National and Regional Impacts of Increasing Non-Agricultural Market Access by Developing Countries – the Case of Pakistan*

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Abstract: The US, the EU, Brazil and India met in Germany in June 2007 with a view to bridging differences between developed and developing countries on the Doha Round of trade negotiations. However, the talks broke down because of disagreement on the intertwined issues of agricultural protection and Non-Agricultural Market Access (NAMA). This study uses the first regional computable general equilibrium (CGE) model of Pakistan to evaluate the national and regional impacts of increasing NAMA as per two actual proposals of the US and the EU and Brazil and India at the 2007 meeting. The results suggest that overall benefits to Pakistan's economy—in terms of increased exports and real GDP—will plausibly be higher under the NAMA proposal advocated by the US and the EU than that advanced by Brazil and India. However, inter-industry inequalities in Pakistan and the existing regional disparities between the largest region and the three smaller regions of the country are projected to be higher under the proposal of the US and EU. Drawing on the results of the CGE simulations, the study puts forward a NAMA proposal which can be beneficial and acceptable to both developed and developing countries. A breakthrough in NAMA may also break the impasse over the agricultural issues because of the interdependence of the two issues.

I. INTRODUCTION

Non-agricultural Market Access (NAMA) negotiations form one of the central pillars of the Doha Round of trade negotiations. The NAMA negotiations are aimed at facilitating multilateral trade by means of reducing or eliminating tariffs, tariff peaks, high tariffs and tariff escalation

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and identifying and removing non-tariff barriers (NTBs) with respect to non-agricultural or industrial products, whilst allowing developing countries less than full reciprocity of commitments. So far, the NAMA negotiations have focussed on a variety of issues including various formulas for reducing bound (and hence applied) tariff rates, coefficients of such formulas, the treatment of unbound tariffs, possible exceptions to tariff reductions, the erosion of the preference margins currently enjoyed by least developed countries (LDCs) in developed country markets and removal of very low or ‘nuisance’ tariffs.

Among these issues, the subject of tariff reductions has achieved the primary importance and has also become the bone of contention between developed and developing countries. There is now general acceptance of application of a non-linear ‘Swiss formula’ to bound tariff rates with two coefficients, a high one for developing countries and a low one for developed countries, resulting in higher final applied tariffs for developing countries vis-à-vis developed countries. However, there is substantial difference between developed and developing countries on what these coefficients, and the resulting applied tariffs, should be. The Doha Round discussions—which took place among the trade representatives of the G-4, the United States (US), the European Union (EU), Brazil and India, in Potsdam, Germany on 19-21 June 2007—broke down primarily because of disagreement on the magnitudes of the coefficients of the Swiss formula to be used by developed and developing countries to increase NAMA.

The issue of relative reductions in tariffs on non-agricultural products in developing and developed countries has been further complicated by its links with agricultural protection matters being discussed in the Doha Round, especially trade-distorting domestic support in the form of agricultural production subsidies and high tariffs restricting market access for agricultural products. In the Doha Round discussions in Germany, while the US and EU demanded increased NAMA from developing countries, Brazil and India—which represented developing countries—stressed that no compromises would be made on NAMA unless the US made large concessions on its trade-distorting farm subsidies and the EU offered more agricultural market access. As a result, the meeting ended without securing an agreement, making it obvious that a successful conclusion of the Doha Round may not be possible unless concessions are made on trade-distorting agriculture domestic support by the US, on agricultural market access by the EU, and on NAMA by developing countries. Since these issues are intertwined, a breakthrough in NAMA may also break the impasse over the agricultural issues, and vice versa.

In respect of NAMA, developing countries have argued that unilateral and/or hasty tariff liberalisation may impose harsh adjustment costs on developing countries—such as balance of payment problems, deindustrialisation and a slowdown in economic growth—unless developed countries implement more-than-proportional reciprocal measures toward opening their markets for agricultural and non-agricultural products. But are the concerns of developing countries about unilateral and extensive tariff reductions justified? This is the first question addressed in this study using Pakistan as a case study. What is more, while some developing countries in the South Asian regions (such as Pakistan, Sri Lanka and India) as well as countries outside the region (such as China and Thailand) are confronting conflicts related to regional disparities, these countries seemed to have ignored to take into consideration, and raise in the NAMA negotiations, the implications of possible intra-country regional disparities that may arise in the wake of increased NAMA permitted by them.

