td>611090</td>
<td>Sweaters, pullovers etc, knit etc, textiles nesoi</td>
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<td>611110</td>
<td>Babies' garments &amp; clothing access of wool, knit</td>
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<td>611120</td>
<td>Babies' garments &amp; clothing access of cotton, knit</td>
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<td>611130</td>
<td>Babies' garments &amp; clothing access syn fibers, knit</td>
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<td>Babies' garments etc, knit etc, textiles nesoi</td>
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<td>Track &amp; warm-up suits etc, knit etc, cotton</td>
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<td>611212</td>
<td>Track &amp; warm-up suits etc, knit etc, synth fibers</td>
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<td>Track &amp; warm-up suits etc, knit etc, textile nesoi</td>
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<tr>
<td>611220</td>
<td>Ski suits, knitted or crocheted</td>
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<td>611231</td>
<td>Men's or boys' swimwear of synthetic fibers, knit</td>
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<td>611239</td>
<td>M/b swimwear of other textile materials, knit</td>
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<td>W/g swimwear of other textile materials, knit</td>
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<td>611300</td>
<td>Garments, knit etc, coated etc rubber, plastic etc</td>
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<td>Other garments of wool or fine animal hair, knitte</td>
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<td>611420</td>
<td>Other garments of cotton, knitted or crocheted</td>
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<tr>
<td>611430</td>
<td>Other garments of manmade fibers, knitted or croch</td>
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<tr>
<td>611490</td>
<td>Other garments of other textile materials, knitted</td>
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<td>611511</td>
<td>Panty hose &amp; tght syn fib meas &lt;67 dctx/syn, knit</td>
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<td>611512</td>
<td>Panty hose &amp; tght syn fib 67 dctx or more/syn, knit</td>
<td>GMN</td>
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## E.1 Concordance between six digit HS codes and model categories

(Continued)

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<td>Pantyhose &amp; tights tex material ex synthetic, knit</td>
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<td>611520</td>
<td>Women's hosiery &lt; 67 dctx/singl yarn, knit</td>
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<td>Socks &amp; ot hosry &amp; ftwr w/out appld sls wool, knit</td>
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<td>611592</td>
<td>Socks &amp; other hosiery nesoi of cotton, knit</td>
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<td>611593</td>
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<td>Socks &amp; other hosiery textile materials nesoi, kt</td>
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<td>Gloves impreg ctd or cov w plas/rubber, knit</td>
<td>GMN</td>
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<tr>
<td>611691</td>
<td>Mittens and mitts of wool, knitted</td>
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<tr>
<td>611692</td>
<td>Gloves, mittens and mitts of cotton, knitted or cr</td>
<td>GC</td>
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<tr>
<td>611693</td>
<td>Gloves, mittens and mitts synthetic fibers, knit</td>
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<tr>
<td>611699</td>
<td>Gloves, mittens &amp; mitts other textile mtrl, knit</td>
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<td>611710</td>
<td>Shawls, scarves, mufflers, veils &amp; the like, knit</td>
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<td>Ties, bow ties and cravats, knitted or crocheted</td>
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<td>Other made-up clothing accessories, knitted or cro</td>
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<tr>
<td>611790</td>
<td>Parts of garments or of clothing accessories, knit</td>
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### Chapter 62: Apparel articles and accessories, not knitted or crocheted

