ICTSD Project on Tropical Products



How Would A Trade Deal On Cotton Affect Exporting And Importing Countries?

By **Mário Jales,** Cornell University

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International Centre for Trade and Sustainable Development

Issue Paper No. 26

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Published by

International Centre for Trade and Sustainable Development (ICTSD)
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Acknowledgments

This paper has been produced under the ICTSD Programme on Agricultural Trade and Sustainable Development. The activities of this programme have benefited from support from the UK Department for International Development (DFID) and the Dutch Ministry of Foreign Affairs (DGIS). ICTSD is particularly grateful to Sheila Page (Overseas Development Institute) and Romain Benicchio (Oxfam International) for their comments on earlier drafts of this paper, as well as all the participants who expressed views and made suggestions at a meeting with the author on 20 November 2009.

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Citation: Jales, M, (2010), *How would a WTO Agreement on Cotton Affect Importing and Exporting Countries?* ICTSD Programme on Agricultural Trade and Sustainable Development Issue Paper No. 26, International Centre for Trade and Sustainable Development, Geneva, Switzerland.

ISSN 1994-6856

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

AMS	Aggregate measurement of support
C-4	Cotton Four group (Benin, Burkina Faso, Chad and Mali)
CAP	Common Agricultural Policy
CCP	Counter-cyclical payment
DDA	Doha Development Agenda
DP	Direct payment
DSB	Dispute Settlement Body
DSU	Dispute Settlement Understanding
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organization
FAPRI	Food and Agricultural Policy Research Institute
GATS	General Agreement on Trade in Services
GSM	General sales manager
HS	Harmonized Commodity Description and Coding System
ICAC	International Cotton Advisory Committee
Kg	Kilogram
LDC	Least-developed country
LDP	Loan deficiency program
MFN	Most-favoured nation
MLA	Market loss assistance payment
NFIDC	Net food importing developing country
OECD	Organisation for Economic Cooperation and Development
PFC	Production flexibility payment
RAM	Recently-acceded member
ROW	Rest of the world
SCGP	Supplier credit guarantee programme
SFP	Single farm payment
SLIRAM	Small low-income recently-acceded member
TRIPS	Trade-Related Aspects of Intellectual Property Rights
TRQ	Tariff-rate quota
US	United States
USD	United States dollar
USDA	United States Department of Agriculture
VRAM	Very recently-acceded member
WTO	World Trade Organization

FOREWORD

Cotton has proved to be one of the most controversial issues in the current Doha Round of multilateral trade negotiations. Historically, the substantial subsidies provided by developed country producers – primarily the US and EU – have artificially depressed world prices, undermining the viability of otherwise competitive but unsubsidised producers in the developing world. West African countries in particular have championed reform of the existing system, with the 'C-4' group (Benin, Burkina Faso, Chad and Mali) making cotton a 'make or break' topic in the ongoing talks.

The issue came to dominate the Cancún Ministerial Conference in 2003, with the failure of developed countries to make significant concessions widely seen as a contributing factor to the breakdown of the meeting. The Hong Kong Ministerial Conference, two years later, confirmed Members' intention "to address cotton ambitiously, expeditiously and specifically". However, the issue has subsequently languished, with the US in particular insisting that it could not be resolved until agreement had been reached on other aspects of the agriculture modalities. In the absence of any counter-proposal from the US or EU, the current draft text produced by the chair of the agriculture negotiations simply reproduces the C-4 submission, although the US has indicated that this proposal is unacceptable to them.

Parallel to the efforts to address cotton subsidies through the Doha negotiations, a number of countries have also sought to reduce trade distortion for this product through the WTO's dispute settlement process. The US-Brazil Upland Cotton dispute (DS267), initiated by Brazil but supported also by a number of other countries as third parties, resulted in some specific findings about the inconsistency of various US cotton subsidies with existing WTO rules. The US has subsequently taken various steps to reform some of its cotton payments, although the WTO has found that these were largely insufficient. The US has also continued to notify its direct payments under the WTO's 'green box', even though the WTO's adjudicative bodies found that these were non-compliant. Furthermore, the case in turn has prompted further complaints from Canada and Brazil, which have claimed that US amber box spending had therefore exceeded Uruguay Round bindings in several of the years for which notifications had been made.

The recently-announced process to resolve the dispute, on the eve of punitive retaliatory trade measures that Brazil was due to impose on the US, could leave African countries dependent on a negotiated settlement at the WTO. Under the bilateral accord, the US has agreed to review its export credit programme and provide USD 150 million in compensation to Brazilian producers - leaving cuts to the controversial 'countercylical' payments and marketing loan payment programmes to be discussed in subsequent talks.

In an attempt to overcome the current impasse in this area, this paper aims to provide policy-makers, negotiators and other stakeholders with a clear and accurate assessment of the likely implications of a trade deal on cotton along the lines of that being discussed in the WTO's Doha Round. The study also examines the implications of various alternative trade policy scenarios, taking into consideration recent historical trends in cotton prices, production and trade in different countries and geographical regions, and analyses the relevance of internal policy reforms in the EU and the US in particular.

Ricardo Meléndez-Ortiz
Chief Executive, ICTSD

EXECUTIVE SUMMARY

The WTO Doha Round could have a significant positive impact on world cotton prices and contribute to the expansion of cotton production and exports in developing countries. However, the likelihood of such an outcome is highly dependent on the depth of the subsidy reductions adopted by WTO members. The poor record of internal policy reforms in key subsidizing countries and the failure of the US to comply with recommendations from the WTO Dispute Settlement Body (DSB) highlight the importance of multilateral trade negotiations in addressing the profound distortions that characterize the world cotton market.

Cotton has proved to be one of the most politically sensitive issues in the Doha Round. Substantial subsidies provided by developed countries have continued to depress world prices and undermine the viability of otherwise competitive producers in the developing world. Cotton-exporting West African countries in particular have championed reform of the existing system. Collectively known as the Cotton Four (C-4), Benin, Burkina Faso, Chad and Mali have denounced the deleterious effects of cotton subsidies on poverty and food security and called for the establishment of a mechanism to phase out support for cotton. Nevertheless, due to little concrete engagement by subsidizing countries, the issue has languished.

In parallel to the efforts to address cotton subsidies through the Doha negotiations, countries have also sought to reduce trade distortions through the DSB. The *US Upland Cotton* dispute initiated by Brazil has led to significant developments in WTO jurisprudence on subsidies in general, as well as specific findings about the illegality of various US cotton subsidies under existing WTO rules. Meanwhile, unilateral domestic policy reforms in the EU and US have had limited if any impact on world cotton markets. The 2003-04 reform of the EU Common Agricultural Policy (CAP) changed the guaranteed minimum price for cotton to a mix of coupled and allegedly decoupled payments. In the US, the 2008 Farm Bill kept cotton subsidies largely unchanged, indicating an unwillingness to comply with the DSB panel rulings or the mandates from the Hong Kong Ministerial Declaration.

The paper assesses the likely implications for exporting and importing countries from a trade deal in cotton. The study estimates the price, production and trade effects of reforming cotton subsidies and tariffs under alternative scenarios, with a primary focus on the WTO Doha Round. For each scenario, the model simulates the prices and quantities that would have obtained in a base year had the policy reforms implied by the given scenario been retroactively applied to that year. Simulations cover ten base years (1998-2007) that not only provide a wide variance in prices and subsidy levels but also reflect recent trends in supply and demand.

Scenarios

Five policy reform scenarios are simulated: the first two are alternative reform packages in the context of the Doha Round; the following three are benchmarks to which the potential outcomes of Doha can be contrasted.

Scenario A models the December 2008 Revised Draft Modalities. It contains a number of special provisions applicable exclusively to the cotton sector. Most prominent among them are the more rigorous caps on cotton product-specific AMS and blue box support and the extension of duty- and quota-free access for cotton exports from least-developed countries (LDCs).

Scenario B is also based on the modalities draft, except that it ignores the special cotton provisions and instead subjects cotton to the general disciplines applicable to standard agricultural products. Given that the 2005 Hong Kong Ministerial Declaration established a mandate to reduce cotton subsidies "more ambitiously than under whatever general formula is agreed" for standard products, the outcome of the Doha Round must be more ambitious than Scenario B.

Scenario C models the hypothetical implementation by the US of the DSB recommendations in the *US Upland Cotton* dispute, namely: (i) the withdrawal of export credit guarantees and user marketing payments; and (ii) the removal of the adverse effects of marketing loan programme payments (MLP) and counter-cyclical payments (CCP).

Scenario D models the insufficient measures actually taken by the US in response to the DSB recommendations. Although the US has withdrawn part of its prohibited subsidies, it has done nothing to remove the adverse effects of MLP and CCP.

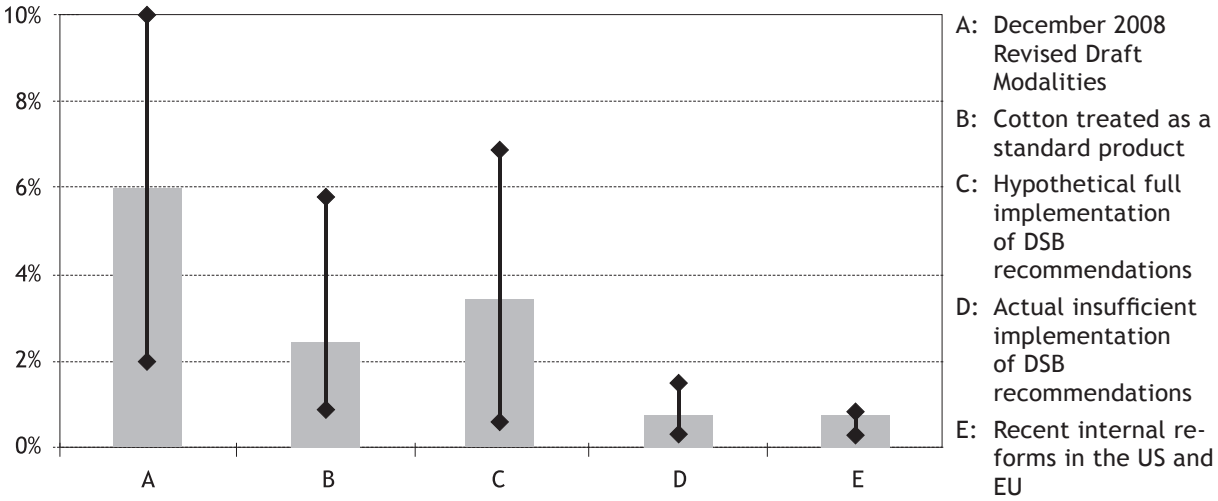
Scenario E abstracts from multilateral negotiations and litigations and focuses on internal reforms in the US and EU. It models policy changes introduced by both the 2008 US Farm Bill and the 2003-04 EU CAP reform.

Impact on Prices

Figure 1 summarizes world price effects for each scenario. Bars indicate average impacts in 1998-2007 and arrows indicate the full range of results. Impacts are moderate to high in Scenario A, lower in Scenarios B and C, and negligible in Scenarios D and E. The substantial variance in results on a year-by-year basis is largely due to the counter-cyclical nature of a considerable share of notified cotton subsidies. Estimated price effects are highest in years with below average world prices and record high trade-distorting domestic support, such as 1999 and 2001.

Had cotton subsidies and tariffs been reduced in 1998-2007 as described in Scenario A, the world price of cotton would have increased by 6 percent on average, with a range between 2 percent and 10 percent. However, had cotton been treated as a standard product (Scenario B), the average world price increase would have been only 2.5 percent. This difference in results is mainly driven by the size of caps on US trade distorting domestic support for cotton in each scenario: USD 510 million in Scenario A (USD 143 in AMS and USD 367 in the blue box) and USD 2,240 million in Scenario B (USD 1,140 million in AMS and USD 1,100 million in the blue box). Since the average trade-distorting support provided to US cotton producers in 1998-2007 was USD 2,248 million, it comes as no surprise that cuts in US subsidies are not very significant in Scenario B. Discarding the special cotton provisions from the modalities text would greatly reduce the potential of the Doha Round to deliver lower subsidy levels and higher world prices for cotton.

Figure 1: Estimated Impact of Alternative Scenarios on the Cotton World Price, 1998–2007 (bar indicates average; vertical line indicates range)



By comparison, the world price of cotton would have increased on average by 3.5 percent in 1998-2007 had the US fully implemented the DSB panel recommendations in the *US Upland Cotton* dispute (Scenario C). The limited actions actually taken by the US in response to the DSB panel recommendations (Scenario D) would have increased the world price on average by only 0.7 percent. Had recent unilateral domestic reforms in US and EU cotton subsidies applied over the entire 1998-2007 period (Scenario E), the world price would have increased by 0.7 percent on average. The EU CAP reform would have accounted for the entirety of this change. The US 2008 Farm Bill alone would have had no impact on the cotton world price.

Impact on Production

Production effects would have varied significantly across countries and scenarios. Output would have decreased in countries that undertake reductions in applied levels of subsidies and tariffs. Elsewhere, production would have increased.

In Scenario A, US and EU cotton production would have declined by 9 percent and 24 percent, respectively. In years with historically low world prices, the decline in US output would have been larger than average (15 percent). In 2001 alone, US production would have declined by 680 thousand metric tonnes, which was more than the combined production volume of the C-4 countries that year. The fall in US and EU production would have been almost fully compensated by output expansion elsewhere. On average, production would have been 2 percent higher in Australia, Brazil, the C-4 countries, Central Asia, Pakistan and Turkey, and 1 percent higher in China and India. More importantly, production value in these countries would have increased by 7-8 percent on average and 11-14 percent in years of peak subsidy levels.

The impact on production would have been significantly smaller in Scenario B. On average, production volumes would have declined by 4 percent in the US and remained unchanged in the EU. Average output expansion in the rest of the world would have been limited: 0.8 percent in Australia, Brazil, the C-4 countries, Central Asia, Pakistan and Turkey, and 0.3 percent in China and India. In Scenario C, US production would have fallen by 7 percent on average. In response, production would have increased by 1-1.3 percent in Australia, Brazil, the C-4 countries, Central Asia, EU, Pakistan and Turkey, and 0.5 percent in China and India. Scenarios D and E would have had negligible effects on production volumes across most countries. The only exception being the EU in Scenario E (output would have fallen on average by 20 percent).

Impact on Trade

Among net exporters, export volumes would have retracted in the US and increased elsewhere (Australia, Brazil, C-4 countries, Central Asia and India). The simultaneous increase in export quantities and world prices would have led to an unambiguous rise in the value of exports for all net exporters except the US. The magnitude of changes in exports would have been largest in Scenario A, moderate in Scenarios B and C, and small or negligible in Scenarios D and E. Countries with large textiles manufacturing sectors (India and Brazil) would have experienced relatively greater expansion in cotton exports.

Among key net importers (Bangladesh, China, Indonesia, Pakistan and Turkey), import volumes would have decreased in every scenario analyzed due to the expansion of domestic output and the retraction of domestic demand. Since reductions in import quantities dominate world price increases, estimated import costs would also have fallen. The magnitude of changes in imports follows the same pattern observed above for exports. EU import quantities and costs would have increased substantially in the scenarios where European production falls (A and E) and remained mostly unchanged in the other scenarios (B, C and D).

Subsidies vs. Tariffs

Virtually all benefits for cotton in the Doha Round will accrue from the reduction of subsidies. There are two reasons why market access will play a marginal role at best. First, the cotton sector already enjoys exceptionally low levels of applied tariffs.[1] Second, only two WTO members (the US and Oman) will have to reduce current applied tariffs as a result of the negotiations. All other countries either: (i) already provide duty-free access, (ii) enjoy significant tariff overhang, or (iii) qualify for tariff-cut exemptions due to their status as LDCs, very recently-acceded members or small low-income recently-acceded members.

The extension by developed countries of duty-free access for cotton exports from LDCs will have little if any impact on market access opportunities for LDCs. First, all developed countries apart from the US already provide duty-free access to cotton imports at a most-favored nation (MFN) basis. Second, as US cotton consumption has plummeted in recent years, the country's share of world cotton imports has collapsed to only 0.05 percent. Moreover, US cotton quotas are consistently under-filled despite the low level of in-quota tariffs (between zero and 3 percent).

In contrast, developing countries account for nearly 95 percent of world cotton imports. Of the top fifteen developing country importers, all but China currently provide duty-free MFN access to cotton. The Doha Round will not significantly alter market access conditions in China since Beijing is likely to exempt cotton from tariff reduction and quota expansion by selecting it as a Special Product. Even if China were not to select cotton as a Special Product, the large tariff overhang would be enough to prevent any effective cut in the applied tariff.

When it comes to cotton, subsidies should be the heart and soul of the negotiations. There is an urgent need to rebalance existing trade rules that permit developed countries to highly subsidize domestic production, depress world prices, push farmers elsewhere out of production and impair prospects for economic advancement in the developing world. The adoption of ambitious domestic support reforms for cotton in the Doha Round would be a significant step towards the establishment of a fair and market-oriented trading system.

1. INTRODUCTION

Cotton has proved to be one of the most politically sensitive issues in the Doha Round of multilateral negotiations at the World Trade Organization (WTO). Substantial subsidies provided by developed countries – primarily the US and EU – have continued to depress world prices and undermine the viability of otherwise competitive producers in the developing world. Cotton-exporting West African countries in particular have championed reform of the existing system. Collectively known as the Cotton Four (C-4), Benin, Burkina Faso, Chad and Mali have denounced the deleterious effects of cotton subsidies on poverty and food security at the farm level and called for the establishment of a mechanism to phase out support for cotton with a view to its total elimination. The issue came to dominate the 2003 Cancún Ministerial Conference, with the failure of developed countries to make significant concessions widely seen as a contributing factor to the breakdown of the meeting. The 2004 Framework for Establishing Modalities in Agriculture (WTO, 2004b) and the 2005 Hong Kong Ministerial Declaration (WTO, 2005a) recognized the vital importance of cotton for developing countries and established a mandate to address it "ambitiously, expeditiously and specifically" within the agricultural negotiations. Nevertheless, the issue has subsequently languished due to little concrete engagement by subsidizing countries. In the absence of any counter-proposal from the US or EU, the December 2008 Revised Draft Modalities for Agriculture (WTO, 2008a) reproduce the C-4 submission.

In parallel to the efforts to address cotton subsidies through the Doha negotiations, countries have also sought to reduce trade distortion in the agricultural sector through the Dispute Settlement Body (DSB) of the WTO. The *US Upland Cotton* dispute initiated by Brazil has led to significant developments in WTO jurisprudence on subsidies in general, as well as specific findings about the illegality of various US cotton subsidies under existing WTO rules. Despite successive DSB rulings against certain aspects of US cotton subsidies, Washington has hitherto failed to bring cotton payments into conformity with WTO obligations. Meanwhile, unilateral domestic policy reforms in the EU and US have had limited if any impact on world cotton markets. The 2003-04 reform of the EU Common Agricultural Policy (CAP) and subsequent amendments changed the guaranteed minimum price for cotton to a mix of coupled and allegedly decoupled payments.[2] In the US, the 2008 Farm Bill kept cotton subsidies largely unchanged and indicated an unwillingness to comply with the DSB panel rulings or the mandates from the Hong Kong Ministerial Declaration.

Cotton was brought to the spotlight in the Doha Round due to its unique development dimension. Three characteristics set it apart from other agricultural products. First, cotton is the single most important agricultural export commodity for least developed countries (LDCs) as a group (Figure 1.1). LDC cotton export earnings were higher than the combined value of bean, sugar, tea, cashew nut and cocoa exports in 2004-07. The share of cotton in total agricultural export receipts in 2004-07 was as high as 80 percent in Burkina Faso, 74 percent in Mali, 59 percent in Benin and 51 percent in Chad (Figure 1.2). Cotton is also an important agricultural export for non-LDC developing countries, most notably in Central Asia. Moreover, cotton is the second most important agricultural export for India, a non-LDC that is home to one third of the world's poor.

Second, cotton is one of the few sectors in which LDCs account for an important share of world exports. Figure 1.3 depicts the shares of LDCs, other developing countries and developed countries in world export quantities in 2003-07 for eight key subsidized agricultural commodities. The share of LDCs in world export quantities is highest for cotton (11 percent), followed by peanuts (3.5 percent). For corn, rice, sorghum, soybeans, sugar and wheat, the share of LDCs in world export quantities is less than 1 percent.

Third, cotton is a highly subsidized commodity in developed countries. Figure 1.4 presents trade-distorting domestic support as a share of the production value for key agricultural products in the US. The average level of subsidization in the US cotton sector in 1998-2007 (50 percent) was at least twice as high as in any other sector except rice. In years with lower cotton world prices, the level of subsidization reached 70-90 percent of the value of production. In the EU, cotton subsidies were on average 71 percent as large as the value of production in 2000-05, with a peak of 140 percent in 2003. Starting in 2006, 65 percent of EU cotton subsidies have been given in the form of decoupled payments. While other agricultural products, such as cocoa and coffee, are also important export commodities for LDCs, they are not subject to subsidization in the developed world.

The present study assesses the likely implications for exporting and importing countries from a trade deal in cotton. It estimates the price, production and trade effects of reforming cotton subsidies and tariffs under alternative scenarios, with a primary focus on the WTO Doha Round. The special cotton provisions of the December 2008 Revised Draft Modalities are contrasted with the general agricultural provisions in the same text, the DSB panel recommendations in the *US Upland Cotton* dispute, and recent internal policy reforms in key subsidizing countries.

Quantitative estimates are derived from a single-commodity, multi-country, partial equilibrium model of cotton trade that builds upon Sumner (2005) and is similar in approach, if not in structure, to Vanzetti and Graham (2002), Tokarick (2003), Poonyth *et al.* (2004), Alston *et al.* (2007) and Cabral and Jales (2008). For each scenario, the model simulates the prices and quantities that would have been obtained in a base year had the policy reforms implied by the given scenario been retroactively applied to that year. The economic model used to assess the likely implications of policy reforms in the cotton sector is described in Annex A.