Pakistan is an excellent case study. It has been active in multilateral trade negotiations and trade liberalisation over the last decade or so. In the meantime, the benefits of trade liberalisation have not been equally distributed among different regions, giving rise to regional disparities and conflicts similar to countries like India and Sri Lanka. Therefore, it is important to examine the link between Doha trade negotiations and possible impacts of regional disparities before embarking on the reform process. The Pakistan experience can provide guidance to other developing countries – such as Sri Lanka, India, China and Thailand – on taking a position on the size of the Swiss-formula coefficients in the NAMA negotiations; and on the necessity of designing policy and programs in reducing regional disparities and regional conflicts while undertaking trade liberalisation process under the NAMA negotiations.

The next section provides background information on the Doha Round of trade negotiations, with particular focus on negotiations on NAMA, Pakistan's position on NAMA, and regional disparities in Pakistan. Section 3 undertakes a brief literature review with a view to providing a rationale for using a single-country CGE model to realising the objectives of this study. Section 4 explains briefly the CGE model and database used in this study. Section 5 illustrates the design of simulation experiments with the model. Section 6 examines and compares the national and regional results of the simulations. Concluding remarks and policy implications are presented in Section 7.

II. THE DOHA ROUND, NAMA AND REGIONAL DISPARITIES IN PAKISTAN

1 The Doha Round of Trade Negotiations and NAMA

The Doha Development Agenda (DDA) was developed in the Doha Round under the umbrella of the World Trade Organization (WTO) in Doha in November 2001. As is stated in the Doha Declaration (see WTO 2001), the DDA is aimed at strengthening multilateral trading system and promoting economic development of WTO members primarily through reductions in tariffs on agricultural and non-agricultural products (called 'increased market access'); gradual elimination of all forms of export subsidies; and substantial reductions in production subsidies to agriculture (entitled 'trade-distorting domestic support'). It also considers special and differential treatment for developing countries an integral part of all elements of the negotiations to enable these countries to effectively take account of their development needs, including food security and rural development. Other issues include the rules negotiations, trade facilitation, and implementation issues (for details, see WTO 2001).

The DDA received wide-ranging support from member countries in the Doha Round. Consequently, the Doha Declaration set a series of deadlines with a concluding date of no later than 1 January 2005. However, reaching consensus on various elements of the DDA has proven to be far more difficult than originally envisaged. While developed countries used to be the key player in the Uruguay Round, developing countries have substantially increased their bargaining power in the Doha Round by forming various groups. These groups include the Cairns Group (alliance of 18 countries looking for ambitious outcomes in the market access areas), the G-20 (group for safeguarding interests of developing countries in agriculture

negotiations), the G-33 (group of developing countries and LDCs aiming to get preferential terms in market access and special and differential treatment) and the NAMA-11 (group of 11 developing countries—including India, Argentina, Brazil, Indonesia, Pakistan and China—formed to secure a better deal on NAMA).

As a result, the Fifth Ministerial Conference in Cancún, Mexico, in September 2003—which was intended as a stock-taking meeting where members would agree on how to complete the rest of the negotiations—was soured by discord on agricultural issues (farm subsidies and market access) and ended in deadlock on issues related to trade and investment, trade and competition policy, transparency in government procurement and trade facilitation (called the ‘Singapore issues’). Nevertheless, significant progress was made on 1 August 2004 when a set of decisions—sometimes referred to as the July 2004 package—was adopted in the General Council on these issues (see WTO 2004). *The Doha Ministerial Declaration Paragraph 16* (WTO 2001) and *Annex B of the July Package* (WTO 2005) laid the mandate for negotiations on NAMA. The important features of the mandate are as follows: (i) reduce or as appropriate eliminate tariffs, tariff peaks, high tariffs and tariff escalation, as well as NTBs in particular on products of export interests to developing countries; (ii) developing countries shall, as integral part of modalities, have less than full reciprocity in reduction commitments, and special and differential treatment for keeping certain tariff lines unbound or apply no or less than formula cuts; and (iii) the reduction commitment will commence from bound rates and for unbound lines the most favourite nation (MFN) applied rates of 2001 will from the base rate.

The original deadline of 1 January 2005 for concluding the DDA was missed. While further progress in narrowing members’ differences was made at the Hong Kong Ministerial Conference in December 2005, some gaps remained unbridgeable, particularly over agricultural issues and NAMA (WTO 2005). With respect to NAMA, it was decided at the Hong Kong Ministerial Conference that a Swiss formula will be used to cut tariffs on non-agricultural products, with different formula coefficients for dissimilar groups of countries, as the higher the coefficient, the lower is the reduction in tariffs (please see Box 1 for an explanation of the Swiss formula). It was agreed that a high coefficient would be used for developing countries and a low coefficient would be applicable to developed economies, with LDCs excluded from tariff reductions. However, there remained substantial differences between developed and developing countries on what these coefficients should be.