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<td>620112</td>
<td>Men's or boys' overcoats etc, not knit, cotton</td>
<td>GC</td>
</tr>
<tr>
<td>620113</td>
<td>Men's or boys' overcoats etc, not knit, mmmd fiber</td>
<td>GMN</td>
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<tr>
<td>620119</td>
<td>M/b overcoats carcoats smlr art ot tex mtrl, nt kt</td>
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<td>620191</td>
<td>M/b anoraks, ski jackets &amp; smlr art wool, not knit</td>
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<tr>
<td>620192</td>
<td>M/b anoraks, ski jackets &amp; smlr art cotton, nt kt</td>
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<td>M/b anoraks ski jackets &amp; smlr art manmade fib, nkt</td>
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<td>620211</td>
<td>W/g overcoats raincoats &amp; smlr article wool, n kt</td>
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<td>Women's or girls' overcoats etc, not knit, mm fib</td>
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<tr>
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<td>W/g overcoats &amp; similar coats ot tex mtrl, n knit</td>
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<td>620233</td>
<td>W/g anoraks ski jackets &amp; smlr articles mmf, n kt</td>
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<td>W/g anoraks ski jacket &amp; smlr art ot tex mtrl, n kt</td>
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<td>620311</td>
<td>Men's or boys' suits of wool, not knit</td>
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<td>620312</td>
<td>Men's or boys' suits of synthetic fibers, not knit</td>
<td>GMN</td>
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<tr>
<td>620319</td>
<td>Men's or boys' suits of textile mat nesoi, n knit</td>
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<tr>
<td>620321</td>
<td>Men's or boys' ensembles of wool, not knitted</td>
<td>GW</td>
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<tr>
<td>620322</td>
<td>Men's or boys' ensembles of cotton, not knitted or</td>
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<tr>
<td>620323</td>
<td>Men's or boys' ensembles synthetic fibers, nt knit</td>
<td>GMN</td>
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<td>620329</td>
<td>Men's or boys' ensembles, not knit, textiles nesoi</td>
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<td>620331</td>
<td>M/b suit-type jackets and blazers of wool, nt knit</td>
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<td>620332</td>
<td>Men's/boys' suit-type jackets &amp; blazers cot, n kt</td>
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<td>620333</td>
<td>M/b suit-type jackets &amp; blazers synthetic fib, n kt</td>
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<td>620339</td>
<td>Men's or boys' suit-ty jac, not knit, text nesoi</td>
<td>GMN</td>
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(Continued on next page)
### E.1 Concordance between six digit HS codes and model categories (Continued)

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<th>Description</th>
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<tbody>
<tr>
<td>620341</td>
<td>M/b trouser overalls breeches shorts wool, nt knit</td>
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<tr>
<td>620342</td>
<td>Men's or boys' trousers etc, not knit, cotton</td>
<td>GC</td>
</tr>
<tr>
<td>620343</td>
<td>Men's or boys' trousers etc, not knit, synth fiber</td>
<td>GMN</td>
</tr>
<tr>
<td>620349</td>
<td>Men's or boys' trousers etc, not knit, text nesoi</td>
<td>GMN</td>
</tr>
<tr>
<td>620411</td>
<td>W/g suits of wool, not knit</td>
<td>GW</td>
</tr>
<tr>
<td>620412</td>
<td>Women's or girls' suits of cotton, not knitted or</td>
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</tr>
<tr>
<td>620413</td>
<td>Women's or girls' suits synthetic fibers, not knity</td>
<td>GMN</td>
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<tr>
<td>620419</td>
<td>Women's or girls' suits, not knit, textiles nesoi</td>
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<td>620421</td>
<td>Women's or girls' ensembles of wool, not knit</td>
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<tr>
<td>620422</td>
<td>Women's or girls' ensembles of cotton, not knitted</td>
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<td>620530</td>
<td>Men's or boys' shirts, not knit, manmade fibers</td>
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<td>620590</td>
<td>Men's or boys shirts of textile materials, nt knit</td>
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<td>620610</td>
<td>W/g blouses, shirts and shirt blouses silk, nt kt</td>
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<td>620620</td>
<td>W/g blouses, shirts and shirt blouses wool, nt kt</td>
<td>GW</td>
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<tr>
<td>620630</td>
<td>W/g blouses shirts &amp; shirt blouses cotton, not kniit</td>
<td>GC</td>
</tr>
<tr>
<td>620640</td>
<td>W/g blouses, shirts &amp; shirt blouses mmf, not kniit</td>
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<tr>
<td>620690</td>
<td>W/g blouses shirts etc ot textile materials, nt kt</td>
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<td>620711</td>
<td>M/b underpants and briefs of cotton, not kniit</td>
<td>GC</td>
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<tr>
<td>620719</td>
<td>M/b underpants and briefs of textile mtrl, not kniit</td>
<td>GMN</td>
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<td>620721</td>
<td>M/b nightshirts and pajamas of cotton, not kniit</td>
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<tr>
<td>620722</td>
<td>M/b nightshirts &amp; pajamas manmade fibers, not kniit</td>
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</tr>
<tr>
<td>620729</td>
<td>M/b nightshirts &amp; pajamas ot textile mtrl, nt kniit</td>
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(Continued on next page)
### E.1 Concordance between six digit HS codes and model categories (Continued)