The model comprises 28 countries or groups of countries, including 12 net cotton exporters (Australia, Benin, Brazil, Burkina Faso, Chad, India, Kazakhstan, Mali, Syria, Turkmenistan, US and Uzbekistan) and 16 net cotton importers (Bangladesh, China, Colombia, EU, Hong Kong, Indonesia, Iran, Japan, Mexico, Pakistan, Singapore, South Korea, Taiwan, Thailand, Turkey and a rest of the world (ROW) aggregate). The countries that are explicitly included in the model represent a very significant portion of world cotton markets. They accounted for 95 percent of world production, 94 percent of world consumption, 91 percent of world exports and 87 percent of world imports in 2004-08.

Simulations cover ten base years between 1998 and 2007, a period that not only provides a wide variance in prices and subsidy levels but also reflects recent trends in supply and demand forces. This analytical time period is longer and more current than the time periods evaluated in previous partial equilibrium models of world cotton markets. The wide range of cotton world prices allows the comparison of the effects of trade policy instruments in years of prevailing low and high prices. Since most previous models are based on pre-2001 data, the current model enriches the debate by incorporating data that reflect recent trends in cotton policies, prices, production, consumption and trade.[3]

A lot has changed in world cotton markets in the last decade. While annual global cotton production was relatively stable at 20 million metric tonnes in 1998-2003, it soared to approximately 26 million metric tonnes in 2004-07 due in large part to remarkable output expansion in China, India and Brazil (Figure 1.5). Between 1998 and 2007, cotton production in these countries increased by 80 percent, 85 percent and 210 percent, respectively. As a result, the shares of individual countries in world cotton production have changed considerably over time. Figure 1.6 compares the average shares of the ten largest cotton producers in 1995-98 and 2004-07. China, India and Brazil

were the only countries that experienced an expansion in their participation in world cotton production. The combined share of these three countries rose from 42 percent in 1998 to 57 percent in 2007. Meanwhile, the share of all other developing countries declined from 35 percent to 25 percent, and that of developed countries from 23 percent to 18 percent.

The composition of world cotton demand by individual countries has also changed remarkably (Figure 1.7). First and foremost, Chinese consumption almost tripled from 4 million metric tonnes in 1998 to 11 million tonnes in 2007. Second, developed country demand retracted from 4 million metric tonnes to 1.7 million metric tonnes in the same period. Finally, while cotton consumption in other Asian developing countries increased by nearly 50 percent in this period, demand in non-Asian developing countries remained mostly unchanged. As a result of these changes in domestic demand, China's share in world cotton consumption nearly doubled from 21 percent in 1998 to 40 percent in 2007 (Figure 1.8). Other Asian developing countries with rising textiles and clothing sectors also increased their shares in world cotton demand, most notably Bangladesh, Vietnam and Pakistan. Meanwhile, the combined share of developed countries in world cotton consumption fell from 23 percent to only 6 percent.

Changes in supply and demand forces around the globe have led to significant adjustments in trade patterns. The sharp fall in domestic consumption and the large levels of domestic and export subsidies in the US have allowed this country to significantly expand its exports (Figures 1.9 and 1.10). In contrast, traditional exporters in Central Asia and Africa have lost market share. India and Brazil, which not long ago were net cotton importers, are now among the world's largest exporters. Substantial changes have also occurred in the import side. While developed countries accounted for 30 percent of world cotton imports in 1998, their share fell to 7 percent in 2007. In contrast, Asian developing countries now account for more than 75 percent of world cotton imports (Figures 1.11 and 1.12). An accurate model of cotton trade must reflect trends in cotton production, consumption and trade by incorporating the most recent data available.

The paper is divided into three sections in addition to this introduction. Section 2 describes five alternative reform scenarios. Section 3 presents the simulation results and analyses their sensitivity to the choice of supply and demand elasticities. Finally, Section 4 summarizes the main findings and concludes.

2. SCENARIOS

In order to assess the likely implications of a multilateral trade deal for cotton, five scenarios are investigated in this study. The first two scenarios represent alternative reform packages in the context of the WTO Doha Round. The following three are benchmarks to which the potential outcomes of the Doha Round can be contrasted, namely the hypothetical complete implementation of DSB panel recommendations the in the *US Upland Cotton* dispute, the actual measures taken by the US in response to this dispute, and recent internal policy reforms in the US and EU. The key features of these scenarios are detailed below.

2.1. Scenario A: December 2008 Revised Draft Modalities

Scenario A is based on the Revised Draft Modalities for Agriculture (WTO 2008a), presented on 6 December 2008 by the chair of the Special Session of the WTO Committee on Agriculture. The cotton-related provisions in this text are identical to those in the previous Revised Draft Modalities for Agriculture (WTO 2008b), presented on 10 July 2008. Modalities texts are assessments drawn from WTO member countries' positions and are intended to reflect possible areas of agreement among the membership. Although not binding, modalities texts provide a good indication of the direction in which the negotiating process is going.

The December 2008 modalities draft contains provisions on each of the three pillars of the agricultural negotiations: domestic support, market access and export competition. The following subsections describe the key provisions from each of these pillars that are modelled in Scenario A.

Domestic Support

In terms of domestic support, five provisions in the December 2008 Revised Draft Modalities are especially important for cotton: (i) the reduction in the Final Bound Total AMS; (ii) the product-specific AMS cap; (iii) the overall blue box cap; (iv) the product-specific blue box cap; and (iv) the reduction in the *de minimis* level of support.

The Final Bound Total AMS is subject to a tiered formula of reduction: where current commitment is greater than USD 40 billion, the rate of reduction is 70 percent; where it is greater than USD 15 billion and less than or equal to USD 40 billion, the rate of reduction is 60 percent; and where it is less than or equal to USD 15 billion, the rate of reduction is 45 percent. For developing countries with Final Bound Total AMS levels above USD 100 million, the reduction rate is 30 percent. Developing countries with Final Bound Total AMS levels at or below USD 100 million are not required to undertake a reduction. Although additional exemptions also apply to net food importing developing countries (NFIDC), very recently-acceded members (VRAM) and small low-income recently-acceded members with economies in transition (SLIRAM), they have no practical effect as not a single country in these groups has notified AMS support for cotton.[4]

The reduction in the Final Bound Total AMS is important for the cotton sector for two reasons. First and foremost, the formula establishing the product-specific AMS cap for cotton depends directly on the size of the cut that a given country applies to its overall AMS commitment. Second, the reduction in the Final Bound Total AMS may impose additional indirect restrictions in product-specific AMS support if the new Final Bound Total AMS is inferior to the sum of all product-specific AMS caps to which a country may be entitled.

Product-specific AMS caps for cotton are obtained by following a two-step process. First, a base level of support is defined as the average cotton AMS notified in 1995-2000.[5] Second, a stringent cut is applied to this base level. The relative size of the cut is determined by a formula that depends on the rate of reduction applied to the Final Bound Total AMS.[6] According to this formula, countries that reduce their Final Bound Total AMS by 70 percent, 60 percent, 45 percent and 30 percent shall reduce their

cotton AMS base levels by 84.3 percent, 82.2 percent, 85.7 percent and 71.9 percent, respectively. The cotton AMS reduction formula has the incongruent outcome of demanding a slightly larger percentage cut from developed countries that have the lowest Final Bound Total AMS. However, this outcome has no practical effect, as none of the countries in this group (*i.e.* Australia, Canada, Iceland, New Zealand, Norway and Switzerland[7]) notified AMS for cotton in 1995-2000.

Caps are introduced on overall and product-specific expenditures in the new blue box. For developed countries, overall blue box expenditures are capped at 2.5 percent of the average total value of agricultural production in 1995-2000. For developing countries, overall blue box expenditures are capped at five percent of the average total value of agricultural production in either 1995-2000 or 1995-2004, whichever is higher. The overall blue box cap may impose additional restrictions on product-specific spending in a given country only if it is inferior to the sum of the monetary value of product-specific blue box caps.

Product-specific blue box caps for cotton are also established according to a two-step process: first, a base level is established; second, a cut is applied to this level. For all WTO members other than the US, base levels are defined as the average value of blue box support provided to cotton and notified in 1995-2000. For the US only, the base level is obtained by the multiplication of three factors: (120 percent)*(overall blue box cap)*(share of cotton in total legislated maximum permissible expenditure under the 2002 Farm Bill).[8] The reduction rates applied to cotton blue box base levels are straightforward: 66.7 percent in the case of developed countries and 44.4 percent in the case of developing countries.

De minimis support levels are reduced by 50 percent in developed countries and 33.3 percent in developing countries with Final Bound Total AMS. Developing countries without a Final Bound Total AMS are not required to cut their *de minimis* levels. Exemptions also apply to NFIDCs, VRAMs, SLIRAMs and developing countries that allocate almost all their AMS support for subsistence and resource-poor producers.

Market Access

The key provisions for cotton in the market access pillar are: (i) the tiered formula for tariff reduction; (ii) the selection and treatment of sensitive products; (iii) the selection and treatment of special products; and (iv) the extension of duty- and quota-free access for cotton exports from LDCs.

The tiered formula for tariff reduction is implemented as described in Paragraphs 61 and 63 of the modalities draft.[9] Special and differential treatment is provided for developing countries in the form of lower reduction rates and higher thresholds in each tier. Tariff cuts for recently-acceded members (RAMs) are moderated by eight percentage points. LDCs, VRAMs and SLIRAMs are exempt from tariff reductions.

Cotton is not selected as a sensitive product by any developed or developing country. Except for the US, all developed countries already provide duty-free access to cotton at a most-favoured nation (MFN) basis.[10] For these countries, virtually all cotton tariff lines were bound at zero during the Uruguay Round.[11] Therefore, there is no rationale for choosing cotton as a sensitive product in these countries. Although the US has positive tariffs and four separate tariff-rate quotas (TRQs) for cotton, it is assumed that Washington will not select cotton as a sensitive product. This is due in part to the fact that existing US cotton TRQs are consistently under-filled, despite the relatively low levels of in-quota tariffs (between zero and 3 percent in *ad valorem* equivalent terms). Moreover, quota volume expansion would not be very significant since cotton consumption in the US has fallen by 70 percent in the last decade. Furthermore, given the limit in the number of tariff lines that may be selected as sensitive, other agricultural products are likely to take precedence over cotton in the US, including sugar, dairy and orange juice. Using a formula that takes into account (i) the importance of a

good in domestic demand, (ii) the cut in prices implied by the tiered formula, and (iii) the extent to which treatment as a sensitive product reduces the size of a tariff cut, Blandford *et al.* (2008) conclude that cotton would not figure in the list of sensitive products of the US. In a study at the more detailed 8-digit level of the harmonized commodity description and coding system (HS), Ibañez, Rebizo and Tejeda (2008) also conclude that cotton is unlikely to be selected as a sensitive product in the US.

Cotton is not selected as a special product by any developing country, except China. This assumption is derived from the fact that applied tariffs for cotton are already low in most developing countries. Of the top fifteen developing country importers of cotton, all but China currently provide duty-free MFN access to cotton. Sun (2008) and Tian (2009) identify cotton as one of the agricultural products that Chinese authorities are most likely to select for special treatment in the Doha Round. As a special product, cotton in China would be exempt from tariff reduction and quota expansion. Even if China were not to select cotton as a Special Product, the large tariff overhang would be enough to prevent any effective cut in the applied tariff. China has unilaterally expanded its cotton TRQ volume year after year in order to allow additional imports at the lower in-quota tariff rate. While the current bound tariff is set at 40 percent *ad valorem*, the applied tariff has seldom exceeded 10 percent in recent years.[12]

Finally, developed countries are required to grant duty- and quota-free access to cotton exports from LDCs. In practice, this measure will have little impact on market access opportunities for LDCs. First, as most developed countries already provide duty- and quota-free access to cotton imports at an MFN basis, this provision will not represent any special concession to LDCs. Second, although Washington will be required to change its current import regime to accommodate this special cotton provision, US cotton import demand is expected to be trivial at best. The US is not an important importer or consumer of cotton. Rather, it is the world's largest exporter, with an astounding market share of 40 percent in 2004-07. In contrast, the US accounted for only 0.05 percent of world cotton imports in the same period. This share is expected to decrease even further due to the dramatic contraction in US cotton consumption. The dwindling of the domestic textile industry has led to a decline of 70 percent in US cotton consumption in the last decade. Current US cotton TRQs are consistently under-filled in spite of zero or low in-quota tariffs.

Export Competition

Scenario A takes into account: (i) the complete elimination of export subsidies for cotton; and (ii) the elimination of the subsidy component of export financing support (export credits, export credit guarantees and insurance programmes).

2.2. Scenario B: Cotton Treated as a Standard Product

Scenario B is also based on the modalities draft, except that it ignores the special cotton provisions and instead subjects cotton to the general disciplines applicable to standard agricultural products. The specific differences between Scenario A and Scenario B are twofold. First, in Scenario B, cotton AMS and blue box caps are established by following only the first step of the two-step processes described in Scenario A. As a result, cotton AMS and blue box caps are identical to their respective base levels. In contrast, in Scenario A, cotton AMS and blue box caps result from the application of stringent cuts to base levels.

Second, in establishing base levels for product-specific AMS, the US and developing countries are required under Scenario A to use the average AMS support notified in 1995-2000. In contrast, in Scenario B, the US and developing countries have access to the standard flexibilities contained in Paragraphs 23-25 and Paragraphs 27-28 of the draft modalities text.[13]

In terms of domestic support, the general provisions of Scenario B are less ambitious than the special cotton provisions of Scenario A. In terms of market access and export competition,

Scenario B is identical to Scenario A. As a result, Scenario B implies a lower overall degree of reform than Scenario A.

Scenario B should be interpreted as a floor for cotton policy reform in the Doha Round. Any outcome of the negotiations for cotton must necessarily be more ambitious than Scenario B. In the Framework for Establishing Modalities in Agriculture (WTO, 2004b), the WTO General Council recognized the vital importance of cotton for developing countries and established a mandate to address it "ambitiously, expeditiously, and specifically, within the agriculture negotiations" in relation to all trade-distorting policies affecting the sector in all three pillars of market access, domestic support and export competition. In the Hong Kong Ministerial Declaration (WTO, 2005a), the WTO General Council reaffirmed its commitment to ensure having an explicit decision on cotton within the agriculture negotiations, including that trade distorting domestic subsidies for cotton must be reduced more ambitiously than under whatever general formula is agreed for other agricultural products.

2.3. Scenario C: Hypothetical Full Implementation of DSB Recommendations in *US Upland Cotton* Dispute

Scenario C models the hypothetical implementation by the US of the DSB recommendations in the *US Upland Cotton* dispute, namely (i) the withdrawal of prohibited subsidies and (ii) the removal of the adverse effects of subsidies found to cause serious prejudice (WTO, 2004a; WTO, 2005b).

Two variations of Scenario C are presented. In Scenario C1, the first recommendation is implemented by simulating the elimination of user marketing payments (Step 2), the Supplier Credit Guarantee Programme (SCGP), the Intermediate Export Credit Guarantee Programme (GSM 103) and the Export Credit Guarantee Programme (GSM 102). Since the DSB is silent regarding the exact steps the US must take to remove the adverse effects of subsidies found to cause serious prejudice, the second recommendation is implemented by limiting the combined annual value of marketing loan programme payments (MLP), market loss assistance payments (MLA) and counter-cyclical payments (CCP) so that their negative impact on the world price of cotton is not greater than 2 percent. Cabral *et al*. (2009) estimate this value to be USD 600 million.

Scenario C2 is identical to Scenario C1, except that MLP, MLA and CCP are limited so that their negative impact on the world price is not greater than 4 percent. Cabral *et al*. (2009) estimate this value to be USD 1,360 million.

2.4. Scenario D: Actual Incomplete Implementation of DSB Recommendations in *US Upland Cotton* Dispute

Scenario D models the insufficient measures actually taken by the US in response to the DSB recommendations in the *US Upland Cotton* dispute. Although the US has withdrawn part of its prohibited subsidies (Step 2 payments, SCGP and GSM 103), it has done nothing to remove the adverse effects of subsidies found to cause serious prejudice to other WTO members.

In September 2006, the DSB agreed to Brazil's request for the establishment of a panel pursuant to Article 21.5 of the Dispute Settlement Understanding (DSU) concerning the alleged failure of the US to implement the recommendations and rulings of the DSB. In June 2008, the DSB concluded that, notwithstanding changes in US agricultural programs, Washington had failed to bring its cotton subsidies into conformity with WTO obligations (Cross, 2009; WTO, 2007; WTO, 2008c). In August 2009, the DSB authorized Brazil to take countermeasures against the US, including cross-retaliation in intellectual property rights and services (WTO, 2009a; WTO, 2009b).

2.5. Scenario E: Internal Policy Reforms in the US and EU

Scenario E abstracts from multilateral negotiations and litigations and focuses on internal policy reforms in key subsidizing countries, namely the 2008 Farm Bill in the US and the 2003-04 CAP reform in the EU.

The following changes in US cotton subsidies brought about by the 2008 Farm Bill are incorporated in Scenario E: (i) payment acres for direct payments are reduced from 85 percent to 83.3 percent of a farm's base acreage for the covered commodity; (ii) the target price for counter-cyclical payments is reduced from USD 0.724 per pound to USD 0.7125 per pound; (iii) storage payment rates are reduced by 10 percent; and (iv) Upland Cotton Economic Adjustment Assistance payments are introduced, providing USD 0.4 per pound to domestic users of cotton for all documented use of upland cotton regardless of its origin.[14]

Scenario E also incorporates changes in EU cotton subsidies introduced by the 2003-04 reform of the CAP and subsequent amendments.[15] The previous guaranteed minimum price system was replaced by a combination of coupled and allegedly decoupled payments. In the reformed support scheme, 65 percent of the subsidies provided in the 2000-02 reference period are extended as decoupled aid. Another 35 percent are linked to cotton production in the form of area payments. Coupled payment rates and eligible areas vary according to the EU country contemplated: EUR 805.6 per hectare for 250,000 eligible hectares in Greece; EUR 1,400 per hectare for 48,000 eligible hectares in Spain; EUR 556 per hectare for 360 eligible hectares in Portugal; and EUR 805.6 per hectare for 3,342 eligible hectares in Bulgaria. In addition, Spain has introduced a supplementary environmental area coupled payment at a rate of approximately EUR 350 per hectare (Arriaza and Gómez-Limón, 2007).

3. SIMULATION RESULTS

Simulation results indicate that the December 2008 Revised Draft Modalities would have a significant positive impact on world cotton prices and contribute to the expansion of cotton production and exports in developing countries. The poor record of internal policy reforms in key subsidizing countries and the failure of the US to comply with DSB rulings and recommendations highlight the importance of multilateral trade negotiations in addressing the profound distortions that characterize the world cotton market.

This section is divided into four subsections. Estimated impacts of alternative reform scenarios on cotton prices, production and trade are discussed in Subsections 3.1, 3.2 and 3.3, respectively. Because there are uncertainties with regard to any elasticity estimates utilized in empirical modelling, alternative simulations are run with a different set of supply and demand elasticities. The results of this sensitivity analysis are described in Subsection 3.4.

3.1 Impact on the World Price

World price effects for each scenario and year are summarized in Figures 3.1 and 3.2. Average price increases are highest under the December 2008 Revised Draft Modalities, followed by the scenarios in which Washington hypothetically implements the DSB recommendations in the *US Upland Cotton* dispute. Impacts from the measures actually taken by the US in response to the *US Upland Cotton* dispute or from recent internal policy reforms in the US and EU are negligible.

The substantial variance in results on a year-by-year basis is due in large part to the counter-cyclical nature of a considerable share of notified cotton subsidies. The world price of cotton and the level of subsidies fluctuated significantly between 1998 and 2007. Figure 3.3 depicts cotton world prices and total cotton amber box support notified by WTO members in this period. It provides corroborating evidence of the counter-cyclical nature of domestic support to cotton: years with the highest world prices (*i.e.* 2003 and 2007) had the lowest levels of subsidies; years with the lowest prices (*i.e.* 1999, 2001 and 2004) had the highest levels of subsidies. The years with the lowest world prices are also those in which policy reforms would have had the most significant effect on world prices. Since WTO members are especially concerned about the adverse effects of subsidies during periods of low world prices, it is important to pay special attention to simulation results for years such as 1999, 2001 and 2004.

Doha Round Scenarios

The two Doha Round scenarios result in an increase in the world price of cotton. However, the magnitude of the price rise varies significantly across scenarios. As expected, world price impacts in Scenario A (December 2008 Revised Draft Modalities) are substantially greater than in Scenario B (cotton treated as a standard product).

Had cotton subsidies and tariffs been reduced in 1998-2007 as described in Scenario A, the world price of cotton would have increased on average by 6 percent, with a range between 2 percent and 10 percent. However, had cotton been treated as a standard product (Scenario B), the average world price increase would have been only 2.5 percent. The price effect in Scenario B is approximately two-fifths as large as in Scenario A. This difference is mainly driven by the size of caps on US trade-distorting domestic support for cotton in each scenario: US$510 million in Scenario A (US$143 in AMS and US$367 in the blue box) and US$2,240 million in Scenario B (US$1,140 million in AMS and US$1,100 million in the blue box). Since the average trade-distorting support provided to US cotton producers in 1998-2007 was US$2,248 million, it comes as no surprise that cuts in US subsidies are not very significant in Scenario B. Discarding the special cotton provisions

from the modalities text and treating cotton as a standard product would greatly reduce the potential of the Doha Round to deliver lower subsidy levels and higher world prices for cotton.

US Upland Cotton Dispute

While the full implementation of the DSB recommendations in the *US Upland Cotton* dispute would have a small to moderate impact on the world price of cotton, the limited measures actually taken by the US in response to the dispute would have a negligible effect.