Since then, the NAMA negotiations have focussed on a variety of issues including various formulas for reducing bound tariff rates, coefficients of the Swiss formula, the treatment of unbound tariffs, possible exceptions to tariff reductions for some developing countries, possible sectoral approaches¹, preference erosions², and removal of very low or ‘nuisance’ tariffs (see Bchir et al. 2005, Kinnman and Lodefalk 2007). While there is no universal agreement on these issues to date, the magnitudes of possible Swiss formula coefficients for tariff reductions

¹ The sectoral approach essentially means cutting or eliminating tariffs on certain sectors, independent of the tariff-cutting formula followed for other sectors. Sectors suggested for tariff-cutting are mainly the ones that are big export earners for developing countries and are also labour-intensive. Developing countries will benefit tremendously if developed countries reduce their high tariffs on these sectors.

² Preference erosions refer to the erosion of the preference margins currently enjoyed by LCDs in developed country markets after increased NAMA provided to developing countries. LCDs advocate that developed countries should give preferential treatment to the products of LDCs in their markets to offset this loss.

have become the central pillar of negotiations, and also the key area of disagreement, between developed and developing countries. A subsequent DDA meeting in July 2006, among the G-6 (the US, EU, Japan, Australia, Brazil and India), could not break the impasse over the Swiss formula coefficients and some other matters, particularly agricultural issues, and the Director General of the WTO suspended the negotiations in July 2006.

Box 1: Swiss Formula

The Swiss formula was originally proposed by Switzerland in the 1973–79 Tokyo Round negotiations. While many variants of the Swiss formula have been discussed in the Doha negotiations, there is now general acceptance of application of the following simple Swiss formula to bound tariff rates (Kinnman and Lodefalk, 2007).

Swiss Formula: $T_1 = (A \times T_0) / (A + T_0)$

where T_1 = final bound tariff rate; T_0 = initial bound tariff rate; and A = reduction coefficient and maximum final bound tariff rate.

Bound tariff for each product is to be cut according to the coefficient (A) of the Swiss formula (a higher coefficient leads to a lower reduction in tariffs, and vice versa). The new applied tariff is then calculated as the minimum between the initial applied tariff and the reduced bound tariff. The Swiss formula is non-linear in nature. Using the reduction coefficient (A), it reduces higher tariffs more steeply in proportion to lower tariffs, and establishes a maximum final rate equivalent to A no matter how high the original tariff was. As a result, the higher the tariff rate, the greater is the reduction. The formula is harmonising in the sense it addresses tariff peaks, high tariffs and tariff escalation.

Efforts were made to invigorate the DDA in 2007. In particular, commerce ministers belonging to various WTO negotiating alliances met in Geneva on 11 June 2007 and trade representatives of the G-4—the US, the EU, Brazil and India—met in Potsdam, Germany on 19–21 June 2007 with a view to bridging their differences on the DDA negotiations. In the meeting, the US indicated that it could accept a \$US17 billion annual spending limit for its trade-distorting domestic support instead of the \$US22.5 billion offered previously, but India and Brazil wanted to see that halved (see Permanent Mission of Pakistan to the WTO (PMPTWTO) 2007). Similarly, the EU wanted a 23 per cent cut in duties on many of its sensitive³ farm products, whereas India and Brazil demanded a 49 per cent reduction.

On the Swiss formula coefficients, the US and EU wanted the coefficients to be close together (10 for developed countries and 15 for developing countries), whereas India and Brazil sought 5 and 30 (PMPTWTO 2007).⁴ In fact, a consensus emerged between Brazil

³ Paragraph 31 of the July Package allows members to designate an appropriate number, to be negotiated, of tariff lines to be treated as sensitive, taking account of existing commitments for these products (see WTO 2004).

⁴ The stance of India and Brazil is supported by most groups of developing countries, notably the G-20, the G-30 and the NAMA-11.

and India—who represented developing countries—that no compromises would be made on NAMA unless the US made large concessions on its trade-distorting farm subsidies and the EU offered more agricultural market access. Owing to the extreme positions of the participants over NAMA and the agricultural issues, the meeting ended without securing an agreement over the DDA (for further details, see Centre for Trade and Development (CENTAD) 2007, PMPTWTO 2007).