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<td>Men’s or boys’ singlets etc, not knit, text nesoi</td>
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<tr>
<td>620811</td>
<td>M/g slips and petticoats manmade fibers, not knit</td>
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</tr>
<tr>
<td>620819</td>
<td>M/g slips &amp; petticoats of textile materials, n kt</td>
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<tr>
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<td>M/g nightdresses and pajamas cotton, not knit</td>
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</tr>
<tr>
<td>620822</td>
<td>M/g nightdresses &amp; pajamas manmade fibers, not knitted</td>
<td>GMN</td>
</tr>
<tr>
<td>620829</td>
<td>W/g nightdress &amp; pajamas of textile material, n knit</td>
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</tr>
<tr>
<td>620891</td>
<td>Women’s or girls’ undshirts etc, not knit, cotton</td>
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<tr>
<td>620892</td>
<td>Women’s or girls’ undshirts etc, not knit, mm fibr</td>
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<td>Women’s or girls’ undshirt etc, no knit, tex nesoi</td>
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<td>Babies’ grmnt &amp; clthing accessories wool, not knit</td>
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<tr>
<td>620920</td>
<td>Babies’ garments &amp; clthing access cotton, not knit</td>
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<tr>
<td>620930</td>
<td>Babies’ garments/clthing access syn fibers, not knit</td>
<td>GMN</td>
</tr>
<tr>
<td>620990</td>
<td>Babies’ garments/clthing access of textile material, not kni</td>
<td>GMN</td>
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<td>Garments of fabric of felts/nonwoven</td>
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<td>M/b overcoats etc felts nonwoven impregn tex f, n kt</td>
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<tr>
<td>621030</td>
<td>W/g overcoat etc impregnated, rubberized etc. n kt</td>
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<tr>
<td>621040</td>
<td>Men’s or boys’ garments, not knit, coated etc</td>
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<tr>
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<td>Women’s or girls’ garments, not knit, coated etc</td>
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<td>621111</td>
<td>Men’s or boys’ swimwear, not knitted or crocheted</td>
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<td>621112</td>
<td>Women’s or girls’ swimwear, not knitted or crochet</td>
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<tr>
<td>621120</td>
<td>Ski-suits, not knitted or crocheted</td>
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<td>Men’s or boys’ other garments of wool, not knit</td>
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<td>621132</td>
<td>Men’s or boys’ other garments of cotton, not knitt</td>
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<tr>
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<td>Men’s or boys’ other garments manmade fibers, n kt</td>
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<tr>
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<td>621142</td>
<td>Oth gar wom grls cotton ex track ski-suits swmwer</td>
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<tr>
<td>621143</td>
<td>Oth gar wom grls mm fib ex track ski-suits swmwer</td>
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<td>621149</td>
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<td>Brassieres, knit or crocheted or not</td>
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<td>621220</td>
<td>Girdles &amp; panty girdles, knit or crocheted or not</td>
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<td>621230</td>
<td>Corsets, knitted or crocheted or not</td>
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<td>621290</td>
<td>Braces suspenders garters art parts kt o ct nesoi</td>
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<tr>
<td>621310</td>
<td>Handkerchiefs, of silk or silk waste</td>
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<tr>
<td>621320</td>
<td>Handkerchiefs, of cotton</td>
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<tr>
<td>621390</td>
<td>Handkerchiefs, of other textile materials</td>
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<td>Shawls scarves mufflers mantillas silk silk waste</td>
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<td>621420</td>
<td>Shawls scarves and the like of wool, not knit</td>
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<td>Shawls scarves and the like of synthetic fib, n kt</td>
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### E.1 Concordance between six digit HS codes and model categories