On average, the insufficient reforms implemented by the US (Scenario D) would have caused the world price of cotton to rise by only 0.7 percent in 1998-2005, with a range between 0.3 and 1.5 percent. However, if the US hypothetically withdrew all prohibited subsidies and limited the combined annual value of MLP, MLA and CCP so that their negative impact on the world price was not greater than 2 percent (Scenario C1), the world price of cotton would have risen on average by 3.5 percent, with a range between 0.6 and 7 percent. If the combined value of MLP, MLA and CCP was instead limited so that their negative impact on the world price was not greater than 4 percent (Scenario C2), the average world price increase would have been 2.3 percent, with a range between 0.6 and 5 percent. On average, the price increases resulting from Scenarios C1, C2 and D correspond to three-fifths, two-fifths and one-tenth, respectively, of the average price increase resulting from Scenario A.

Domestic Reforms in the US and EU

Had the 2008 US Farm Bill and the 2003-04 EU CAP reform been simultaneously implemented in 1998-2007 (Scenario E), the world price of cotton would have increased on average by 0.8 percent. Virtually all the impact would have been explained by the reform of EU cotton subsidies. When the 2008 US Farm Bill is considered alone, no impact on the cotton world price is observed.

3.2. Impact on Production

The reduction of cotton subsidies and tariffs as described in Scenarios A through E would have led to small reductions in the total volume of world cotton production in 1998-2007. Nonetheless, due to the accompanying rise in the world price of cotton, the value of production at a global level would have increased. Figure 3.4 summarizes the estimated impacts of alternative policy reform scenarios on cotton world prices, production and production value. Bars represent the average impact in the 1998-2007 period; vertical lines indicate the range of results. Scenario A has the greatest average increase in the world price of cotton (6 percent), the most pronounced decline in world production volume (1.3 percent), and the greatest increase in world production value (4.5 percent on average, 7 percent in years with peak subsidy levels).

Production effects would have varied significantly across countries and scenarios. Output would have decreased in countries that undertake reductions in applied levels of subsidies and tariffs. Elsewhere, production would have increased. Figures 3.5 and 3.6 summarize the impact of alternative scenarios on production quantities and values in specific countries and regions.

Production responses depend, among other things, on the supply price elasticities assumed. The higher the supply elasticity, the greater the production effect in a given country. When supply is highly elastic, production changes can be substantial even in the presence of small price changes. Conversely, when supply is highly inelastic, changes in production can be small despite large changes in prices. Thus, the choice of elasticities is an important one. All simulations reported in this subsection are based on the elasticities reported in Sumner (2003), which are summarized in Table 3.1. Supply price elasticities are greater in the EU, US and Brazil (0.6, 0.42 and 0.4, respectively), and lower in India and China (0.13 and 0.14, respectively). In Australia, Central Asia, Pakistan,

Turkey and West Africa, the supply elasticity is 0.3. *Ceteris paribus*, production responses should be highest in the EU, US and Brazil and lowest in India and China.

The model adopted in this study assumes perfect price transmission from world to domestic markets and the full ability of producers to respond to price changes. In reality, price transmission in some developing countries may be significantly hindered by government-controlled pricing systems, excessive transportation and transaction costs and overvalued exchange rates. Moreover, producers in these countries may be significantly constrained by lack of access to inputs such as credit, labour and water.[16] Under these circumstances, simulation results overestimate potential impacts on production.

In a detailed econometric study of the Indian cotton sector, Mittal and Reimer (2008) show that, despite extensive public regulation, Indian rural market prices of cotton closely follow world prices. They also find that Indian cotton farmers are surprisingly responsive to price changes in the medium to long run. In contrast, Goreux (2003) notes that cotton production in the CFA countries of West Africa is not very correlated to the world price and that transmission to domestic producer prices varies significantly from year to year. He also emphasizes the lack of reliable estimated elasticities of supply response to world prices for African countries.

Doha Round Scenarios

In Scenario A, US and EU cotton production would have declined on average by 9 percent and 24 percent, respectively. In years with historically low world prices, the decline in US output would have been larger than average (15 percent). In 2001 alone, US production would have declined by 680 thousand metric tonnes, which was more than the combined production volume of the C-4 countries that year. In the EU, the output decline would have been less pronounced following the implementation of the 2003-04 CAP reform (18 percent). The fall in US and EU production would have been almost fully compensated by output expansion elsewhere. On average, production would have been 2 percent higher in Australia, Brazil[17], the C-4 countries, Central Asia[18], Pakistan and Turkey, and 1 percent higher in China and India. In years with historically high subsidy levels, production in these two sets of countries would have increased by 3-3.5 percent and 1.3 percent, respectively. More importantly, production value (measured at the world price level in USD) would have increased by 7-8 percent on average and 11-14 percent in years of peak subsidy levels.

The impact on production would have been significantly smaller in Scenario B. On average, production volumes would have declined by 4 percent in the US and remained unchanged in the EU. Average output expansion in the rest of the world would have been limited: 0.8 percent in Australia, Brazil, the C-4 countries, Central Asia, Pakistan and Turkey, and 0.3 percent in China and India. Production value in these countries would have risen by 3 percent.

US Upland Cotton Dispute

The hypothetical implementation of Scenario C1 in 1998-2007 would have caused US production to fall by 7 percent on average, with a range between 1 and 13 percent. In response, production would have increased by 1-1.3 percent in Australia, Brazil, the C-4 countries, Central Asia, EU, Pakistan and Turkey, and 0.5 percent in China and India. Production value in these countries would have increased by 4-4.5 percent.

Production impacts in Scenario C2 are approximately two-thirds as high as in Scenario C1. Production in the US would have declined by 4.3 percent on average, with a range between 1 and 9 percent. Production would have increased by 0.7-0.9 percent in Australia, Brazil, the C-4 countries, Central Asia, EU, Pakistan and Turkey, and by 0.3 percent in China and India. Production value in these countries would have increased by 3 percent.

Scenario D would have had negligible effects on production. US output would have declined by

1 percent on average and production elsewhere would have remained virtually unchanged.

Domestic Reforms in the US and EU

The 2003-04 reform of the CAP would have reduced EU production by on average 20 percent between 1998 and 2005. Production elsewhere would have increased by only 0.1-0.3 percent. The 2008 US Farm Bill would have had virtually no impact on production in the US and elsewhere. The combined impact of EU and US domestic reforms (Scenario E) coincides with the individual impact of the EU CAP reform.

3.3. Impact on Trade

Figures 3.7 and 3.8 summarize the impact of alternative policy reform scenarios on net trade volumes and values. Changes in exports and imports are greatest in Scenario A, moderate in Scenarios B and C, and small or negligible in Scenarios D and E (except for EU imports in Scenario E). Trade volumes exhibit a large variance in a year-to-year basis, significantly more so than production volumes.

Among net exporters, export volumes generally retract in the main subsidising country (the US) and increase elsewhere (Australia, Brazil, C-4 countries, Central Asia and India). Countries with larger textiles and apparel sectors (India and Brazil) experience relatively greater expansion in exports due to the contraction in domestic consumption caused by higher world prices. The simultaneous increase in export quantities and world prices leads to an unambiguous rise in the value of exports for all net exporters except the US. For this country, the increase in the world price does not compensate for the retraction of export quantities in scenarios A through D.

Among key net importers (Bangladesh, China, Indonesia, Pakistan and Turkey), import volumes decrease in every scenario analyzed due to increased domestic output and decreased domestic demand. Estimated import costs also fall in countries with large domestic cotton sectors (China, Pakistan and Turkey) since reductions in import quantities dominate world price increases. Nonetheless, import bills increase slightly in countries with small domestic cotton production volumes (Bangladesh and Indonesia). In the EU, import quantities and costs increase substantially in Scenarios A and E (scenarios in which EU subsidies are significantly reduced), decrease slightly in Scenarios B and C, and remain virtually unchanged in Scenario D.

Doha Round Scenarios

Had Scenario A been retroactively applied in 1998-2007, annual US export volumes would have declined by 16 percent on average, with a wide range between 2 percent and 34 percent. This fall in US exports would have been counterbalanced by increased exports from other cotton suppliers. Export volumes would have increased on average by 12-14 percent in Brazil and India and 2-2.5 percent in Uzbekistan, the C-4 countries and Australia. Imports would have declined in the major Asian importing countries, especially in those with large domestic cotton sectors, including Pakistan (14 percent), China (12 percent decrease) and Turkey (8 percent). The decline in import volume would have been less pronounced in countries that rely almost exclusively on imported cotton, such as Bangladesh (1.3 percent) and Indonesia (1.2 percent). In the EU, import volumes would have been on average 30 percent higher than actual observed levels. Nonetheless, European import volumes would have continued on their downward trend year after year.

Trade flow effects in Scenario B would have been approximately two-fifths as high as in Scenario A for all countries except the EU. While EU import volumes would have increased on average by 30 percent in Scenario A, they would have decreased by 1.5 percent in Scenario B. This is because the EU would not be required to significantly alter applied subsidy levels in order to confirm with the cotton product-specific caps established in Scenario B.

US Upland Cotton Dispute

The hypothetical full implementation of the DSB recommendations in Scenarios C1 and C2 would have led to trade flow effects that are three-fifths and two-fifths as high as in Scenario A, respectively. As in Scenario B, the only exception would have been EU imports, which would have decreased by 2-2.5 percent.

In contrast, if the measures actually taken by the US in response to the DSB recommendations had been retroactively applied in the 1998-2005 period (Scenario D), impacts on trade flows would have been negligible. Exports would have on average declined by 2.5 percent in the US and increased by 1.5 percent in Brazil and India and 0.25 percent in Uzbekistan, the C-4 countries and Australia. Imports would have declined by 3 percent in Pakistan, 2 percent in China and 1 percent Turkey, and remained virtually unchanged in the EU, Bangladesh and Indonesia.

Domestic Reforms in the US and EU

Scenario E would have led to a large average increase in EU imports (25 percent) and a small increase in US exports (1 percent). For the other key importing and exporting countries, results would have been similar to Scenario D. Virtually all changes would have been brought about by the 2003-04 reform of the CAP. When considered alone, the 2008 US Farm Bill would have had no impact on cotton trade flows.

3.4. Sensitivity Analysis

Previous studies have reported that estimates of price, production and trade impacts of cotton policy reforms are sensitive to the choice of supply and demand elasticities (Goreux, 2003; Poonyth *et al.*, 2004). This subsection analyzes the sensitivity of simulation results to changes in elasticity parameters.

Price elasticities of supply and demand are drawn from the existing literature and are assumed to be constant over time. While results presented in Subsections 3.1, 3.2 and 3.3 are based on elasticities reported in Sumner (2003), results discussed below are obtained using elasticities reported in Poonyth *et al.* (2004).[19] The two sets of elasticities are very dissimilar (Table 3.1). Nearly all elasticities in Poonyth *et al.* are larger (in absolute value) than those in Sumner. The simple mean of the demand elasticities reported in the former is 2.5 times larger (in absolute value) than in the latter (–0.67 in Poonyth *et al.* vs. –0.27 in Sumner). For supply elasticities, the difference in simple means is of three to one (0.90 in Poonyth *et al.* vs. 0.30 in Sumner). In addition, the correlation between the two alternative sets of elasticities is very low (0.25 for demand elasticities and 0.04 for supply elasticities). Elasticity values for key countries differ significantly between the two sets. For example, supply elasticities for China and India, the world's two largest cotton producers, are 0.14 and 0.13 according to Sumner, but 1.2 according to Poonyth *et al.* While Mexico has the lowest (in absolute terms) demand elasticity of any country according to Sumner (–0.14), it has the highest as per Poonyth *et al.* (–1.30).

In general, when the elasticities reported in Sumner are replaced by the ones reported in Poonyth *et al.*, the impact on world prices becomes weaker and the effect on quantities produced and traded becomes stronger. The sensitivity of price, production and trade impacts to the use of this different set of supply and demand elasticities is analyzed in more detail below.

World Price

Table 3.2 compares world price effects estimated using the two alternative sets of elasticities. In every scenario and year, the estimated impact on the cotton world price is weaker when the elasticities from Poonyth *et al.* are used. While differences are small in absolute terms, they are significant in relative terms.

With the elasticities reported in Poonyth *et al.*, estimated world price increases in Scenario A are approximately one-half of those obtained with the elasticities reported in Sumner. In

Scenarios B, C and D, they are roughly three-fifths as large. Finally, in Scenario E, they are only two-fifths as large. Although the magnitudes of the price rises vary with the different sets of elasticities, the year-by-year variation in results remains unchanged: the greatest impact occurs in years with the lowest world prices and the lowest impact occurs in years with the highest world prices. The relative differences between price impacts across scenarios also remain mostly unaffected.

Production

Table 3.3 summarizes average production impacts under the two alternative sets of elasticities. Given that supply elasticities in Poonyth *et al.* are higher than in Sumner, production effects are greater under the former. Differences in estimated production effects are especially pronounced for countries that are required to reduce applied subsidy levels. For example, while US and EU cotton outputs in Scenario A decline by 9 percent and 24 percent under Sumner's elasticities, they retract by 19 percent and 33 percent when Ponnyth *et al.*'s elasticities are used. Estimates based on Sumner and Poonyth *et al.* elasticities are within three percentage points in China and India, two percentage points in Pakistan and Turkey, and one percentage point in Australia, Brazil, the C-4 countries and Central Asia. The greater the difference in supply elasticities for a given country, the larger the disparity in estimated production impacts. Differences are larger for China and India because their supply elasticities in Poonyth *et al.* are substantially greater than in Sumner.

The impact on the value of production depends on simultaneous changes in world prices and production quantities. Since in most countries price changes dominate changes in production volumes, estimated changes in production value are generally greater with the elasticities reported in Sumner (Table 3.4). Since changes in production quantity dominate price changes in countries that undertake reductions in applied subsidy levels, changes in production value are higher with the elasticities reported in Poonyth *et al.* For China and India, changes in production values are approximately the same with either set of elasticities.

Trade

Tables 3.5 and 3.6 summarize average trade impacts estimated under the two alternative sets of elasticities. For most countries, changes in net trade volumes are less than one percentage point greater when simulations are run with the elasticities reported in Poonyth *et al.* The main exceptions are India, China and countries that undertake reductions in applied subsidy levels (the US in Scenarios A through D; the EU in Scenarios A and E). In India and China, changes in net trade flows are three times higher when Poonyth *et al.*'s elasticities are used. This wider disparity in results is due in part to the very large difference between the supply elasticities reported in Sumner (0.13 for India and 0.14 for China) and Poonyth *et al.* (1.2 for both countries). China and India are the countries in which the difference between Sumner's and Poonyth *et al.*'s elasticities is the greatest.

In all key exporting countries other than the US, the expansion in net exports is due to the combined effect of increased production and reduced domestic consumption. Since supply and demand elasticities are larger in Poonyth *et al.*, the rise in production and fall in domestic consumption are larger under this choice of elasticities. In most key importing countries, the fall in net imports is explained by the combined effect of expanded domestic output and retracted domestic consumption. The rise in production and fall in domestic consumption are greater when elasticities are larger (*i.e.* in Poonyth *et al.*). In countries with small domestic cotton production (*i.e.* Bangladesh and Indonesia), the difference between the results obtained with the two sets of elasticities is very small.

4. CONCLUSIONS AND IMPLICATIONS

The WTO Doha Round could have a significant positive impact on world cotton prices and contribute to the expansion of cotton production and exports in developing countries. However, the likelihood of such an outcome is highly dependent on the depth of the subsidy reductions adopted by WTO members. The poor record of internal policy reforms in key subsidizing countries and the failure of the US to comply with DSB recommendations in the *US Upland Cotton* dispute highlight the importance of multilateral trade negotiations in addressing the profound distortions that characterize the world cotton market.

This study demonstrates that ambitious cotton-specific provisions are imperative in order to achieve meaningful reforms in the Doha Round. It validates the mandate given by the WTO membership in the 2004 Framework for Establishing Modalities in Agriculture and reaffirmed in the 2005 Hong Kong Ministerial Declaration to address cotton "ambitiously, expeditiously, and specifically within the agriculture negotiations."

A partial equilibrium model was utilized to estimate the price, production and trade effects of reforming cotton subsidies and tariffs under alternative policy scenarios. The quantitative estimates derived from the model suggest that effects are substantial under the special cotton provisions of the December 2008 Revised Draft Modalities and would deliver significant gains for developing countries. In contrast, most benefits would be dissipated if cotton were treated under the general provisions applicable to other agricultural products. In the absence of a multilateral trade deal on cotton, the impact of domestic policy reforms in the US and EU would be negligible.

This study estimates that the special cotton provisions of the December 2008 modalities draft (Scenario A) would increase the world price of cotton by as much as 10 percent and production volumes in Brazil, Central Asia and West Africa by as much as 3-3.5 percent. As a result, production values in these developing countries and regions would increase by as much as 13 percent when measured at world price levels. Cotton production would decline by as much as 15 percent in the US and 30 percent in the EU due to significant reductions in applied subsidy levels.

Since the counter-cyclical nature of cotton subsidies generates significant variance in simulation results in a year-by-year basis, it is also informative to look at average effects. Had Scenario A been retroactively applied in the 1998-2007 period, the cotton world price would have increased by 6 percent on average. Production quantities in Brazil, Central Asia and West Africa would have increased by 2 percent and production value by 8 percent. Had cotton been treated as a standard product (Scenarios B), the world price would have increased on average by only 2.5 percent, production in the same group of developing countries would have increased by 0.8 percent and production value by 3 percent.

If the measures taken by Washington in response to the *US Upland Cotton* dispute were applied retroactively to 1998-2007 (Scenario D), the world price would have increased on average by less than one percent and production would have remained virtually unchanged across the globe. A similar pattern would have been observed had the 2003-04 EU CAP reform and the 2008 US Farm Bill applied to 1998-2007 (Scenario E), except that EU production would have declined. The 2008 US Farm Bill alone would have had no impact on prices or quantities.

Four main factors distance Scenario A from the full liberalization of cotton markets. First, the elimination of tariffs and subsidies in this scenario applies only to WTO member countries. Policies in non-WTO members are assumed to remain unchanged. Non-WTO members are significant players in international cotton markets. They accounted for 20 percent of world cotton exports in 2004-08. Some of the

world's top cotton exporters are not members of the WTO, including Uzbekistan (world's second largest exporter), Turkmenistan (eight), Kazakhstan (ninth), Tajikistan (tenth) and Syria (twelfth). The current literature has not clarified whether the cotton sectors in some of these countries are actually taxed or subsidized (Rudenko *et al.*, 2009; Rudenko and Lamers, 2006; EJF, 2005; Guadagni *et al.*, 2005).

Second, Scenario A does not contemplate reductions in payments that are claimed to be decoupled from production, such as Direct Payments in the US and Single Farm Payments (SFP) in the EU. Third, it allows WTO members to continue to provide some degree of trade distorting subsidies, namely the amounts implied by *de minimis* levels and AMS and blue box product-specific caps.

Finally, Scenario A is concerned with the degree of reform that could be achieved through multilateral trade negotiations. Therefore, only subsidies that are officially notified[20] by WTO members are taken into account. The Doha Round *per se* is assumed to have no impact on cotton subsidies that are currently not reported by member countries. Whether or not these subsidies will be notified in the future will depend on WTO member countries filing complaints within the scope of the WTO Dispute Settlement Mechanism or the extended monitoring and surveillance structure of the Committee on Agriculture that may emerge from a trade deal in the Doha Round.

The International Cotton Advisory Council (ICAC) and other sources report governmental subsidies to the cotton sector that are significantly higher than the values that are officially notified by WTO members.[21] For example, while the Turkish government declares that no domestic support was provided to its cotton sector between 1998 and 2001, the ICAC reports that Turkish cotton subsidies were in the order of USD 220 million in 1998-99, USD 287 million in 1999-2000 and USD 106 million in 2000-2001 (ICAC, 2002). While Turkey has not submitted any domestic support notifications since 2001, the ICAC reports that the country has continued to subsidize domestic cotton production. A multilateral trade deal in the context of the Doha Round will not by itself force Turkey to notify alleged cotton subsidies. Therefore, for purposes of calculating the potential impacts of the Doha Round, un-notified subsidies are not taken into account.

The magnitude of estimated policy reform effects is fairly sensitive to the choice of supply and demand elasticities. Impacts on the cotton world price are higher when the elasticities reported in Sumner (2003) are selected. On the other hand, impacts on quantities produced and traded are greater with the significantly higher elasticities reported in Poonyth *et al.* (2004). One feature that is common across all scenarios and does not depend on the choice of elasticities is that estimated impacts are almost exclusively explained by reductions in subsidies.

There are two reasons why market access has a marginal role at best. First, the cotton sector already enjoys exceptionally low levels of applied tariffs.[22] Second, only two WTO members (the US and Oman) will have to reduce current applied tariffs as a result of the negotiations. All other countries either: (i) already provide duty-free access to imports at an MFN basis, (ii) enjoy significant tariff overhang, or (iii) qualify for tariff-cut exemptions due to their status as LDCs, very recently-acceded members or small low-income recently-acceded members.

The extension by developed countries of duty-free access for cotton exports from LDCs will have little if any impact on market access opportunities for LDCs. First, all developed countries apart from the US already provide duty-free access to cotton imports at an MFN basis. Second, as US cotton consumption has plummeted in recent years, the country's share of world cotton imports has collapsed to only 0.05 percent. Moreover, US cotton quotas are consistently under-filled despite the low level of in-quota tariffs (between zero and 3 percent).

In contrast, developing countries account for nearly 95 percent of world cotton imports. Of the top fifteen developing country importers, all but China currently provide duty-free MFN

access to cotton. The Doha Round will not significantly alter market access conditions in China since Beijing is likely to exempt cotton from tariff reduction and quota expansion by selecting it as a Special Product. Even if China were not to select cotton as a Special Product, the large tariff overhang would be enough to prevent any effective cut in the applied tariff.