The breakdown of the G-4 talks, while a setback, is unlikely to be the end of the Round. The chairs of the Agricultural and NAMA committees are continually engaged in Geneva to narrow the gaps and positions and provide a starting point for defining the flexibilities available to developing and developed countries. The Director General of the WTO has also stressed in a speech in Kuala Lumpur on 17 August 2007 that completing the Doha Round is a political must, as concluding the Round will boost multilateral trade and economic growth (WTO 2007).

Nevertheless, the successful conclusion of the Doha Round may not be possible unless concessions are made on trade-distorting agriculture domestic support by the US, on agriculture market access by the EU, and on NAMA by developing countries. Since these issues are intertwined, a breakthrough in NAMA may break the impasse over the agricultural issues, and vice versa. In view of that, this study attempts to model the possible impacts at the national and regional levels of increasing NAMA in accordance with the Swiss formula coefficients advocated by Brazil and India as well as the US and EU for developing countries using Pakistan as a case study. Drawing on the analysis undertaken in this study, a possible set of Swiss formula coefficients is also proposed which may be mutually beneficial and acceptable to developing and developed countries.

2. Pakistan's Tariff Reduction Policy and Position on NAMA

Pakistan has active interest in increased NAMA, particularly for its key manufacturing exports which are related to textile and clothing. Some LDCs like Bangladesh which are also competitors of Pakistan in the textile and clothing markets of its major trading partners—the US and EU—are receiving preferential tariff treatment from them. By contrast, Pakistan is not a member of any meaningful bilateral free trade agreement, especially with the US and EU. Therefore, a successful conclusion of the Doha Round resulting in multilateral trade liberalisation is to the advantage of Pakistan unless the competing LCDs secure preferential treatment to their textile and clothing related products from these countries.

Pakistan is also a member of the Cairns Group, the G-20, the G-33 and the NAMA-11 and, hence, supports the stance taken by India and Brazil at the G-4 meeting in June 2007 that the Swiss formula coefficients be 5 and 30 for developed and developing countries, respectively (PMPTWTO 2007a). If this proposal is accepted, the maximum tariff allowed on a non-agricultural product of Pakistan will be 30 per cent. However, similar to most developing countries, apart from China, the gap between bound and applied MFN tariffs—called ‘binding overhang’—on non-agricultural products of Pakistan is substantially high (see Figure 1). This means that a Swiss formula coefficient of 30 is unlikely to reduce bound tariffs on Pakistan’s non-agricultural products to such an extent that they can have a meaningful impact on the

corresponding applied tariffs. On the contrary, applied tariffs on most of its non-agricultural products are likely to fall if a coefficient of 15, as suggested by the US and EU, is used to reduce their bound tariffs (this issue will be further examined in Sections 5 and 6). It appears that Pakistan and the other developing countries supporting the application of the higher coefficient are concerned that a significant reduction in their tariffs on non-agricultural products may impose harsh adjustment costs on developing countries, such as balance of payment problems, deindustrialisation and a slowdown in economic growth. This study will attempt to check the validity of these concerns using Pakistan as a test case.

Figure 1: Average Bound and Applied Tariffs on Non-Agricultural Products of Major Countries in NAMA-11 for the Year 2006

Source: World Tariff Profiles 2006 (WTO, 2007a).

3. Regional Disparities in Pakistan

The history of Pakistan is characterised with conflicts and disparities between the country's various regions. Pakistan's history may be unique in that the country's majority wing — formerly East Pakistan, now Bangladesh — seceded from the nation in 1971 after a bloody war, leaving the minority wing — West Pakistan — as the sole constituent part of the new Pakistan. This conflict arose because of serious interregional economic disparities, caused by biased economic and trade policies, and a denial of basic democratic rights under the West Pakistan-based military regime (see Butt 2006, Zaidi 2000).

Even after this traumatic event, the relationships among the four regions that remain in (West) Pakistan — Punjab, Sindh, North West Frontier Province (NWFP) and Balochistan — have not been harmonious. In particular, the smaller regions — Sindh, NWFP and Balochistan — have strong grievances against the largest region, Punjab, which also has the highest representation in Pakistan's military which has ruled the country for more than half of its post-independence period. The major economic conflicts between the three smaller regions and Punjab are mainly founded on the regional distribution of the revenue collected by the federal government and the water stored in the dams of Pakistan, which are largely allocated on the basis of each region's share in total population (for details, see Butt 2006). This distribution system disadvantages the smaller regions which have significantly lower population densities than Punjab (see Table I).