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<th>Code</th>
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<td>Ties bow ties and cravats manmade fibers, nt knit</td>
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<tr>
<td>621590</td>
<td>Ties, bow ties and cravats, of oth textile materl</td>
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<tr>
<td>621600</td>
<td>Gloves, mittens and mitts, not knit or crocheted</td>
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<td>Oth made-up clothing access part gar access nesoi</td>
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<td>621790</td>
<td>Parts of garments and clothing accessories, nesoi</td>
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#### Chapter 63: Other textile articles; needlecraft sets; worn clothing and textile articles

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<td>Blankets (nt elec) &amp; travelling rugs of wool hair</td>
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<tr>
<td>630130</td>
<td>Blankets (nt elec) &amp; travelling rugs of cotton</td>
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<td>Blanket (nt elec) &amp; traveling rugs of synthetic fib</td>
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<td>630221</td>
<td>Bed linen, printed, of cotton, not knit or Crochet</td>
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<td>630222</td>
<td>Bed linen, printed, of manmade fib, not knit etc</td>
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<td>630229</td>
<td>Oth bed linen, printed, of textile materials nesoi</td>
<td>TMN</td>
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<td>630231</td>
<td>Bed linen nesoi, of cotton, not knit or crocheted</td>
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<td>630232</td>
<td>Bed linen nesoi, of manmade fibers, not knit etc</td>
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<tr>
<td>630239</td>
<td>Other bed linen: of nesoi textile materials</td>
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<td>630240</td>
<td>Table linen, knitted or crocheted</td>
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<td>Table linen of cotton, not knitted or crocheted</td>
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<td>630252</td>
<td>Table linen of flax, not knitted or crocheted</td>
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<td>630253</td>
<td>Table linen of manmade fibers, not knit etc</td>
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<td>Toilet &amp; kitchen linen of cotton terry fabrics</td>
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<td>630291</td>
<td>Toilet &amp; kitchen linen of cotton fabric exc terr</td>
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<td>630292</td>
<td>Nesoi bed, table, toilet &amp; kitchen linen of flax</td>
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<td>630293</td>
<td>Toilet &amp; kitchen linen of manmade fibers</td>
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<td>Curtain (drapes) &amp; int blinds/bd val kt/crochet cot</td>
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<td>630312</td>
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<td>Oth furnishing arti exc heading 9404 bedsprd nesoi</td>
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* See appendix table E.2 for description of codes.

Source: CIE.
E.2 Description of model codes

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<td>Cotton fibre</td>
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<td>Man-made and other natural fibres</td>
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<td>Wool yarn</td>
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<td>YC</td>
<td>Cotton yarn</td>
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<td>YMN</td>
<td>Man-made and other natural fibre yarns</td>
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<td>FW</td>
<td>Wool fabric</td>
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<td>FC</td>
<td>Cotton fabric</td>
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<td>Cotton textiles</td>
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<tr>
<td>TMN</td>
<td>Man-made and other natural fibre textiles</td>
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Source: CIE.
References


REFERENCES


McDougall, R, Elbehri, A and Truong, TP (eds) 1998, Global Trade, Assistance and Protection: The GTAP 4 Data Base, Center for Global Trade Analysis, Purdue University, Indiana.


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