When it comes to cotton, subsidies should be the heart and soul of the negotiations. There is an urgent need to rebalance existing trade rules that permit developed countries to highly subsidize domestic production, depress world prices, push farmers elsewhere out of production and impair prospects for economic advancement in the developing world. The adoption of ambitious domestic support reforms for cotton in the Doha Round would be a significant step towards the establishment of a fair and market-oriented trading system.

ENDNOTES

1 Of the 153 members of the WTO, 84 currently apply duty-free access to cotton imports, 62 apply tariffs between 0 and 10 percent, and only seven apply tariffs between 10 percent and 33 percent. Of the seven countries with tariffs above 10 percent, only Nigeria has a significantly large domestic market. The other countries are Djibouti, Gambia, Haiti, Maldives, Solomon Islands and Tonga.

2 As long as EU cotton subsidies are only partially decoupled and not removed, cotton areas in Greece and Spain are expected to remain relatively significant. Rozakis *et al*. (2008) found that in the absence of the so-called decoupled payments, farm income among a significant share of Greek cotton producers would turn negative, thus leading towards abandonment of activities. According to the European Commission (2007), full decoupling would reduce the relative profitability of cotton: gross margins would fall well below those for other crops and become negative in almost all instances. Without specific coupled incentive to produce cotton, cotton areas would decline dramatically: "In Spain it would be expected that the cotton area would fall to zero. In Greece there would be a decline in the cotton area; only cotton grown extensively under agri-environmental programmes would be expected to continue." In addition, studies that are not specific to the cotton sector have suggested that European farm operators, to a large extent, do not treat the new decoupled payments as fully decoupled (Hennessy and Thorne, 2005; Howley *et al.*, 2009). As a result, these subsidies are believed to maintain a strong supply inducing effect on agricultural production, although less so than the previously fully coupled payments.

3 Poonyth *et al*. (2004) uses average production, consumption and trade data for 1996-2000 and subsidy data for 1997-99. Sumner (2003) uses actual data from marketing years 1999-2001 (figures for 2002-07 are projections). Schmitz *et al*. (2007) uses data for crop years 1999-2000 to 2003-04. In Alston *et al*. (2007), the baseline is defined using 2004-05 data.

4 There are only four NFIDCs with AMS commitments (Jordan, Morocco, Tunisia and Venezuela), none of which have notified AMS support for cotton. There are only four VRAMs with AMS commitments (Macedonia, Saudi Arabia, Ukraine and Vietnam), none of which have notified AMS support for cotton. Finally, the only SLIRAM with an AMS commitment (Moldova) has not notified AMS support for cotton.

5 In terms of establishing product-specific AMS caps for cotton, the December 2008 Revised Draft Modalities for Agriculture do not provide special treatment for the US or developing countries. This is in contrast with the special provisions that apply to these countries in the case of product-specific AMS for all other agricultural products. For the US, the product-specific AMS limits for products other than cotton shall be the resultant of applying proportionately the average product-specific AMS in the 1995-2004 period to the average product-specific total AMS support for the Uruguay Round implementation period (1995-2000) as notified to the Committee on Agriculture. Developing countries shall establish their product-specific AMS limits for products other than cotton by choosing one of the following methods, and scheduling all their product-specific AMS commitments in accordance with the method chosen: (a) the average product-specific AMS during the base period 1995-2000 or 1995-2004 as may be selected by the Member concerned, as notified to the Committee on Agriculture; (b) two times the Member's product-specific *de minimis* level provided for under Article 6.4 of the Uruguay Round Agreement on Agriculture during the base periods referred to in sub-paragraph (a) above; or (c) 20 percent of the Annual Bound Total AMS in the relevant year during the Doha Round implementation period.

6 Paragraph 54 of the December 2008 Revised Draft Modalities for Agriculture establishes that WTO members with an AMS commitment shall reduce their base levels of AMS support for cotton according to the formula given by $R_c = R_g + \frac{(100-R_g)x100}{3xR_g}$, where R_c is the spe-cific reduction applicable to cotton (as a percentage) and R_g is the general reduction in AMS (as a percentage). Base levels of support shall be calculated as the arithmetic average of the amounts notified for cotton in 1995-2000.

7 Switzerland notified AMS support for fibre crops in 1999-2006. The notifications do not specify the specific fibre crops that are supported. Since Switzerland did not produce cotton in this time period, it is assumed that the domestic support for fibre crops in Switzerland did not apply to cotton.

8 The December 2008 Revised Draft Modalities presents two options for the first factor in this multiplication: either 110 percent or 120 percent. The higher percentage is used in Scenario A because it is the less ambitious of the two.

9 According to Paragraphs 61 and 63 of the December 2008 Revised Draft Modalities, developed and developing countries shall reduce their final bound tariffs in accordance with the following tiered formulae (where t stands for the import tariff expressed in *ad valorem* equivalent terms):

DEVELOPED COUNTRIESDEVELOPING COUNTRIESTIERCUTTIERCUT0 < t ≤ 20%50%0 < t ≤ 30%33.3%20% < t ≤ 50%57%30% < t ≤ 80%38%50% < t ≤ 75%64%80% < t ≤ 130%42.7%t>75%70%t>130%46.7%

10 The following developed countries provide duty-free access to cotton imports at an MFN basis: Australia, Canada, the European Union, Iceland, Japan, New Zealand, Norway and Switzerland.

11 The only exceptions are the bound tariffs for cotton waste in Australia (2 percent) and Iceland (11 percent). Nonetheless, current applied tariffs for cotton waste are zero in both countries.

12 If China were to apply the Doha Round tiered formula, it would have to cut its over-quota tariff by 30 percent (percentage cut applicable to second-tier bound tariffs from RAMs). The current bound tariff of 40 percent would be replaced by a new bound tariff of 28 percent, which is still substantially higher than applied levels.

13 For the US, the cotton AMS is the resultant of applying proportionately the average cotton AMS in 1995-2004 to the average product-specific total AMS support notified in 1995-2000. For developing countries, the cotton AMS caps is the highest of the following values: (i) the average notified cotton AMS during the base period 1995-2000 or 1995-2004, as may be selected by the country concerned; (ii) two times the country's *de minimis* level during either 1995-2000 or 1995-2004, as may be selected by the country concerned; or (iii) 20 percent of the Annual Bound Total AMS in the relevant year during the Doha Round implementation period.

14 Although the 2008 US Farm Bill provided further legal basis to the discontinuation of Step 2 payments and the SCGP and GSM 103 export credit guarantee programmes, these policy changes are not included in Scenario E. Instead they are taken into account in Scenario D, which considers the steps taken by Washington to comply with the DSB panel recommendations in the *US Upland Cotton* dispute. The Step 2 subsidy programme was repealed by the Deficit Reduction Act of 2005, which took effect on 1 August 2006, almost two years before the 2008 Farm Bill. Furthermore, Scenario E does not take into account

the establishment of the Average Crop Revenue Election (ACRE) programme given its novelty and the shortage of relevant data. Distance is lacking to properly assess this new instrument.

15 In September 2006, the Court of Justice of the European Communities annulled the cotton support scheme of the 2003-04 CAP reform after a legal challenge made by the Spanish government. According to the Court judgement, the European Commission had failed to conduct a complete impact study before the policy initiation. As a result, the European Commission carried out an impact assessment study in 2007 and the European Council adopted a revised reform of the support scheme for cotton in 2008.

16 For example, cotton growers have repeatedly boycotted cotton markets in Côte d'Ivoire and Mali over the past decade because of high prices of inputs (Bassett, 2008).

17 In Scenario A, cotton output in Brazil would have increased by 1-4 percent in every single year in 1998-2006. However, Brazilian production would have declined by 1.5 percent in 2007 since the country would have been required to cut its applied level of subsidies. A similar pattern would have been observed in Colombia and Mexico.

18 "Central Asia" refers to Kazakhstan, Turkmenistan and Uzbekistan.

19 Sumner (2003) uses the supply and demand elasticities from the FAPRI model.

20 Although the US did not notify market loss assistance payments (MLA) and counter-cyclical payments (CCP) as blue box payments, they are taken into consideration in the analysis since payments of this type are highly likely to be included in the new blue box in the Doha Round. Furthermore, AMS estimates are used for recent years for which domestic support notifications are not yet available, including Brazil (2005-07), China (2005-07), EU (2007), Israel (2007), Mexico (2005-07) and South Africa (2007).

21 A number of WTO members that have not notified domestic support for cotton have allegedly subsidised domestic production, including Benin, Côte d'Ivoire, Egypt, India, Mali, Pakistan and Turkey (ICAC, 2008; Pan *et al.*, 2009a). ICAC subsidy estimates for the three largest cotton subsidizers – the US, China and the EU – are also substantially higher than officially notified figures.

22 Of the 153 members of the WTO, 84 currently apply duty-free access to cotton imports, 62 apply tariffs between 0 and 10 percent, and only seven apply tariffs between 10 percent and 33 percent. Of the seven countries with tariffs above 10 percent, only Nigeria has a significantly large domestic market. The other countries are Djibouti, Gambia, Haiti, Maldives, Solomon Islands and Tonga.

23 These countries would not be required to reduce cotton applied tariffs in the Doha Round because: (i) they are exempt from tariff reductions given their status as least developed countries (LDCs), very recently-acceded members (VRAMs) or small low-income recently acceded members (SLIRAM); or (ii) they have significant tariff overhang for cotton; or (iii) they are not members of the WTO.

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ANNEX A: THE MODEL

This single-commodity, multi-country, partial equilibrium model of cotton trade builds upon Sumner (2005) and is similar in approach, if not in structure, to Vanzetti and Graham (2002), Tokarick (2003), Poonyth *et al*. (2004), Alston *et al*. (2007) and Cabral and Jales (2008). For each scenario, the model simulates the prices and quantities that would have obtained in a base year had the policy reforms implied by the given scenario been retroactively applied to that year.

There are three important assumptions behind the model. The first two are common to the majority of global trade models of the cotton sector. First, the model assumes perfect price transmission between world and domestic markets. In reality, price transmission may be less than perfect due to transportation and transaction costs, exchange rates, economies of scale and governmental intervention (Conforti, 2004). Second, cotton prices are assumed to be the only factor that influences cotton supply and demand. Factors such as rainfall, income, access to credit and infrastructure are not reflected in the model. Finally, cotton is assumed to be a homogeneous product. This implies that full substitution is assumed between domestic and imported cotton, as well as among imports from different sources. The degree of homogeneity of most traded cotton is such as to warrant the perfect substitution assumption; the existence of only little border distortion also warrants the perfect price transmission assumption for most countries (Poonyth *et al.*, 2004).

The fact that the model is non-spatial implies that it is not solved for trade flows between specific pairs of countries. Spatial models are especially suitable for markets where trade preferences play an important role, such as sugar or bananas. They allow the modelling of policies that apply different regimes to imports from different countries (Anania, 2009). Since preferential trade plays a very minor role in the cotton sector, the added benefit of adopting the more complex spatial framework is close to nil. In 2004-08, at least 93 percent of world cotton imports occurred at a most-favoured nation (MFN) basis. Of the remaining 7 percent of world imports that *may* have occurred at a preferential basis, 6.95 percent were imported by countries that will not be required to change cotton applied tariffs in the Doha Round.[23] Therefore, the balance between preferential and non-preferential policy regimes may potentially change for only 0.05 percent of world cotton imports. Needless to say, this is a very small fraction of the market.

Model Structure

The model is based on supply and demand relationships for cotton.

Change in cotton supply in country *i* is given by:

$$d\ln S_i = \varepsilon_i d\ln(P(1+t_i)+U_i)$$

Where:

t_i - 0 if country *i* is a net exporter of cotton
$\hat{t}_i$ if country *i* is a net importer of cotton

$\hat{t}_i$ is the *ad valorem* applied tariff on cotton in country *i*,

U_i is the price wedge caused by cotton subsidies in country *i*,

ε_i is the price elasticity of supply for cotton in country *i*, and

P is the world price of cotton.

The price wedge caused by cotton subsidies in country *i* is given by:

$$U_i = \sum_j u_i^j \gamma_i^j$$

Where:

u_i^j is the per unit value of subsidy *j* in country *i*, and
γ_i^j is the degree to which subsidy *j* provides a production incentive in country *i* relative to revenue from the market.

Letting $a_{P_i} = \frac{P}{P(1+t_i)+U_i}$ $a_{T_i} = \frac{Pt_i}{P(1+t_i)+U_i}$

and $a_{U_i} = \frac{U_i}{P(1+t_i)+U_i}$, yields:

$$d\ln S_i = \varepsilon_i (a_{P_i}(1 + t_i) d\ln P + a_{T_i} d\ln t_i + a_{U_i} d\ln U_i)$$

(Equation 1)

Change in cotton demand in country *i* is given by:

$$d\ln D_i = \eta_i d\ln(P(1+t_i))$$

Where:

t_i - 0 if country *i* is a net exporter of cotton

if country *i* is a net importer of cotton

$\hat{t}_i$

is the *ad valorem* applied tariff on cotton

$\hat{t}_i$ in country *i*,

U_i is the price wedge caused by cotton subsidies in country *i*,

is the price elasticity of supply for

ε_i cotton in country *i*, and

P is the world price of cotton.

Letting $\beta_{P_i} = \frac{1}{(1+t_i)}$ and $\beta_{T_i} = \frac{t_i}{(1+t_i)}$, yields:

$$d\ln D_i = \eta_i (\beta_{P_i}(1+t_i) d\ln P + \beta_{T_i} d\ln t_i)$$

(Equation 2)

Change in world cotton supply is given by the sum of the changes in national supply in every in country *i*:

$$d\ln S_{WORLD} = \sum_i d\ln S_i = \sum_i \Theta_i \varepsilon_i (a_{P_i}(1+t_i) d\ln P + a_{T_i} x$$

$$x\, d\ln t_i + a_{U_i} d\ln U_i)$$

Where Θ_i is the share of country i in world cotton production and $\sum_i \Theta_i = 1$

Change in world cotton demand is given by the sum of the changes in national demand in every in country *i*:

$$d\ln D_{WORLD} = \sum_i d\ln D_i = \sum_i \lambda_i \eta_i (\beta_{P_i}(1+t_i) d\ln P + \beta_{T_i} d\ln t_i)$$

Where λ_i is the share of country i in world cotton consumption and $\sum_i \lambda_i = 1$

World supply must equal world demand in equilibrium. Thus:

$$\sum_i \Theta_i \varepsilon_i (a_{P_i}(1+t_i) d\ln P + a_{T_i} d\ln t_i + a_{U_i} d\ln U_i) =$$

$$= \sum_i \lambda_i \eta_i (\beta_{P_i}(1+t_i) d\ln P + \beta_{T_i} d\ln t_i)$$

Solving for the change in world price yields:

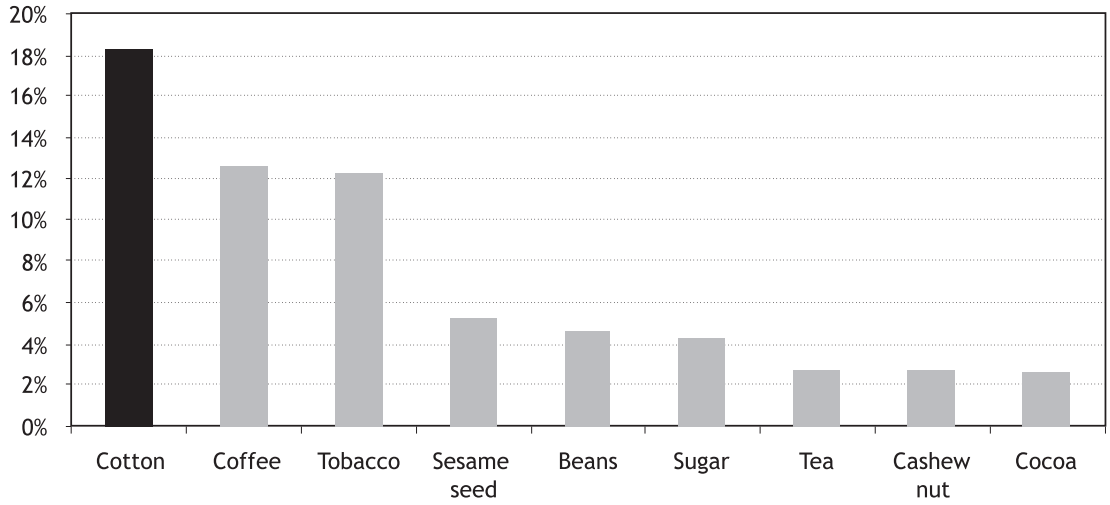
$$d\ln P = \frac{\sum_i (\lambda_i \eta_i \beta_{T_i} - \Theta_i \varepsilon_i a_{T_i}) d\ln t_i - \sum_i \Theta_i \varepsilon_i a_{U_i} d\ln U_i}{(\sum_i \Theta_i \varepsilon_i a_{P_i} - \sum_i \lambda_i \eta_i \beta_{P_i})(1+t_i)}$$

(Equation 3)

The equation above indicates the effect on the world price of changes in cotton subsidies and tariffs. Changes in domestic supply and demand in country *i* are obtained by substituting equation 3 back into equations 1 and 2.

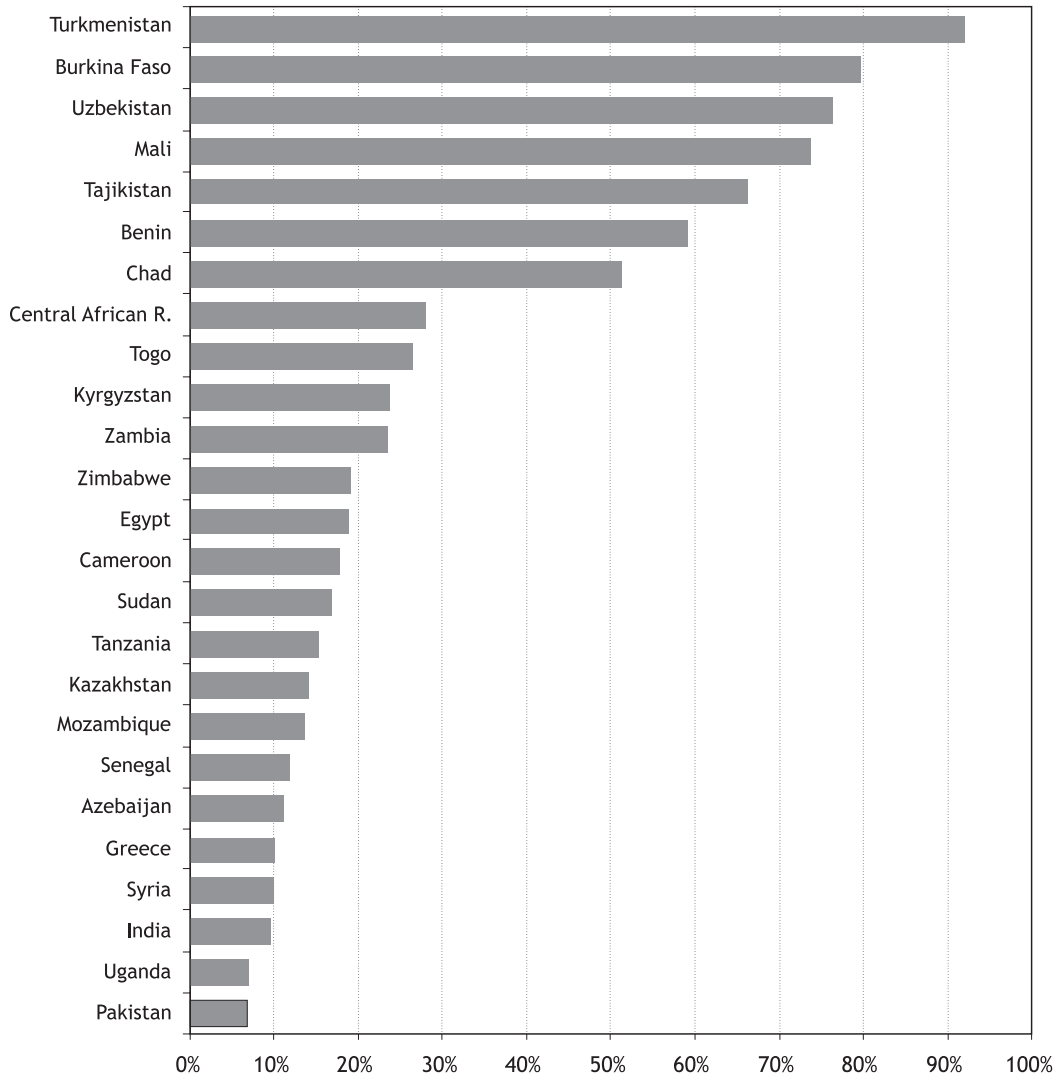
ANNEX B: FIGURES

Figure 1.1: Shares of LDC Combined Agricultural Export Receipts, 2004–07 (by product)



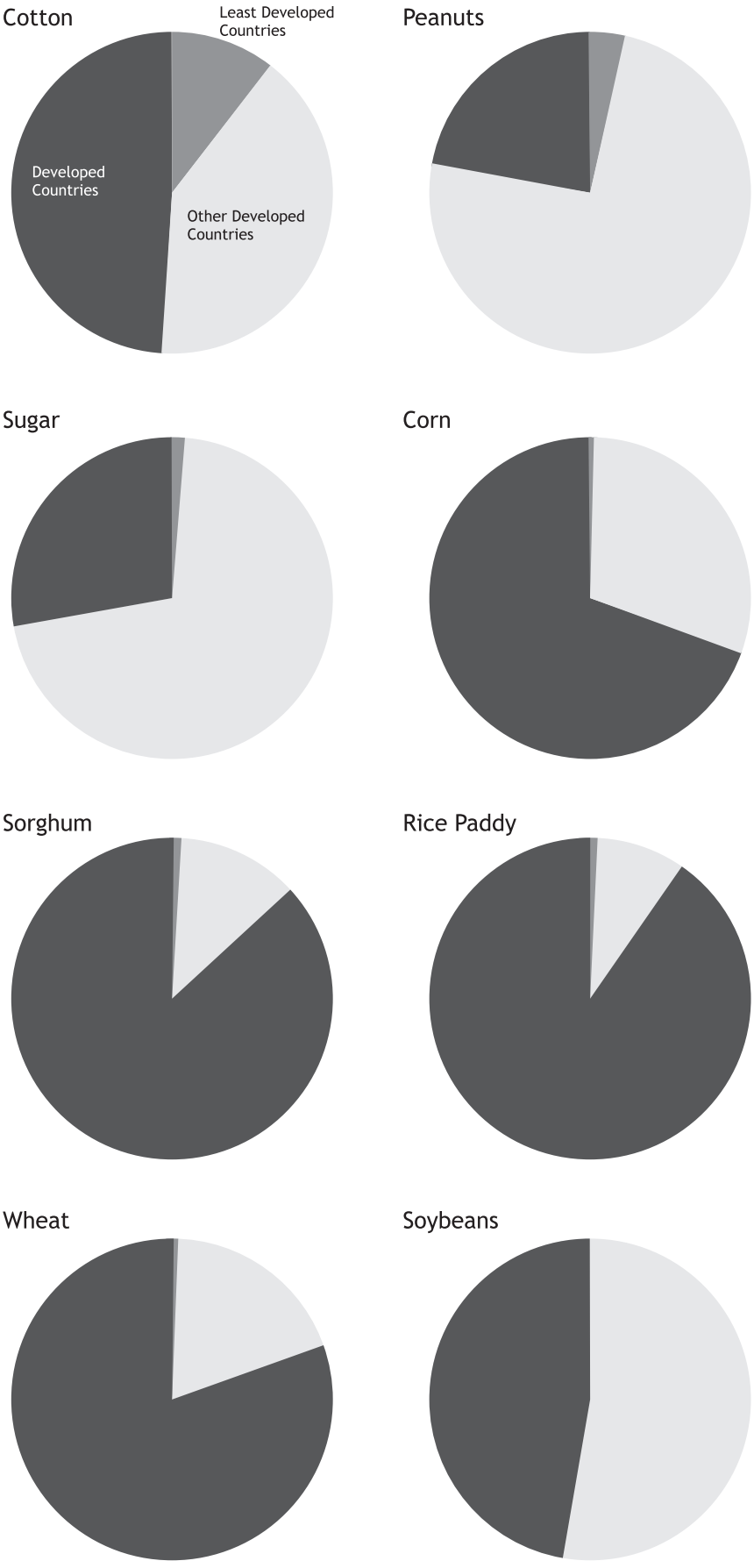
Source: Author. Based on FAO data.