Table 1: Population, Area and Population Density of Pakistan and its Regions

Description	Punjab	Sindh	NWFP	Balochistan	Pakistan
Proportion of population (%)	57	24	14	5	100
Proportion of Area (%)	27	18	10	45	100
Population density (no. of people per square kilometre)	353	213	236	19	164

Source: Ministry of Finance (MoF 1999), and WTO (2005a).

Among the smaller regions, NWFP and Balochistan complain to have been treated most unfairly. The available regional human development index of Pakistan appears to affirm the accusations of the smaller regions, particularly NWFP and Balochistan, against Punjab (see *Figure 2*). At present, the regional conflicts and the associated regional disparities between the largest region, Punjab, and the smaller regions have peaked to a level not seen since the secession of East Pakistan (now Bangladesh) in 1971, particularly on the part of the ongoing rule by the military which is dominated by Punjabis (Butt 2006). This study will attempt to capture the possible impacts of tariff reductions under the latest proposals of the developed and developing countries at the 2007 meeting on the regional disparities of Pakistan.

Figure 2: Regional Human Development Index of Pakistan for 1998

Source: Hussain et al. (2003).

III. WHY USE A SINGLE-COUNTRY CGE MODEL

Almost all recent empirical studies on trade liberalisation as in the DDA have used a standard or modified version of the well known Global Trade and Analysis Project (GTAP) model based on Hertel (1997).⁵ These studies evaluate the possible impacts of various trade liberalisation

⁵ The GTAP is a static CGE model of the world economy with an integrated database. The latest database of the model—GTAP-6 (release 6.2)—has 2001 as its base year and is composed of three integrated components for 87 countries/regions and 57 commodities/sectors of production and contains information on: input-output model for each of the countries/regions; bilateral trade data across countries/regions; and trade protection data. The details of the GTAP model and its database are available at <https://www.gtap.agecon.purdue.edu>.

scenarios in the Doha Round on global welfare. *Table 2* provides a snapshot of some important GTAP studies in this area (most of the studies are based on the GTAP database version 6.2). It is apparent from *Table 2* that simulations scenarios in the existing GTAP literature include simultaneous modelling of many elements of multilateral trade liberalisation in the Doha Round, as well as separate modelling of a single reform agenda of the Doha negotiations, particularly agricultural reforms and NAMA. While all of these studies have a global welfare perspective, many of them have narrowed down their focus to quantifying the effects of the Doha Round negotiations on specific issues, such as poverty, losers and winners among developing countries, interactions between developed and developing countries, and poor countries. The majority of the studies have also confined their global analysis to a particular country, region or a group of countries including various groups of developing countries, Asia Pacific, Sub-Saharan Africa, Europe, India, Bangladesh, Sweden and Ireland.

Despite a burgeoning GTAP literature on the Doha Round, no study to our knowledge has concentrated primarily on Pakistan. In fact, Pakistan was not included in the GTAP database as a separate country until 2005 and is still not identified as a separate country in the latest officially released version (6.0) of the GTAP database. As a result, all the GTAP studies have aggregated Pakistan into a group of countries usually comprising Pakistan, Nepal, Bhutan and Maldives. This aggregated group is unlikely to reflect the true structure of Pakistan's economy. What is more, although the GTAP model is far superior to a single-country CGE model in examining global impacts of trade liberalisation because of its ability to capture inter-country economic linkages, a highly-disaggregated single-country CGE model may be more useful to fully understand and analyse the effects of a specific issue—such as NAMA—on specific sectors (such as key exports) of a single country, particularly at the regional level.

While there is an abundance of single-country CGE studies on trade liberalisation (see Shoven and Whalley 1984, Bandara 1991, Butt 2006), no such study to our knowledge has attempted to model the effects of trade liberalisation under possible DDA scenarios, especially based on the actual negotiation proposals on NAMA submitted by the major groups of developed and developing countries at the June 2007 meeting. In addition, single-country CGE models with regional dimensions now have been developed for many developing countries.⁶ But, despite the sensitivity and potential significance of regional disharmonies in developing countries, no study to our knowledge has attempted to trace the possible effects of implementing proposed Doha Round reforms—including NAMA reforms—on regional disparities in these countries.