Figure 1.2: Share of Cotton in Total Agricultural Export Receipts, 2004–07 (by country)



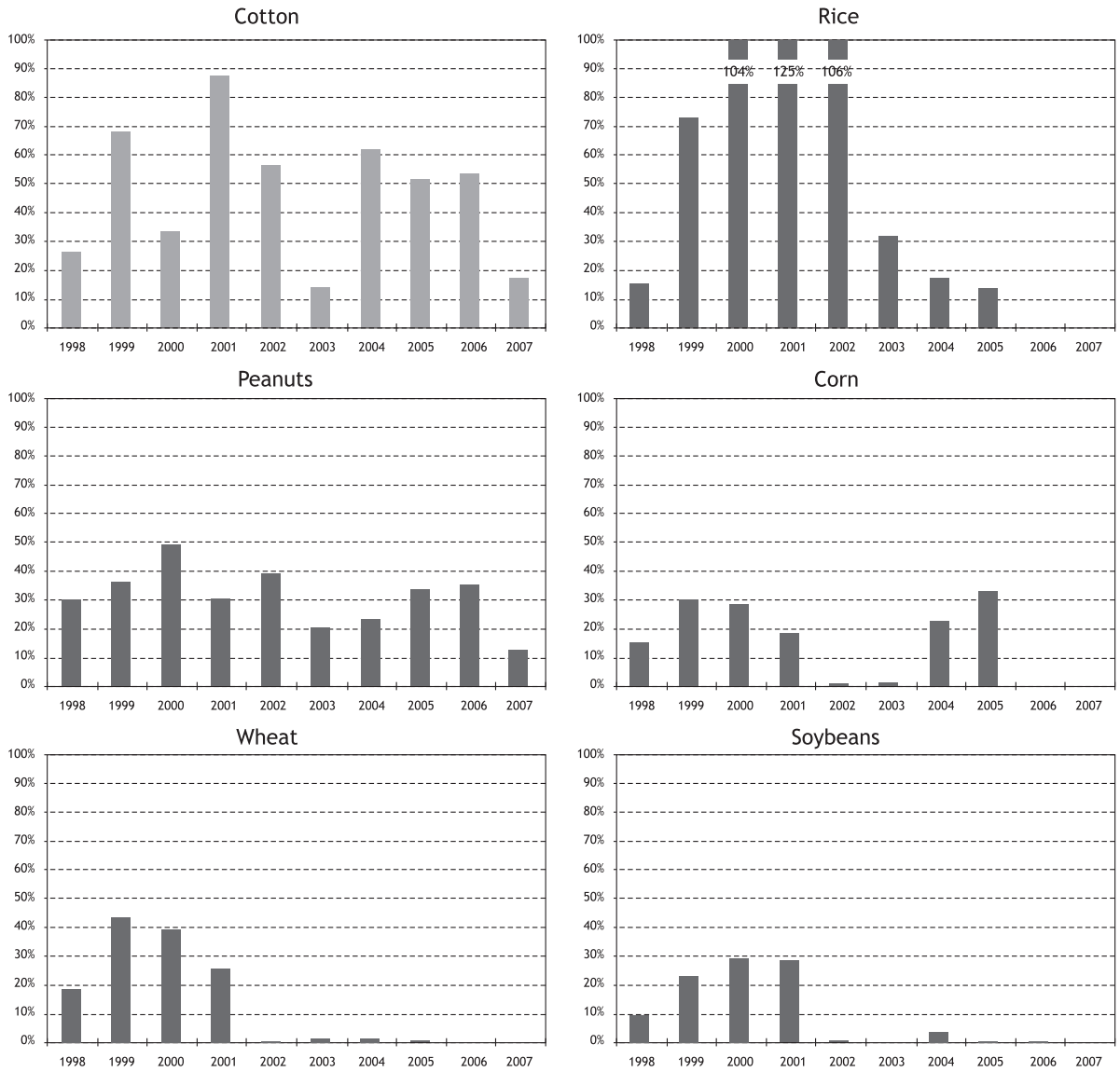
LDCs are indicated by solid bars. Non-LDCs are indicated by crosshatched bars.
Source: Author. Based on FAO data.

Figure 1.3: Shares of World Export Quantities, By Product and Country Category, 2003–07



Source: Author. Based on FAO data.

Figure 1.4: US Trade-Distorting Support* as a Share of Production Value, 1998-2007



**Trade Distorting Support: Notified AMS or de minimis plus Market Loss Assistance (MLA) payments and Counter-cyclical Payments (CCP).*
Source: Author. Based on WTO Notifications and USDA.

Figure 1.5: Composition of World Cotton Production, 1998-2007

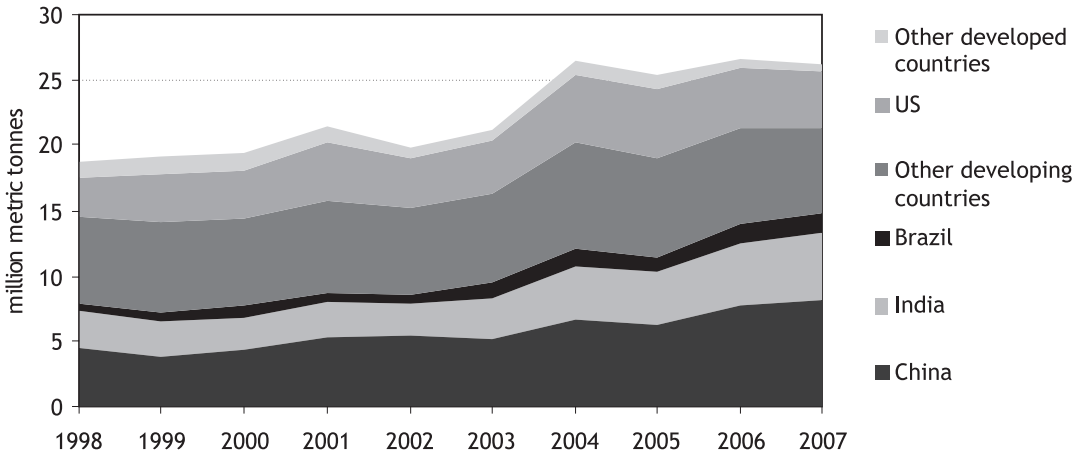


Figure 1.6: Share of World Cotton Production, 1995–98 and 2004–07 averages

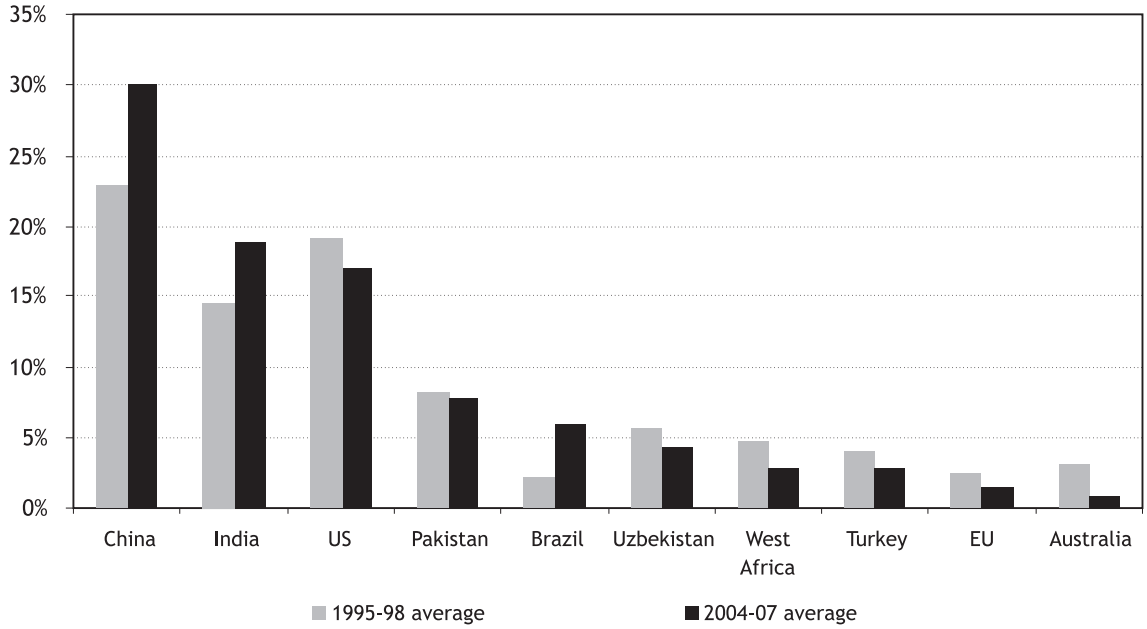


Figure 1.7: Composition of World Cotton Consumption, 1998–2007

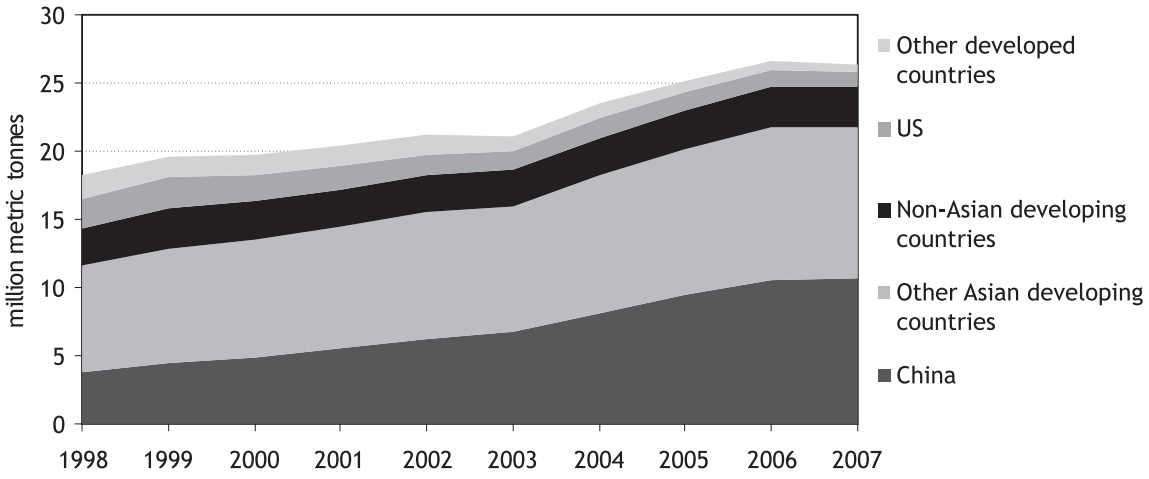


Figure 1.8: Share of World Cotton Consumption, 1995–98 and 2004–07 averages

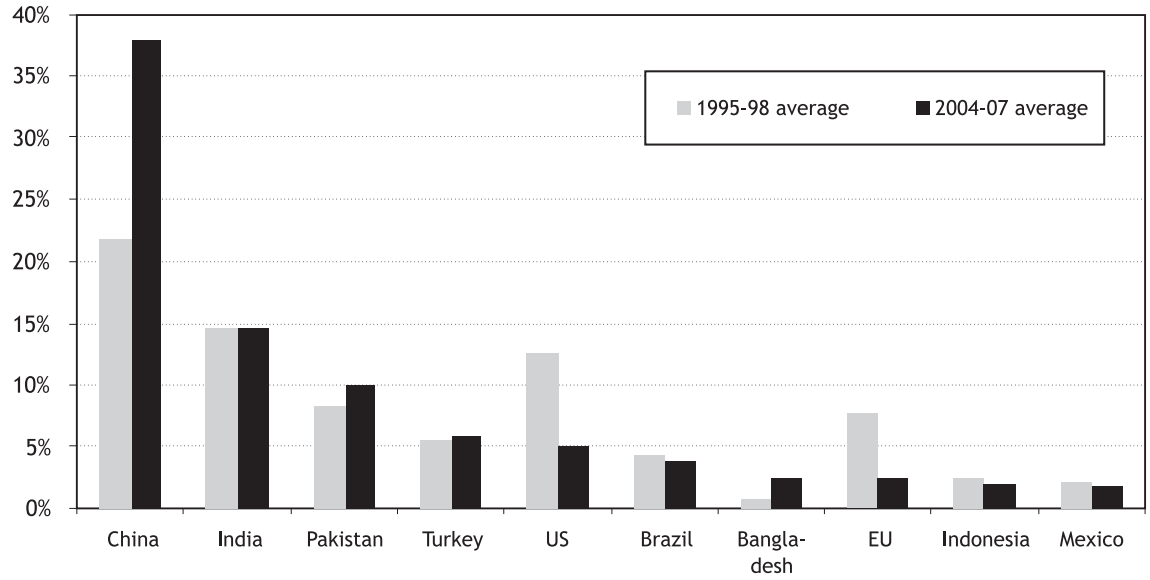


Figure 1.9: Composition of World Cotton Exports, 1998–2007

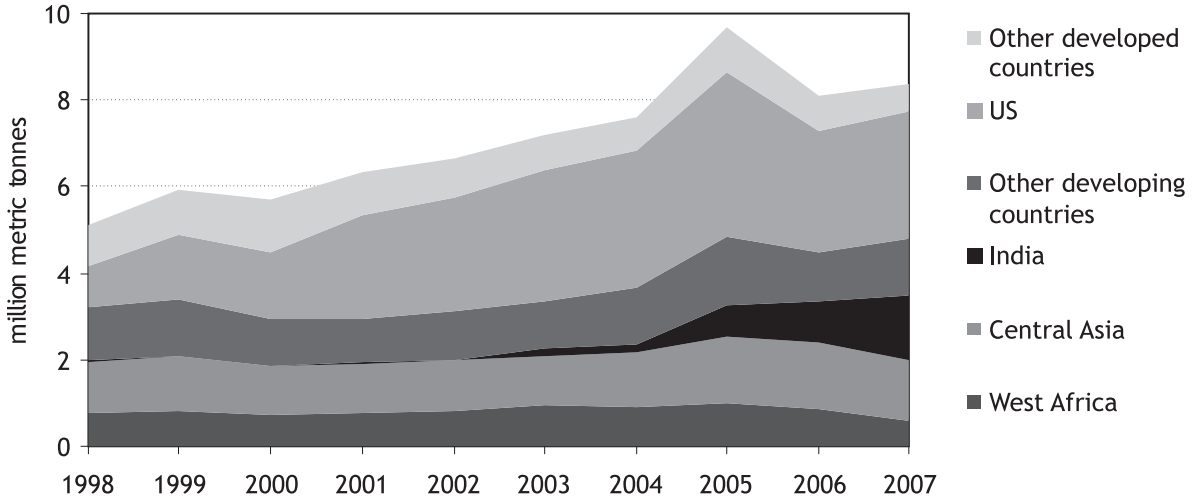


Figure 1.10: Share of World Exports, 1995–98 and 2004–07 averages

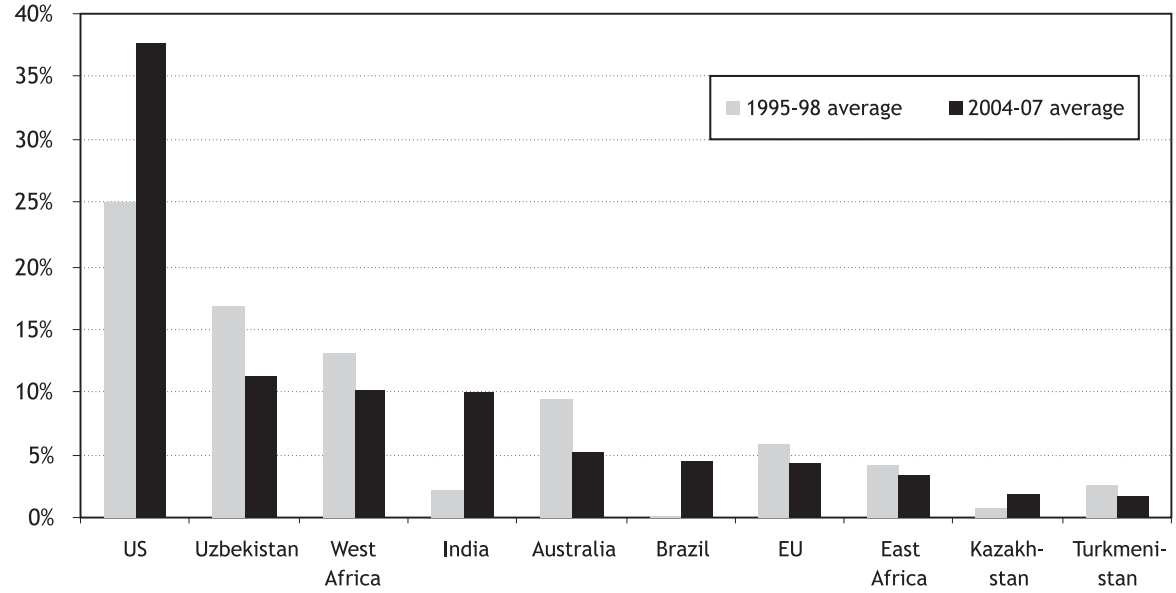


Figure 1.11: Composition of World Cotton Imports, 1998–2007

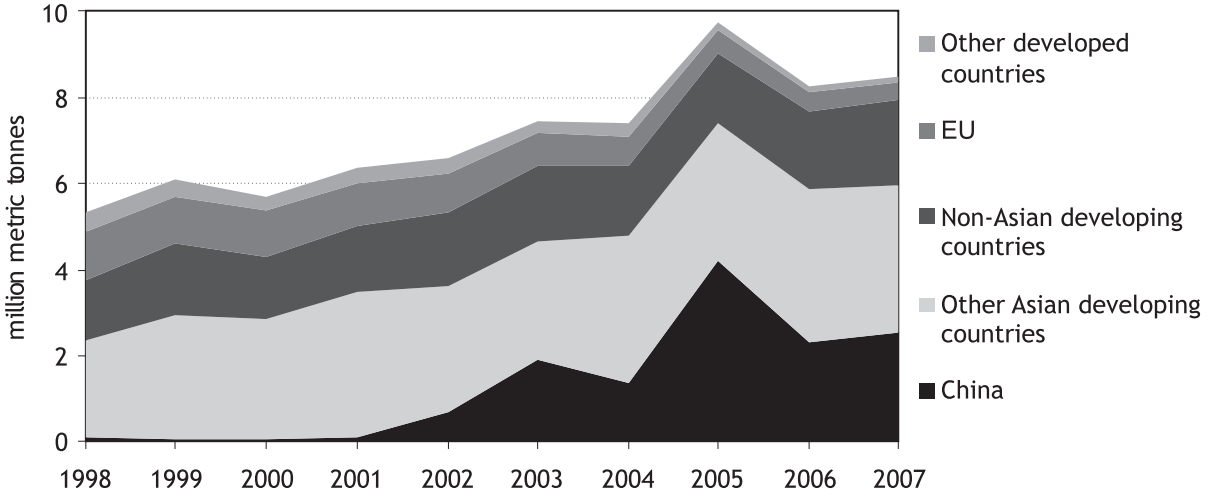


Figure 1.12: Share of World Cotton Imports, 1995–98 and 2004–07 averages

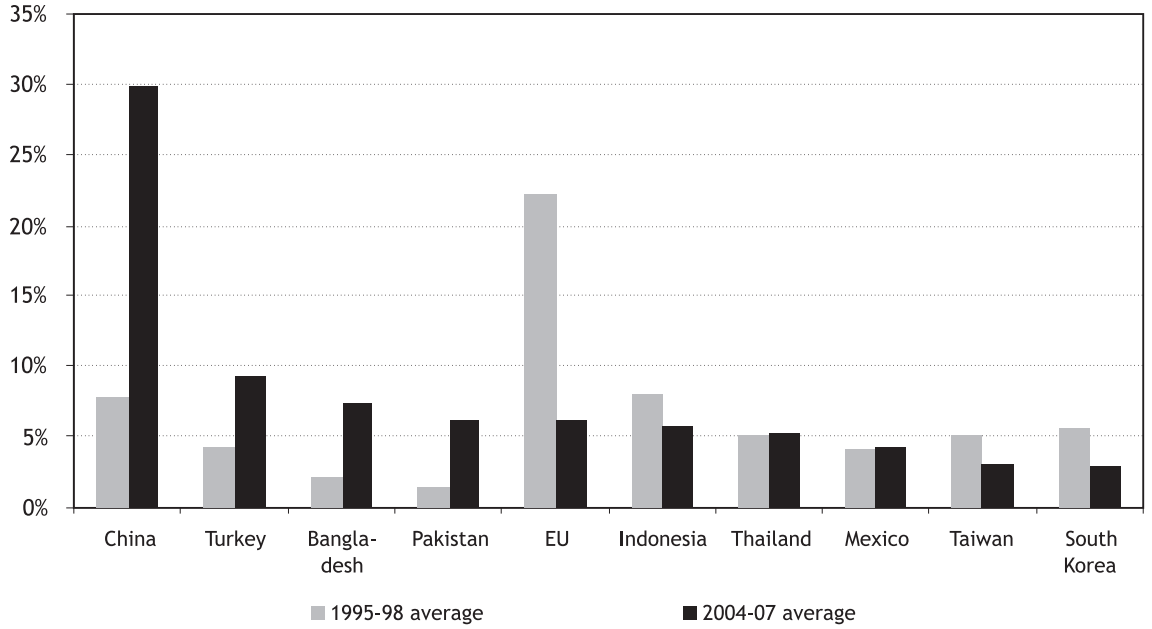


Figure 3.1: Estimated Impact of Alternative Scenarios on the Cotton World Price, 1998–2007 (percentage increase)

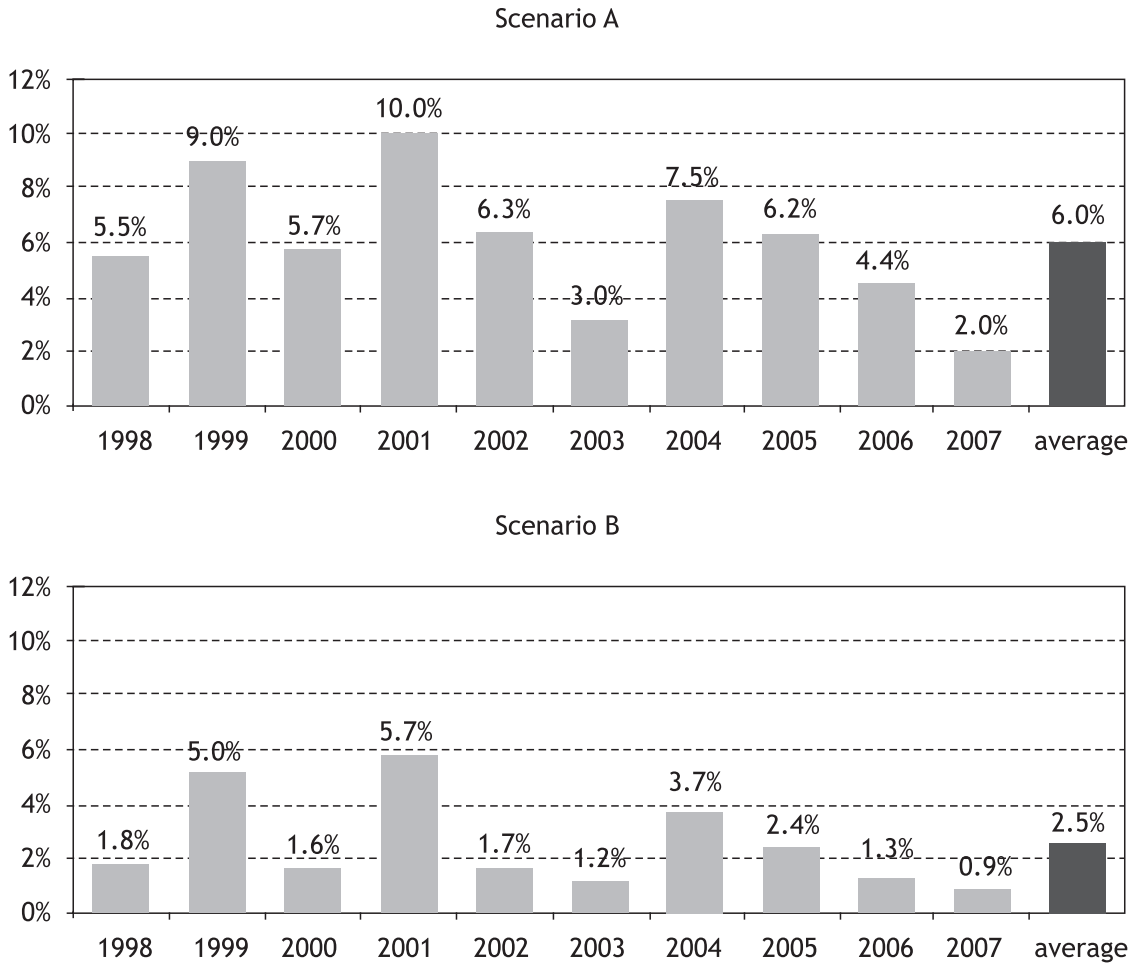
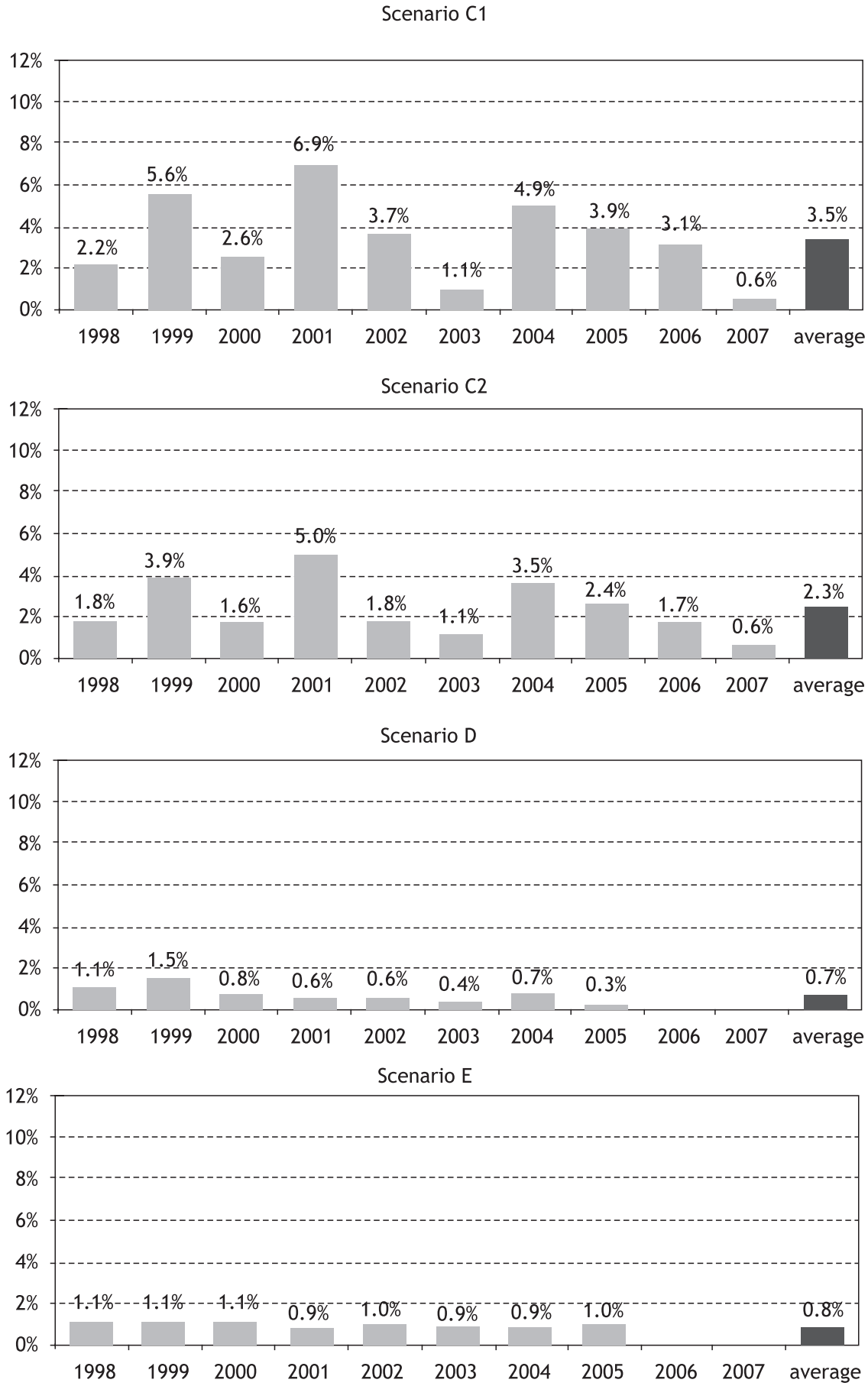
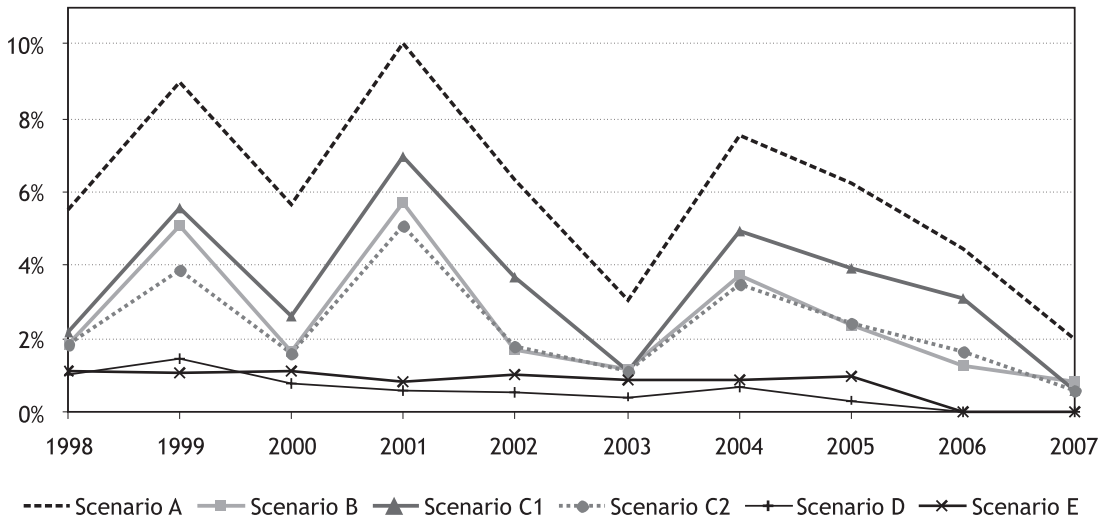


Figure 3.1: *Continued*



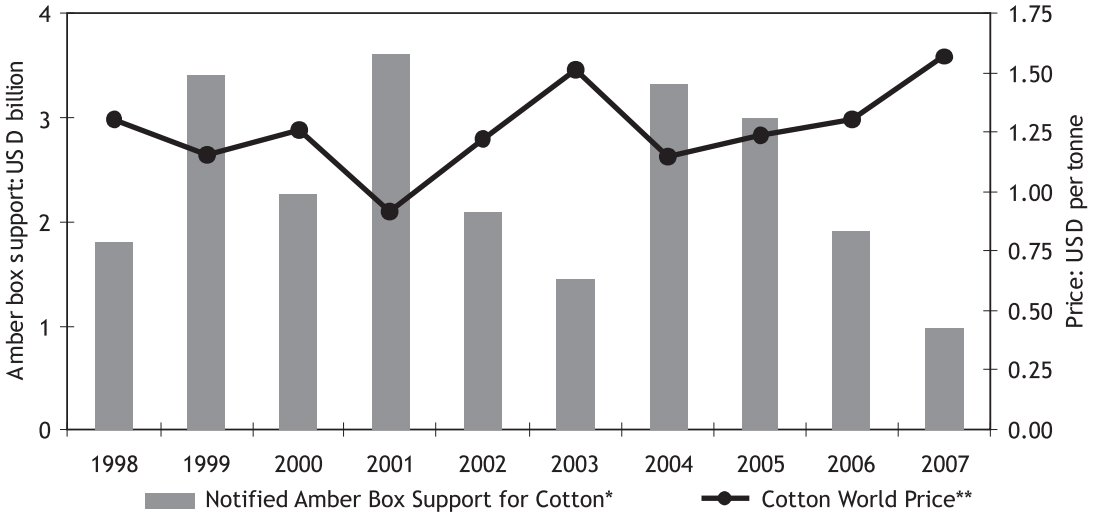
Source: Author's calculations.

Figure 3.2: Estimated Impact of Alternative Scenarios on the Cotton World Price, 1998–2007 (percentage increase)



Source: Author's calculations.

Figure 3.3: Cotton World Price and Amber Box Expenditures Notified to the WTO, 1998–2007



** Includes estimates for 2005-07 for Brazil, China and Mexico.*
*** Cotlook A Index.*
Sources: ICAC, WTO and author's adjustments.

Figure 3.4: Estimated Impact of Alternative Scenarios on Cotton World Price, Production and Production Value

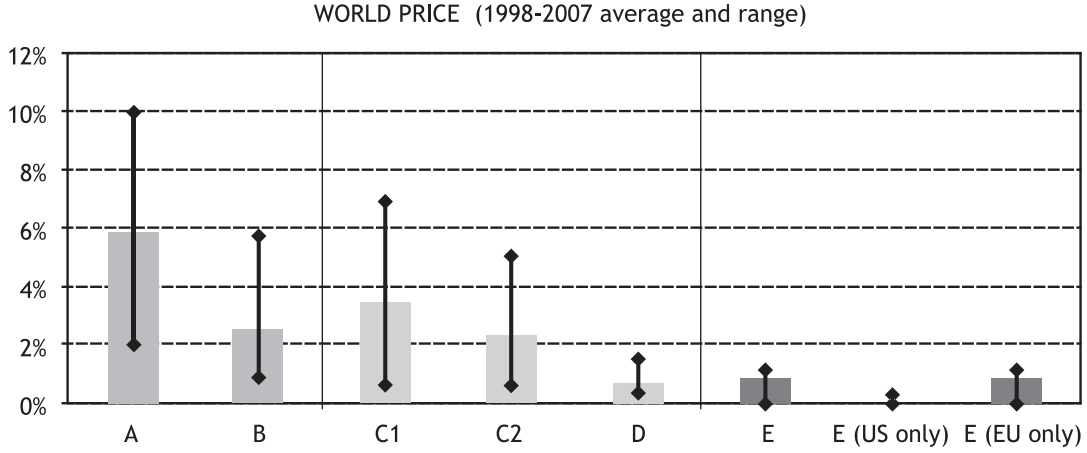
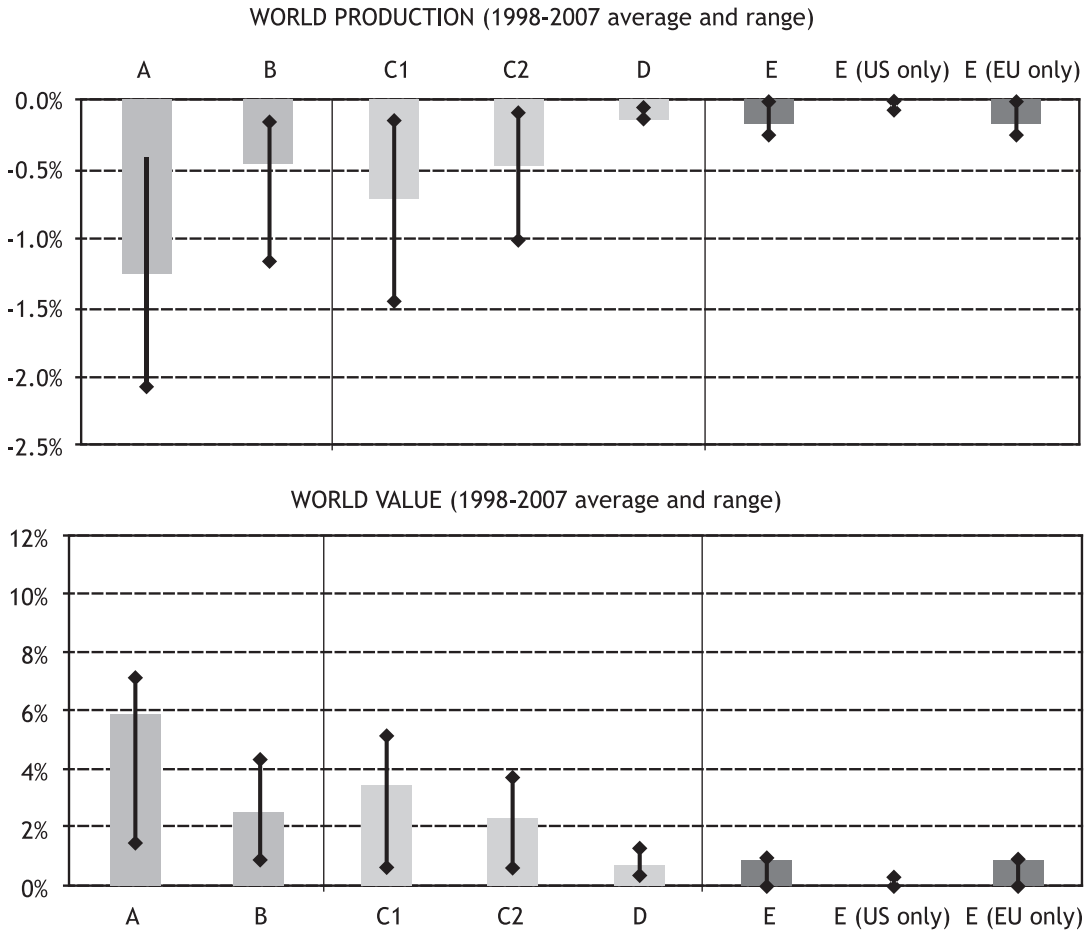


Figure 3.4: *Continued*



Source: Author's calculations.