With respect to Pakistan, the number of prominent CGE studies on the country has grown to around 15 so far (see *Table 3*). All of these studies are single-country models with the exception of Martin et al. (2004), which applies a global CGE model based on the GTAP database. Among these studies, nine studies have examined trade liberalization. Martin et al. (2004) concludes that the abolition of textiles and clothing quotas in the US, EU and Canada against all the developing country exporters restricted by these quotas (particularly, Pakistan, India and China) is likely to reduce Pakistan's real income slightly, due largely to the loss of its quota rents. The remaining eight studies examine the impact of trade liberalisation on income inequalities, poverty, welfare and regional disparities. Siddiqui et al. (1999), Siddiqui

⁶ For example, see Mai (2003), Filho and Horridge (2004), Pambudi (2005) and Butt (2006) for regional CGE models of China, Brazil, Indonesia and Pakistan, respectively.

*Table 2: GTAP Studies on Estimation of Global Welfare Effects of
Trade Liberalisation in the Doha Round*

No	Study	Main Issues	Focus
1	Anderson and Martin (2007)	Multilateral agricultural and NAMA reforms	Asia Pacific
2	Bouët et al. (2007)	Losers and winners from multilateral trade liberalisation	Developing countries
3	Chadha et al (2007)	Possible trade and welfare effects of increased multilateral agricultural reform	India
4	Kinnman and Lodefalk (2007)	Appraisal of multilateral trade liberalisation based on the outcome of the Hong Kong Ministerial Conference	Sweden
5	Anderson et al. (2006)	Market and welfare implications of multilateral agricultural reform	Worldwide
6	Anderson et al. (2006a)	Impacts of multilateral trade liberalisation on poverty	Worldwide
7	Bouët (2006)	Effects of multilateral trade liberalisation on poor countries	Developing countries
8	Polasky (2006)	Winners and Losers among developing countries as a result of multilateral trade liberalisation	Developing countries
9	Stephen et al. (2006)	Effects on LCDs of increased unilateral market access for LCDs, and multilateral trade liberalisation in the Doha Round	Sub-Saharan Africa
10	Anderson and Martin (2005)	Multilateral agricultural trade reform	Worldwide
11	Bachir et al. (2005)	Assessment of multilateral full and partial liberalisation of NAMA (the first GTAP study to take duly into account the difference between bound and applied tariffs)	Developing countries
12	Bachir et al. (2005a)	Multilateral reduction in NAMA	Worldwide
13	Francois et al (2005)	Multilateral trade liberalisation	Worldwide
14	Mathews and Walsh (2005)	Economic consequences of multilateral trade liberalisation	Ireland
15	Bouët et al. (2004)	Evaluation of multilateral agricultural trade liberalisation with emphasis of identifying winners and losers in developing countries	Developing countries
16	Conforti and Salvatici (2004)	Impacts of multilateral agricultural trade liberalisation on interactions between developed and developing countries	Developed and developing countries
17	Jean and Laborde (2004)	Multilateral trade liberalisation	Europe
18	Lips et al. (2003)	Assessment of multilateral agreements and the Doha round negotiations	Bangladesh

and Iqbal (2001), Kemal et al. (2001), Siddiqui and Kemal (2002), Siddiqui and Kemal (2002a), and Kemal et al. (2003) generally find that trade liberalisation (mostly tariff cuts) in Pakistan increases the total household income/welfare and reduces poverty but also leads to increased income disparities among different types of households that are classified on the basis of income levels, types of employment, skills, and the rural-urban areas (for details, see Butt 2006). (It is noteworthy that these six studies have been carried out by a small group of professionals at the Pakistan Institute of Development Economics (PIDE)). Butt (2006) and Butt and Bandara (2008) find a positive association between trade liberalisation (tariff removal) and regional disparities.

Table 3: CGE Studies on Pakistan

No	Study	Focus
1	McCarthy and Taylor (1980)	Impact of food policies on households with different incomes.
2	Dhanani (1988)	Effects of changes in investment, government expenditure, indirect tax, world prices of manufactures, and remittances on poverty.
3	Labus (1988)	Price Liberalisation Policy and public sector enterprises losses.
4	Feltenstein and Shah (1993)	Effects of Taxation on Investment.
5	Naqvi (1997)	Impacts of energy policy on equity.
6	Vos (1998)	Aid flows and the Dutch disease.
7	Siddiqui et al. (1999)	Trade liberalisation (tariff cuts) and income distribution.
8	Siddiqui and Iqbal (2001)	Trade liberalisation (tariff cuts) and household income.
9	Kemal et al. (2001)	Trade liberalisation (tariff cuts) and income distribution.
10	Siddiqui and Kemal (2002)	Impacts of tariff cuts and changes in foreign remittances on poverty.
11	Siddiqui and Kemal (2002a)	Capital inflows, tariff cuts and poverty.
12	Kemal et al. (2003)	Impacts of reducing import quotas and tariffs on welfare.
13	Martin et al. (2004)	Consequences of Textile Quota Abolition with particular focus on Pakistan's economy.
14	Butt (2006)	Impacts of tariff removal on Pakistan's economy and regional disparities.
15	Butt and Bandara (2008)	Trade liberalisation and regional disparities.