Figure 3.5: Estimated Impact of Alternative Scenarios on Cotton Production Quantities (1998–2007 averages and ranges)

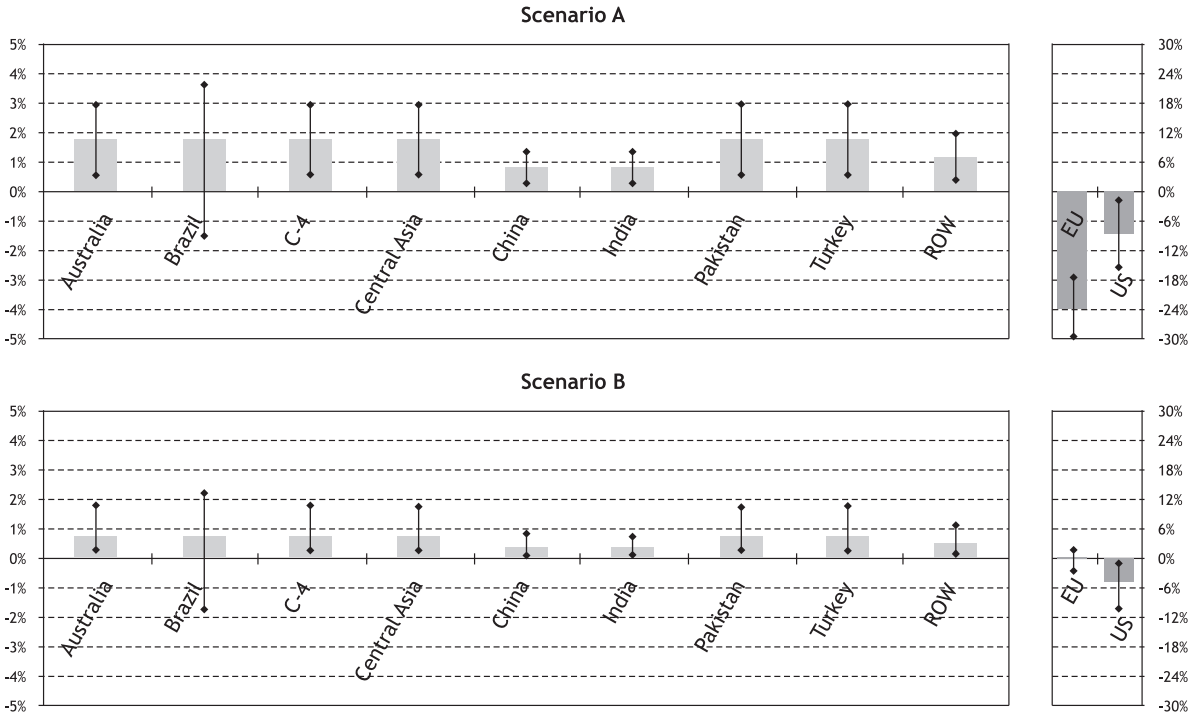
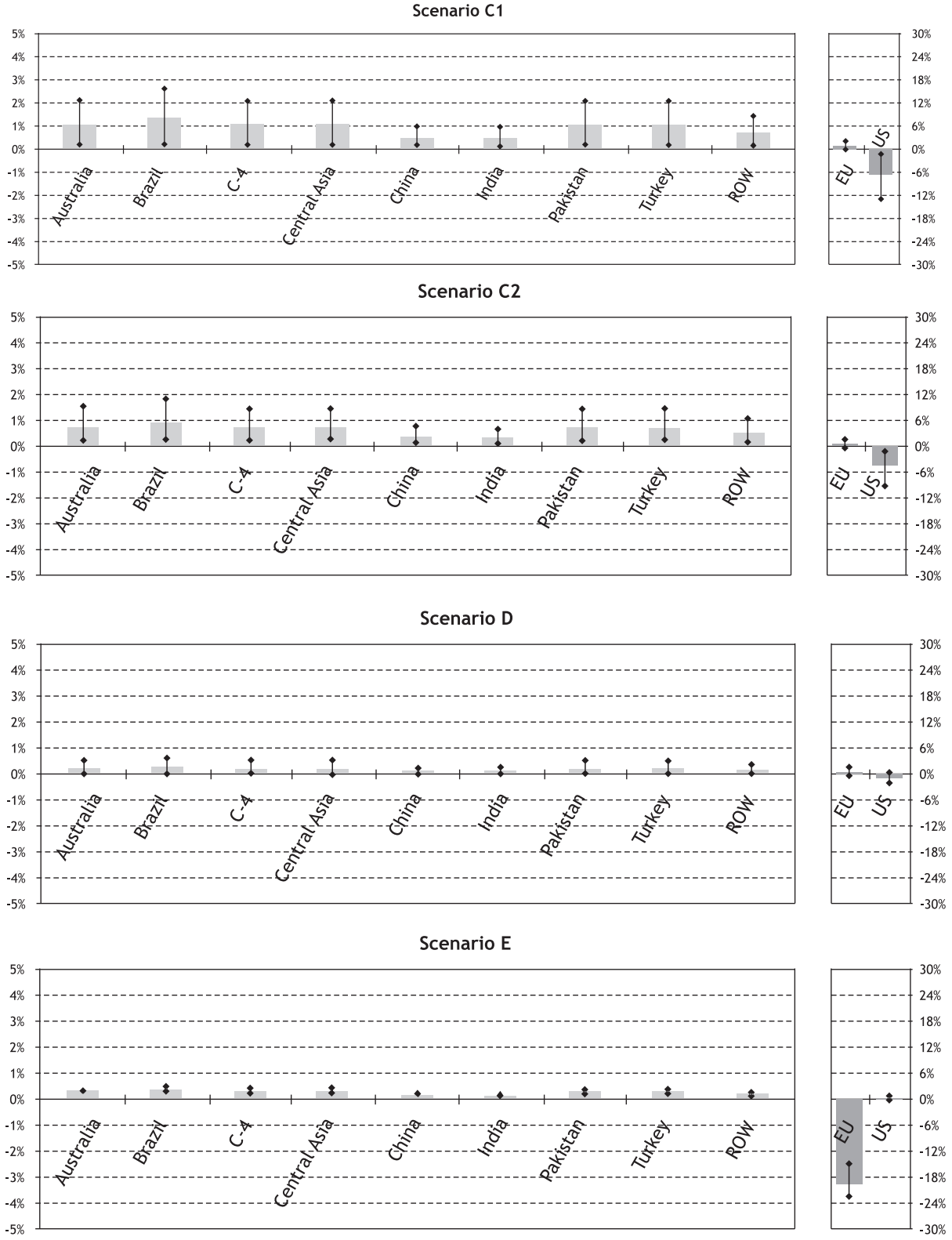


Figure 3.5: *Continued*



Source: Author's calculations.

Figure 3.6: Estimated Impact of Alternative Scenarios on Cotton Production Value (1998–2007 averages and ranges)

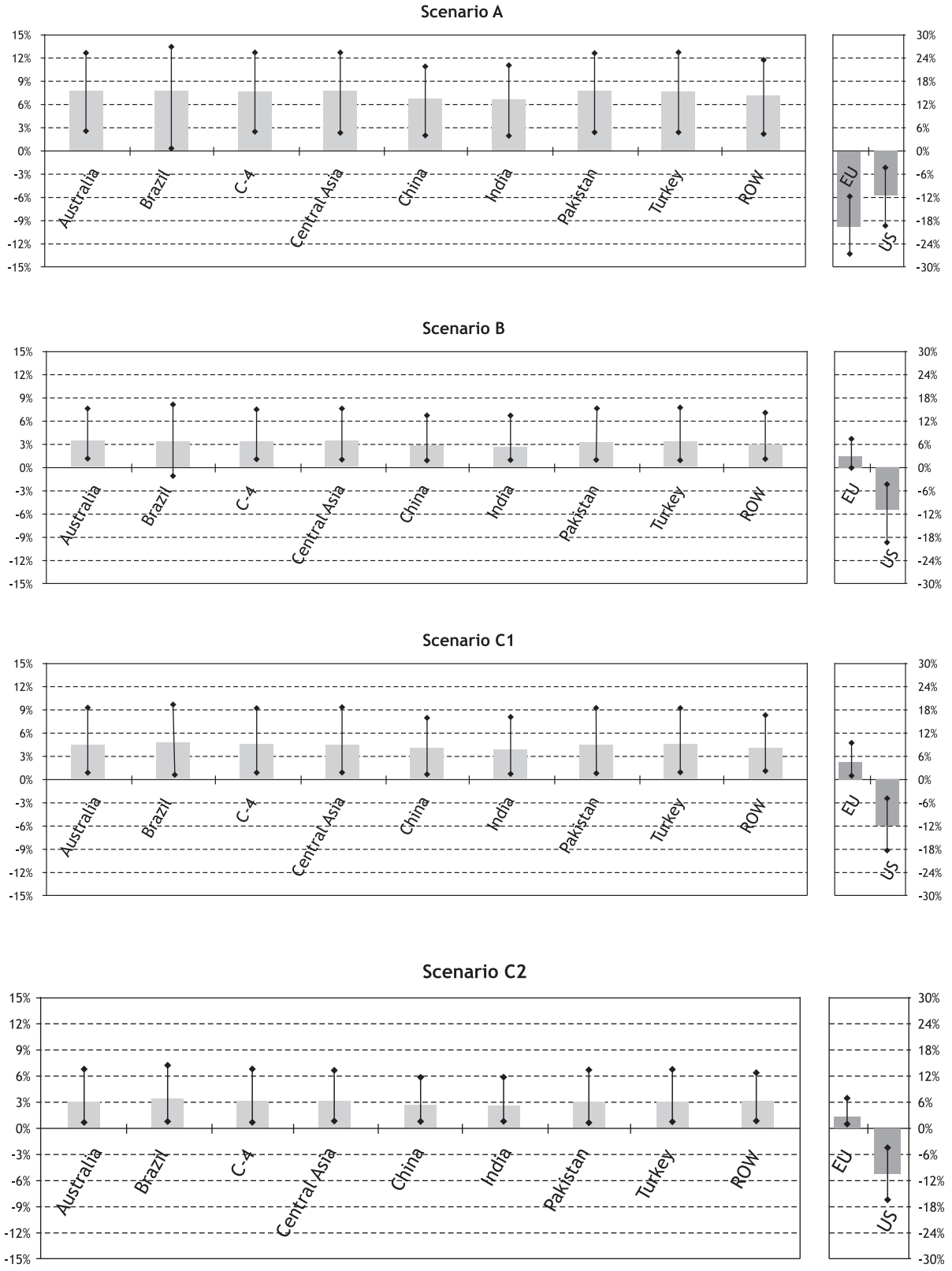
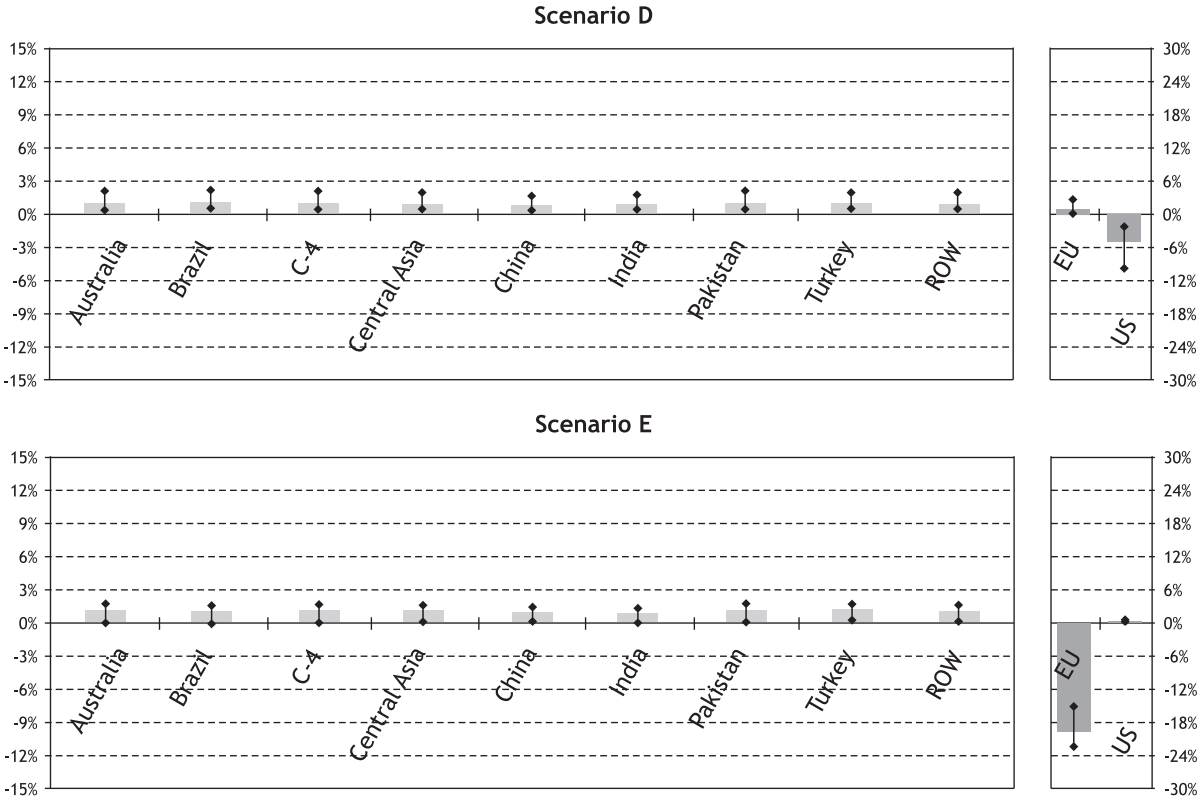


Figure 3.6: *Continued*



Source: Author's calculations.

Figure 3.7: Estimated Impact of Alternative Scenarios on Cotton Net Trade Volumes (percentage change) (1998–2007 averages)

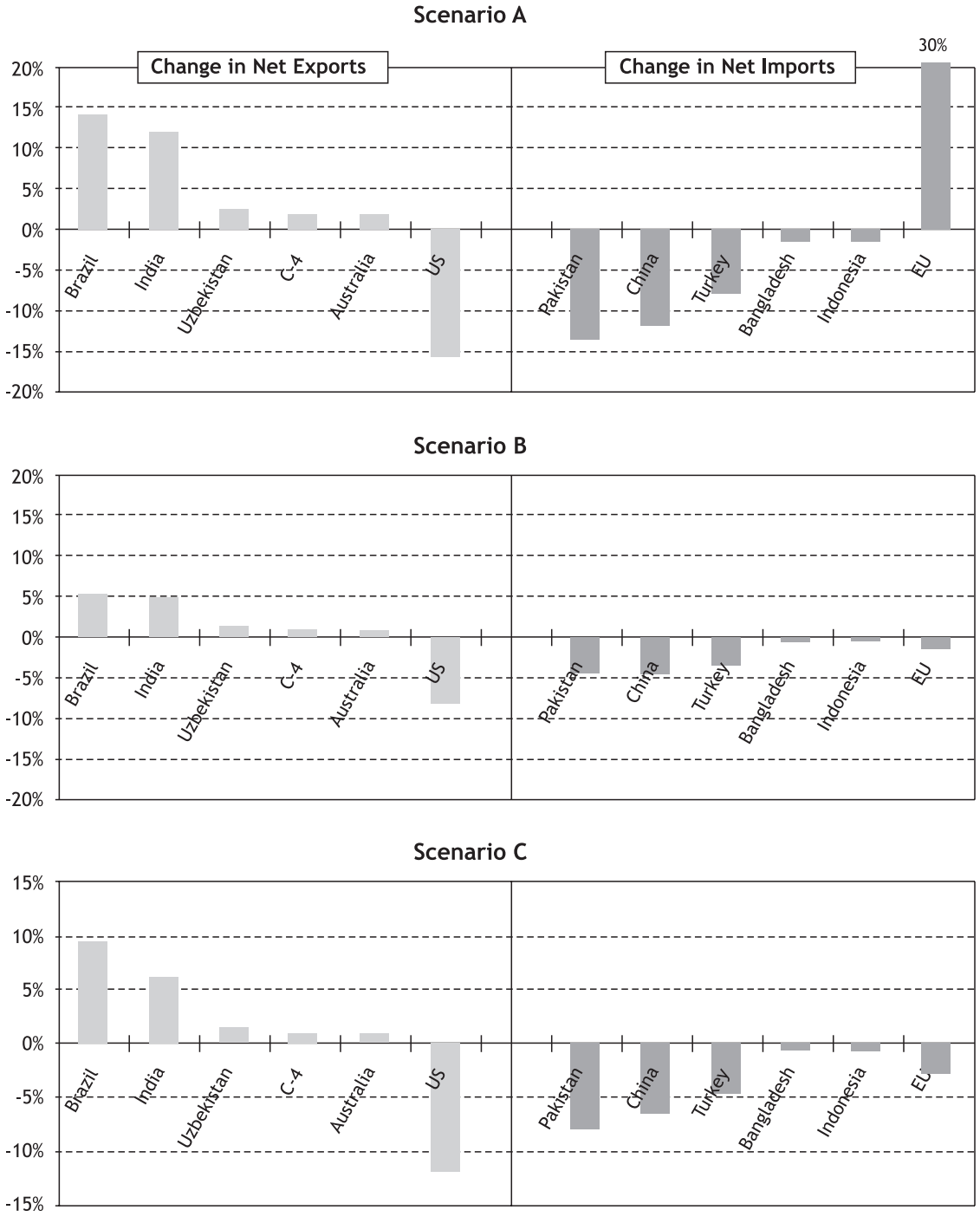
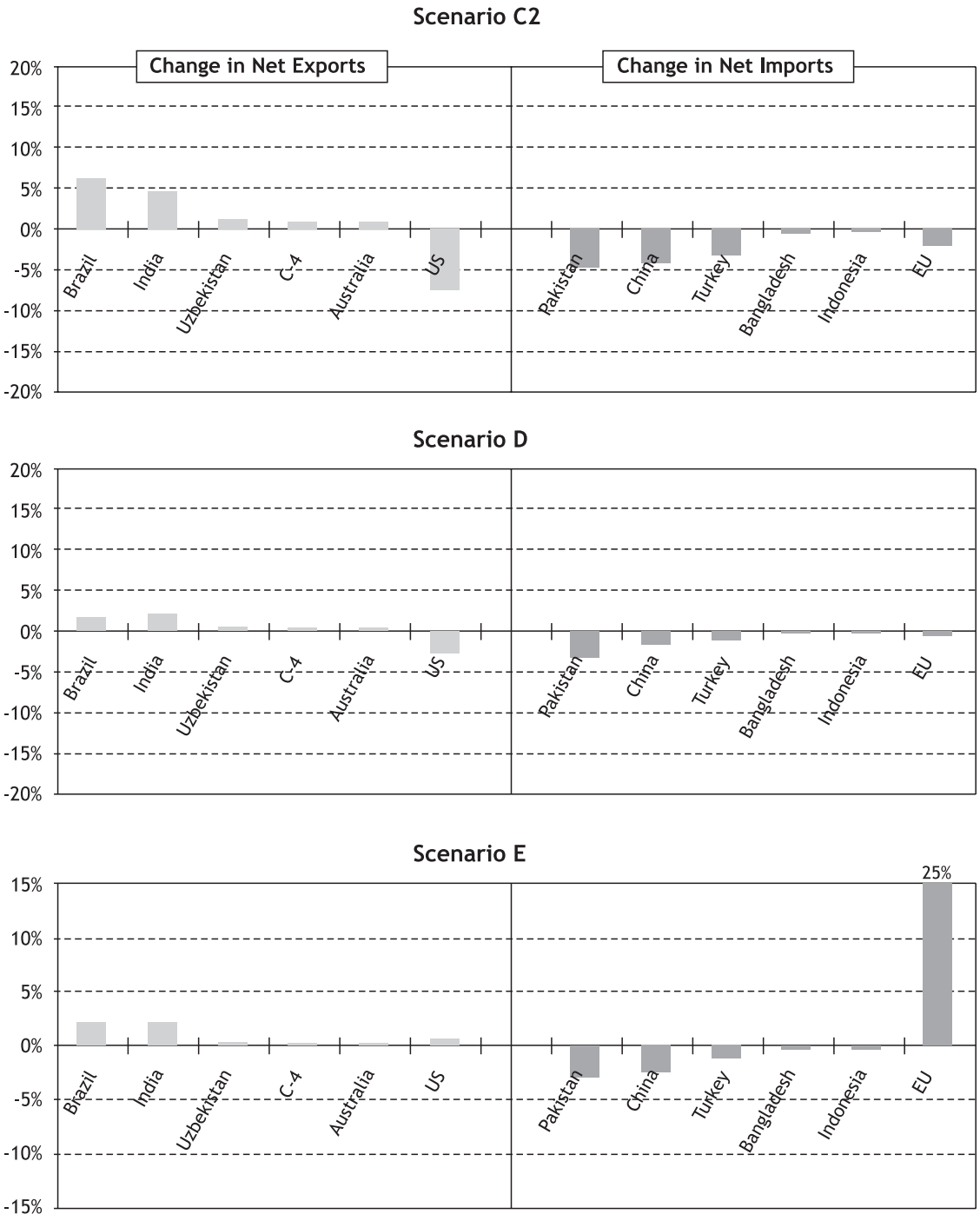


Figure 3.7: *Continued*



Source: Author's calculations.