However, these nine studies have some limitations. None of these studies has modelled the impact of Doha Round scenarios based on actual negotiation proposals. Instead, they have applied uniform cuts to tariffs by certain percentages which have been chosen arbitrarily (excluding Marti et al. 2004, which deals with the abolition of textiles and clothing quotas). As a result, they cannot provide any guidance on the possible effects of specific proposals presented in the Doha Round. In addition, most of these studies have used somewhat inadequate

databases. Martin et al. (2004) have used the GTAP 5.4 database. However, as mentioned previously, even the GTAP 6.0 database (public release version) does not identify Pakistan as a separate country. The six studies of trade liberalization from the PIDE are based on the SAM for 1989–90, which does not have an accompanying import matrix. Analysing trade liberalisation without an explicit import matrix in the I-O accounting framework clearly raises concerns about the reliability of the results of these studies. Finally, apart from Butt (2006) and Butt and Bandara (2008), the number of production sectors in the databases of these studies are highly aggregated – ranging between 5 and 15 – and, therefore, the simulation results are less likely to capture the actual inter-sectoral linkages in the economy.

Using Pakistan as a case study, this paper will make a contribution toward filling these gaps in the literature. It will model the impact of unilateral increases in NAMA by Pakistan as per two recent actual proposals on Swiss formula coefficients, put forward by the US, EU, Brazil and India at the June 2007 meeting. Further, a highly disaggregated database including an import matrix will be used (see Section IV). This will allow us to explore in detail the possible impacts of these proposals on the domestic industries and regional disparities.

IV. THE CGE MODEL AND DATABASE

This study utilises the first CGE model of Pakistan's economy with regional dimensions (developed in Butt 2006) to examine and compare the possible effects on the country's economy of unilateral increases in its NAMA. It is a neoclassical comparative-static⁷ CGE model of the ORANI tradition. It closely follows the original ORANI model described in Dixon et al. (1982)—along with some developments around ORANI illustrated in Horridge et al. (1997), and Horridge (2001, 2003)—which belong to the well-known Johansen (1960) class. It consists of two modules: (i) a core module which produces the national results; and (b) a regional extension which breaks down national results into regional results. Since ORANI is well established in the literature, only a brief and intuitive explanation of the equations of PAKREG is provided here. Interested readers may refer to the above-mentioned studies or Butt (2006) for a comprehensive explanation of the model. PAKREG is implemented using GEMPACK software⁸ which formulates and solves CGE models.

1. The Core Model

The core module has a theoretical structure which is typical of a comparative-static general equilibrium model. It comprises a Walrasian system of interconnected markets of all commodities and factors. It is assumed for simplicity that there is (a) a one-to-one correspondence between industries and commodities; (b) a single occupation of labour; and (c) a single category of households. For each commodity and factor there is a demand side, there is a supply side and there is a market clearing condition. Each market is cleared by a flexible price. All agents in

⁷ A comparative-static CGE model is atemporal, producing results for the economy at some future time period—such as the short run and long run—without providing information on the adjustment paths.

⁸ The GEMPACK software has been developed at the Centre of Policy Studies and IMPACT Project, Monash University, Australia. A detailed description of the GEMPACK software is available in Harrison and Pearson (1998).

each market behave competitively and they are rational optimisers. Consumers maximise utility and minimise costs; producer maximise profits and minimise costs as the situation demands. All micro agents have behavioural functions that satisfy neoclassical regularity conditions which together admit a unique and stable solution for the system. The agents do not have any money illusion. The model maintains, as a default, the real nominal dichotomy. These relationships are converted into equations, which can be grouped into a number of blocks as shown in *Table 4* (for a comprehensive description, see Butt 2006).