Figure 3.8: Estimated Impact of Alternative Scenarios on Cotton Net Trade Values (percentage change) (1998–2007 averages)

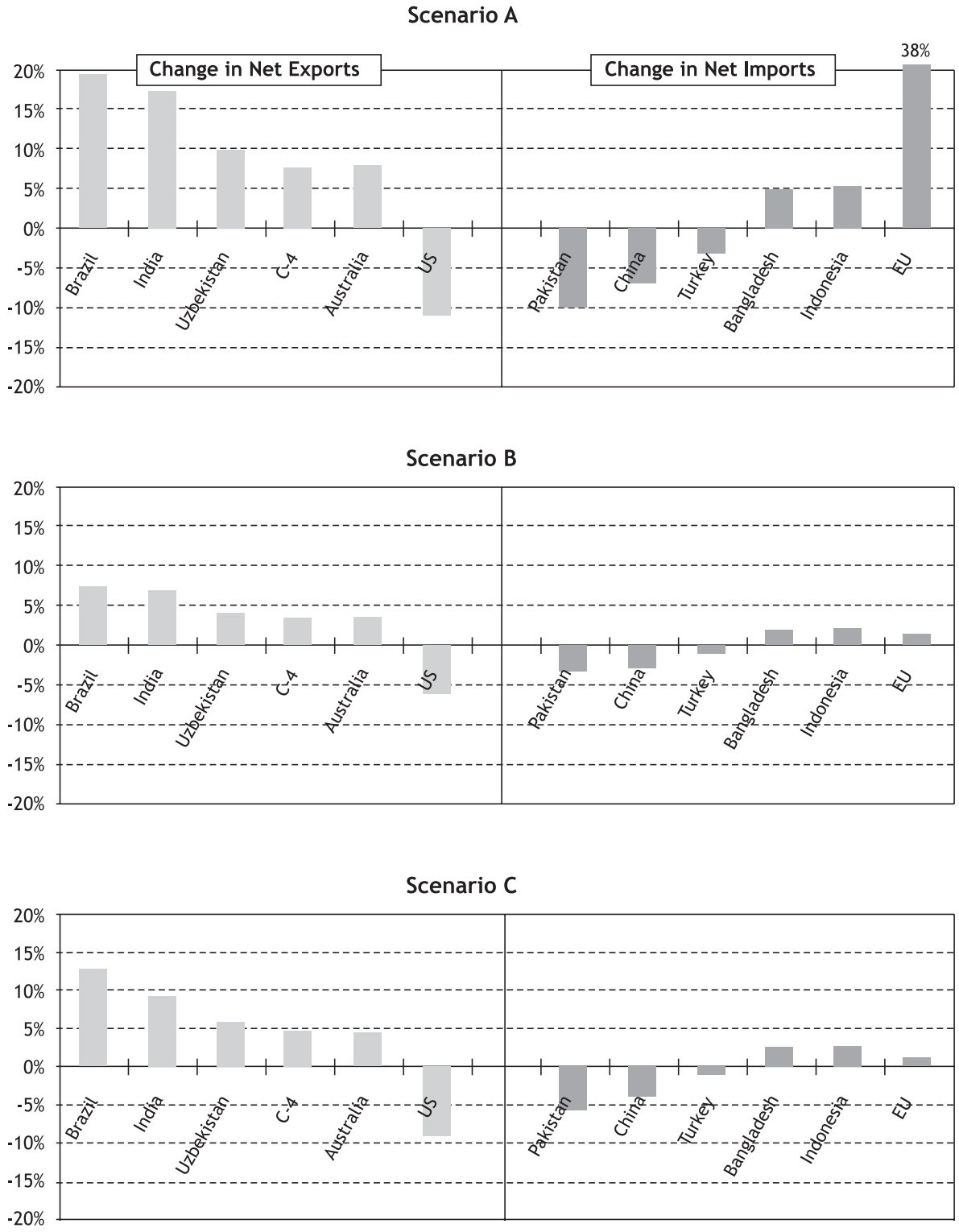
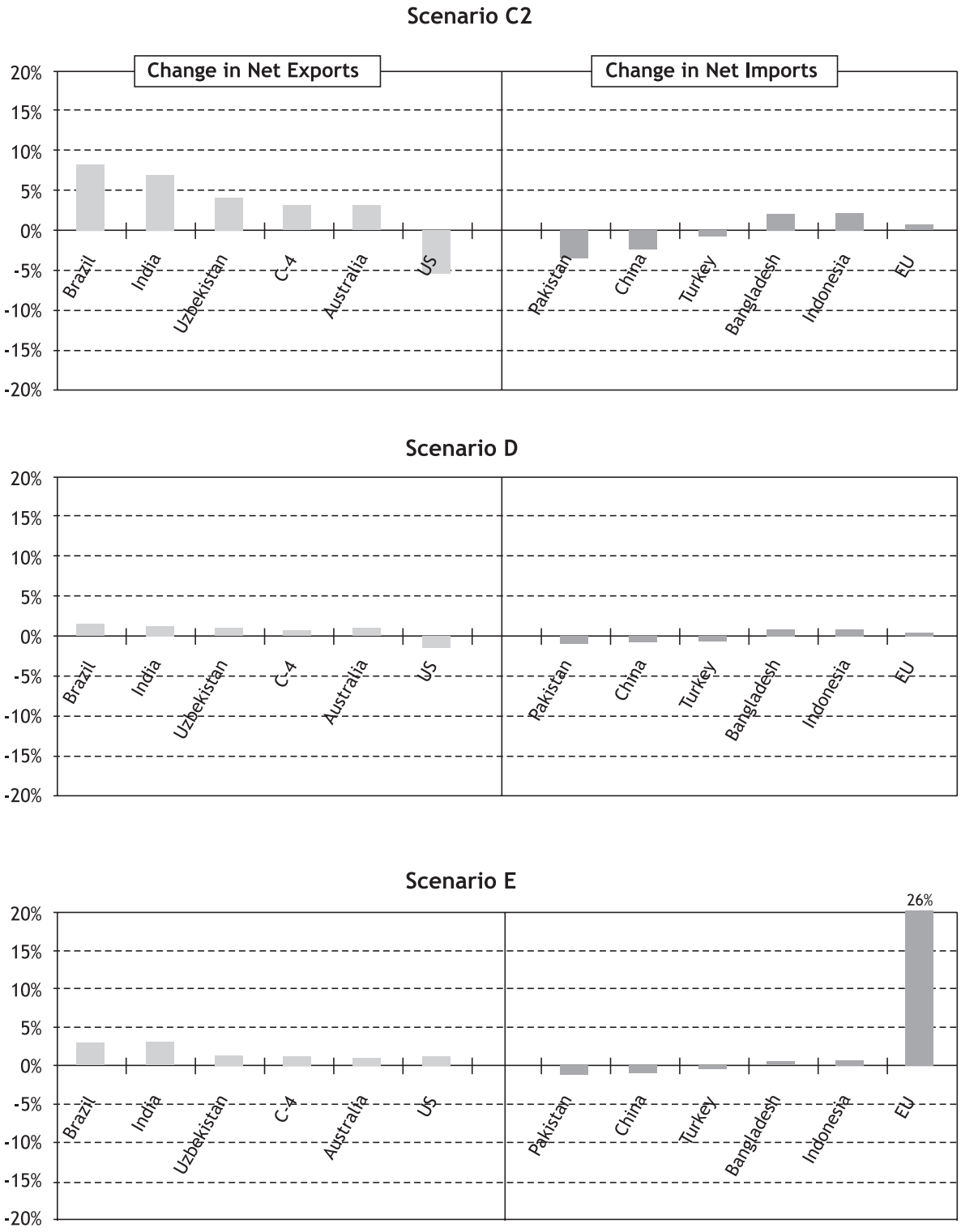


Figure 3.8: *Continued*



Source: Author's calculations.

ANNEX C: TABLES

Table 3.1: Price Elasticities of Supply and Demand in Selected Countries (by source)

Country	Price Elasticity of Supply (ε)		Price Elasticity of Demand (η)	
	Summer (2003)	Poonyth *et al.* (2004)	Summer (2003)	Poonyth *et al.* (2004)
Australia	0.30	0.80	-0.47	-0.60
Bangladesh 1/	0.30	1.20	-0.20	-0.60
Benin 2/	0.30	0.80	-0.25	-0.60
Brazil	0.40	1.20	-0.31	-0.60
Burkina Faso 2/	0.30	0.80	-0.25	-0.60
Chad 2/	0.30	0.80	-0.25	-0.60
China	0.14	1.20	-0.26	-1.00
Colombia 3/	0.30	0.80	-0.65	-1.30
EU	0.60	0.80	-0.16	-0.60
Hong Kong 6/, 8/	0.20	0.80	-0.46	-0.60
India	0.13	1.20	-0.20	-0.80
Indonesia 1/	0.30	0.80	-0.20	-0.60
Iran 4/	0.30	0.80	-0.20	-0.60
Japan	0.20	0.74	-0.33	-0.60
Kazakhstan 5/, 7/	0.30	0.80	-0.20	-0.60
Mali 2/	0.30	0.80	-0.25	-0.60
Mexico	0.50	1.00	-0.14	-1.30
Pakistan	0.30	1.20	-0.24	-1.00
South Korea	0.20	0.80	-0.31	-0.60
Syria 4/	0.30	0.80	-0.20	-0.60
Taiwan	0.20	0.80	-0.46	-0.60
Thailand 1/	0.30	0.80	-0.20	-0.60
Turkey	0.30	1.20	-0.25	-0.60
Turkmenistan 5/	0.30	1.20	-0.20	-0.60
US	0.42	0.80	-0.20	-0.60
Uzbekistan	0.30	0.80	-0.25	-0.60
ROW	0.20	0.20	-0.20	-0.20

Sources: Sumner (2003) and Poonyth et al. (2004).
1/ Corresponds to "Other Asia" in Sumner (2003).
2/ Corresponds to "Africa" in Sumner (2003).
3/ Corresponds to "Other Latin America" in Sumner (2003).
4/ Corresponds to "Other Middle-East" in Sumner (2003).
5/ Corresponds to "Uzbekistan" in Sumner (2003).
6/ Corresponds to "Taiwan" in Sumner (2003).
7/ Corresponds to "Uzbekistan" in Poonyth et al. (2004).
8/ Corresponds to "Taiwan" in Poonyth et al. (2004).

Table 3.2: Estimated Impact on the Cotton World Price According to Alternative Sets of Elasticities, 1998–2007 (by base year)

Elasticises	Base Year										Average	Highest
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007		
Scenario A: December 2008 Revised Draft Modalities												
Summer (2003)	5.5%	9.0%	5.7%	10.0%	6.3%	3.0%	7.5%	6.2%	4.4%	20.%	6.0%	10.0%
Poonyth ey al (2004)	2.9%	4.9%	3.0%	5.0%	3.2%	1.5%	3.7%	3.1%	2.2%	0.9%	3.1%	5.0%
Scenario B: Cotton Treated as a Standard Product												
Summer (2003)	1.8%	5.0%	1.6%	5.7%	1.7%	1.2%	3.7%	2.4%	1.3%	0.9%	2.5%	5.7%
Poonyth ey al (2004)	1.2%	3.0%	1.0%	3.2%	1.0%	0.7%	2.0%	1.2%	0.7%	0.5%	1.4%	3.2%
Scenario C1: Full Implementation of DSB Recommendations (2% Maximum Price Effect)												
Summer (2003)	2.2%	5.6%	2.6%	6.9%	3.7%	1.1%	4.9%	3.9%	3.1%	0.6%	3.5%	6.9%
Poonyth ey al (2004)	1.3%	3.3%	1.5%	3.8%	2.0%	0.7%	2.6%	2.1%	1.6%	0.3%	1.9%	3.8%
Scenario C2: Full Implementation of DSB Recommendations (4% Maximum Price Effect)												
Summer (2003)	1.8%	3.9%	1.6%	5.0%	1.8%	1.1%	3.5%	2.4%	1.7%	0.6%	2.3%	5.0%
Poonyth ey al (2004)	1.2%	2.3%	1.0%	2.8%	1.0%	0.7%	1.9%	1.3%	0.9%	0.3%	1.3%	2.8%
Scenario D: Incomplete Implementation of DSB Recommendations												
Summer (2003)	1.1%	1.5%	0.8%	0.6%	0.6%	0.4%	0.7%	0.3%	-	-	0.7%	1.5%
Poonyth ey al (2004)	0.7%	0.9%	0.5%	0.4%	0.3%	0.2%	0.4%	0.2%	-	-	0.%	0.9%
Scenario E: Internal Policy Reforms in the US and EU												
Summer (2003)	1.1%	1.1%	1.1%	0.9%	1.0%	0.9%	0.9%	1.0%	0.0%	0.0%	0.8%	1.1%
Poonyth ey al (2004)	0.4%	0.4%	0.4%	0.3%	0.4%	0.3%	0.3%	0.4%	0.0%	0.0%	0.4%	0.4%

Source: Author's calculations.

Table 3.3: Estimated Impact on Cotton Production Quantities According to Alternative Sets of Elasticities, 1998–2007 averages (by country or region)

	Scenario A		Scenario B		Scenario C1		Scenario C2		Scenario D		Scenario E	
	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*
Australia	1.77%	2.44%	0.76%	1.16%	1.04%	1.54%	0.70%	1.07%	0.22%	0.36%	0.30%	0.30%
Brazil	1.80%	2.16%	0.76%	1.04%	1.32%	2.20%	0.89%	1.53%	0.28%	0.52%	0.38%	0.42%
C-4	1.77%	2.44%	0.76%	1.16%	1.04%	1.54%	0.70%	1.07%	0.22%	0.36%	0.30%	0.30%
Central Asia	1.77%	2.44%	0.76%	1.16%	1.04%	1.54%	0.70%	1.07%	0.22%	0.36%	0.30%	0.30%
China	0.80%	3.53%	0.34%	1.67%	0.47%	2.22%	0.32%	1.54%	0.10%	0.52%	0.14%	0.43%
EU	-23.66%	-32.62%	0.19%	-0.16%	0.99%	0.73%	0.66%	0.51%	0.20%	0.17%	-19.74%	-26.55%
India	0.77%	3.66%	0.33%	1.74%	0.45%	2.31%	0.30%	1.60%	0.10%	0.54%	0.13%	0.44%
Pakistan	1.77%	3.66%	0.76%	1.74%	1.04%	2.31%	0.70%	1.60%	0.22%	0.54%	0.30%	0.44%
Turkey	1.77%	3.66%	0.76%	1.74%	1.04%	2.31%	0.70%	1.60%	0.22%	0.54%	0.30%	0.44%
US	-8.78%	-18.52%	-4.55%	-9.34	-6.69%	-13.68%	-4.29%	-8.82%	-1.18%	-2.42%	0.33%	0.26%
ROW	1.18%	0.61%	0.51%	0.29%	0.29%	0.39%	0.47%	0.20%	0.15%	0.90%	0.20%	0.07%

Source: Author's calculations.

Table 3.4: Estimated Impact on Cotton Production Values According to Alternative Sets of Elasticities, 1998–2007 averages (by country or region)

	Scenario A		Scenario B		Scenario C1		Scenario C2		Scenario D		Scenario E	
	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*
Australia	7.78%	5.58%	3.32%	2.63%	4.54%	3.51%	3.06%	2.43%	0.96%	0.63%	1.04%	0.53%
Brazil	7.83%	5.31%	3.32%	2.52%	4.83%	4.30%	3.26%	4.18%	1.02%	0.75%	1.11%	0.64%
C-4	7.78%	5.58%	3.32%	2.63%	4.54%	3.51%	3.06%	2.43%	0.96%	0.63%	1.04%	0.53%
Central Asia	7.78%	5.58%	3.32%	2.63%	4.54%	3.51%	3.06%	2.43%	0.96%	0.63%	1.04%	0.53%
China	6.75%	6.71%	2.88%	3.15%	3.95%	4.21%	2.66%	2.91%	0.84%	0.75%	0.91%	0.64%
EU	-19.16%	-30.57%	2.73%	1.29%	4.49%	2.68%	3.02%	1.85%	0.94%	0.48%	-15.15%	-21.02%
India	6.71%	6.85%	2.87%	3.22%	3.93%	4.30%	2.65%	4.30%	0.83%	0.77%	0.91%	0.65%
Pakistan	7.78%	6.85%	3.32%	3.22%	4.54%	4.30%	3.06%	4.30%	0.96%	0.77%	1.04%	0.65%
Turkey	7.78%	6.85%	3.32%	3.22%	4.54%	4.30%	3.06%	4.30%	0.96%	0.77%	1.04%	0.65%
US	-11.67%	-23.12%	-10.49%	-15.81%	-11.72%	-19.48%	-10.41%	-15.44%	-4.99%	-4.69%	1.29%	0.71%
ROW	7.15%	3.68%	3.05%	4.18%	4.18%	2.32%	2.82%	1.61%	0.89%	0.44%	0.96%	0.35%

Source: Author's calculations.

Table 3.5: Estimated Impact on Cotton Net Export and Import Volumes According to Alternative Sets of Elasticities, 1998–2007 averages (by country or region)

	Scenario A		Scenario B		Scenario C1		Scenario C2		Scenario D		Scenario E	
	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*
NET EXPORTERS												
Australia	1.8%	2.5%	0.8%	1.2%	1.0%	1.5%	0.7%	1.1%	0.2%	0.4%	0.2%	0.2%
Benin	1.8%	2.5%	0.8%	1.2%	1.1%	1.6%	0.7%	1.1%	0.2%	0.4%	0.2%	0.2%
Brazil	14.0%	15.3%	5.2%	5.5%	9.6%	13.1%	6.2%	8.6%	1.5%	2.2%	2.2%	2.0%
Burkina Faso	1.8%	2.5%	0.8%	1.2%	1.1%	1.6%	0.7%	1.1%	0.2%	0.4%	0.2%	0.2%
Chad	1.9%	2.7%	0.8%	1.3%	1.1%	1.7%	0.8%	1.2%	0.2%	0.4%	0.3%	0.3%
India	12.1%	37.4%	4.7%	16.5%	6.3%	21.6%	4.7%	16.4%	1.7%	6.3%	2.3%	5.1%
Kazakhstan	2.2%	3.0%	0.9%	1.4%	1.2%	1.9%	0.8%	1.3%	0.3%	0.5%	0.3%	0.3%
Mali	1.8%	2.5%	0.8%	1.2%	1.1%	1.6%	0.7%	1.1%	0.2%	0.4%	0.2%	0.2%
Turkmenistan	3.8%	7.3%	1.6%	3.4%	2.2%	4.7%	1.5%	3.2%	0.4%	1.0%	0.5%	0.7%
US	-15.9%	-34.2%	-8.4%	-17.5%	-11.9%	-24.6%	-7.7%	-16.2%	-2.6%	-5.5%	0.7%	0.6%
Uzbekistan	2.6%	3.5%	1.1%	1.7%	1.5%	2.2%	1.0%	1.5%	0.3%	0.5%	0.4%	0.3%
NET IMPORTERS												
Bangladesh	-1.3%	-2.1%	-0.6%	-1.0%	-0.8%	-1.3%	-0.5%	-0.9%	-0.2%	-0.3%	-0.2%	-0.2%
China	-11.9%	-32.6%	-4.7%	-14.5%	-6.8%	-20.0%	-4.3%	-13.3%	-1.8%	-5.7%	-1.7%	-3.4%
Colombia	-6.5%	-5.0%	-3.3%	-4.0%	-4.5%	-5.3%	-3.1%	-3.7%	-1.0%	-1.3%	-1.1%	-0.8%
EU	29.7%	39.6%	-1.6%	-2.4%	-2.8%	-4.1%	-2.0%	-2.9%	-0.6%	-0.9%	24.9%	33.5%
Indonesia	-1.2%	-1.9%	-0.5%	-0.9%	-0.7%	-1.2%	-0.5%	-0.8%	-0.2%	-0.3%	-0.2%	-0.2%
Japan	-1.9%	-1.8%	-0.8%	-0.9%	-1.1%	-1.2%	-0.8%	-0.8%	-0.2%	-0.3%	-0.3%	-0.2%
Mexico	-0.9%	-3.9%	-0.9%	-3.0%	-1.2%	-4.0%	-0.8%	-2.8%	-0.3%	-1.0%	-0.3%	-0.6%
Pakistan	-13.8%	-28.0%	-4.6%	-10.4%	-8.0%	-17.4%	-4.8%	-10.7%	-1.4%	-3.3%	-1.9%	-2.8%
South Korea	-1.8%	-1.8%	-0.8%	-0.9%	-1.1%	-1.1%	-0.7%	-0.8%	-0.2%	-0.3%	-0.2%	-0.2%
Thailand	-1.2%	-1.8%	-0.5%	-0.8%	-0.7%	-1.2%	-0.5%	-0.8%	-0.2%	-0.3%	-0.2%	-0.2%
Turkey	-8.0%	-13.0%	-3.3%	-6.0%	-4.4%	-7.8%	-3.1%	-5.6%	-1.2%	-2.3%	-1.2%	-1.4%

Source: Author's calculations.

Table 3.6: Estimated Impact on Cotton Net Export and Import Values According to Alternative Sets of Elasticities, 1998–2007 averages (by country or region)

	Scenario A		Scenario B		Scenario C1		Scenario C2		Scenario D		Scenario E	
	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*	Summer	Poonyth *et al.*
NET EXPORTERS												
Australia	7.8%	5.6%	3.3%	2.6%	4.6%	3.5%	3.1%	2.4%	0.8%	0.7%	1.0%	0.5%
Benin	7.8%	5.7%	3.3%	2.7%	4.6%	3.6%	3.1%	2.5%	0.8%	0.7%	1.1%	0.5%
Brazil	19.5%	18.1%	7.2%	6.6%	12.7%	14.8%	8.2%	9.7%	1.2%	1.5%	2.8%	2.2%
Burkina Faso	7.8%	5.6%	3.3%	2.6%	4.6%	3.5%	3.1%	2.4%	0.8%	0.7%	1.0%	0.5%
Chad	8.0%	5.8%	3.4%	2.7%	4.6%	3.7%	3.1%	2.5%	0.8%	0.7%	1.1%	0.6%
India	17.2%	40.6%	6.7%	17.7%	9.2%	23.4%	6.7%	17.6%	1.3%	3.9%	2.8%	5.3%
Kazakhstan	8.2%	6.2%	3.5%	2.9%	4.8%	3.9%	3.2%	2.7%	0.8%	0.7%	1.1%	0.6%
Mali	7.9%	5.7%	3.3%	2.7%	4.6%	3.6%	3.1%	2.5%	0.8%	0.7%	1.1%	0.5%
Turkmenistan	9.9%	10.7%	4.2%	4.9%	5.8%	6.7%	3.9%	4.6%	0.9%	1.2%	1.3%	1.0%
US	-11.1%	-32.4%	-6.1%	-16.4%	-8.9%	-23.3%	-5.6%	-15.1%	-1.5%	-4.0%	1.5%	0.9%
Uzbekistan	8.6%	6.7%	3.7%	3.1%	5.0%	4.2%	3.4%	2.9%	0.9%	0.8%	1.2%	0.6%
NET IMPORTERS												
Bangladesh	5.0%	0.9%	1.9%	0.4%	2.6%	0.6%	1.8%	0.4%	0.5%	0.1%	0.6%	0.1%
China	-7.2%	-30.9%	-2.7%	-3.9%	-3.9%	-18.8%	-2.4%	-12.3%	-0.8%	-4.0%	-1.0%	-3.1%
Colombia	-1.0%	-2.2%	-0.9%	-2.7%	-1.3%	-3.5%	-0.9%	-2.5%	-0.2%	-0.7%	-0.3%	-0.5%
EU	38.3%	44.4%	1.3%	-0.7%	0.9%	-2.0%	0.6%	-1.4%	0.2%	-0.4%	26.2%	34.0%
Indonesia	5.1%	1.1%	2.0%	0.5%	2.7%	0.7%	1.8%	0.5%	0.5%	0.1%	0.6%	0.1%
Japan	3.8%	1.2%	1.7%	0.6%	2.3%	0.7%	1.5%	0.5%	0.4%	0.1%	0.5%	0.1%
Mexico	5.0%	-1.0%	1.6%	-1.6%	2.2%	-2.1%	1.5%	-1.5%	0.4%	-0.4%	0.5%	-0.3%
Pakistan	-10.1%	-26.6%	-3.2%	-9.7%	-5.8%	-16.6%	-3.4%	-10.0%	-0.6%	-1.8%	-1.4%	-2.6%
South Korea	4.0%	1.2%	1.7%	0.6%	2.3%	0.8%	1.6%	0.5%	0.4%	0.1%	0.6%	0.1%
Thailand	4.6%	1.2%	2.0%	0.6%	2.7%	0.7%	1.8%	0.5%	0.5%	0.1%	0.6%	0.1%
Turkey	-3.4%	-10.1%	-0.9%	-4.7%	-1.2%	-6.1%	-0.8%	-4.3%	-0.4%	-1.5%	-0.4%	-1.1%

Source: Author's calculations.

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