Table 4: Main Blocks of Equations in the Core Model

Block 1:	Industry Inputs Demands Demands for primary factors (labour and capital) Demands for intermediate inputs (domestic and imported) Production subsidies
Block 2:	Final Demands for Commodities Demands for capital creation Household demands Export demands Government and inventory demands
Block 3:	Demands for Margins Demands for margins to facilitate commodity flow to users
Block 4:	Market Clearing Equations Domestic commodities Imported commodities Primary factors
Block 5:	Price System Enforcing Zero Pure Profit Conditions Production Capital creation Importing Exporting Distribution
Block 6	Balance of Trade Imports Exports Balance of trade
Block 7	Investment Allocation Distribution of investment Investment budget constraint
Block 8	Labour Market Wage setting equation
Block 9	Miscellaneous Equations

2. The Regional Extension

There are two broad approaches in CGE modelling toward estimating the regional effects of a policy shock: the bottom-up approach; and the top-down approach (for details, see Dixon and Rimmer 2004). A decision to select a particular regional modelling approach depends upon the nature of the shock, accuracy of the results, and regional data constraints. Under the bottom-up approach, all the regional results are calculated and then these results are aggregated

to arrive at the national results. As regards the top-down approach, all the national results are computed first, followed by the disaggregation of these results at the regional level on the basis of certain assumptions and regional economic shares. While the bottom-up approach is probably most suitable for simulating the regional effects of shocks that emanate at the regional level (for example, changes in regional taxes) because it contains comprehensive linkages within regions and among regions, the top-down approach is suitable for simulating the regional effects of a national policy change, such as the removals of tariffs and quotas (see Dixon and Rimmer 2002).

In the model used in study, the top-down regional approach has been preferred over the bottom-up approach because of the suitability of the former approach for simulating the regional effects of economy-wide policy shocks, its cost-effectiveness and the availability of data. The top-down regional equations assume that economy-wide input-output (I-O) coefficients relating to the commodity supply and industry costs apply at the regional level. While the core model can produce the effects of a policy shock at the national level, the top-down regional extension of the model is capable of estimating the impacts at the regional level, as explained below.

Using the top-down approach, all industries in the database are allocated to two groups: national industry group; and local industry group. The national industries produce national commodities, which are traded extensively across regional borders. The local industries produce local commodities (usually services) that are scarcely traded among regions. Each local commodity must be produced by the corresponding local industry in the region for use in the same region and/or for export to the rest of the world from the region. These two groups of industries/commodities—national and local—are treated using different assumptions. The industry growth rate of a national commodity in a region is assumed to be independent of the economic activities in that region. That is, the output growth of each national industry in a region is assumed to move in line with that industry's output growth at the national level. In contrast, the industry growth rates of local commodities are set equal to the rates of growth in demand for local commodities in each region and the rest of the world (exports). This assumption produces local multiplier effects. For example, if a region has an over-representation of national industries that have large percentage increases in output, the effect on aggregate real value added in that region is multiplied through a relatively large increase in regional wage income and hence a relatively large increase in household consumption of local commodities. Local industries in the region grow faster than their national averages, resulting in even higher wage income and more consumption of local commodities. This process is repeated until general equilibrium is reached.

3. The Database

The database needed to implement the core model comprises a national I-O table and some elasticities/parameters, such as the Armington elasticities of substitution between domestic and imported goods, constant elasticities of substitution between primary factors, household expenditure elasticities, export demand elasticities and the Frisch parameter – a parameter that has an inverse relationship with the per capita income of Pakistan (for details, see Dixon

et al. 1982, Butt 2006). The data required for the implementation of the regional extension include each industry's regional shares in output; and local industries' regional shares in investment; consumption, exports, government demand, and inventories. In our model's database, the national industry group contains 50 industries. They are all agricultural, mineral and manufacturing industries and 3 services industries, namely Air Transport, Water Transport and Public Administration (see *Table A1* in the appendix). The local industry group comprises 10 services industries.

V. DESIGN OF EXPERIMENTS: UNILATERAL INCREASES IN NAMA AS PER PROPOSALS OF DEVELOPING AND DEVELOPED COUNTRIES

It has been mentioned in Section II that while there is now general consensus on the application of a simple Swiss formula to bound tariff rates with two coefficients (a high one for developing countries and a low one for developed economies), developed and developing countries have different positions on the size of the coefficients. Developed countries, particularly the US and EU, are campaigning for a coefficient of 10 for developed countries and 15 for developing countries, whereas developing countries want these coefficients to be 5 and 30. In this context, two sets of simulations are conducted utilising the first regional CGE model of Pakistan. The first set of simulation examines the possible impacts on macroeconomic variables, industry output and regional disparities of reducing bound duties on non-agricultural goods of Pakistan using the Swiss formula coefficient proposed by developing countries. The second set of simulations carries out the same experiment using the coefficient advocated by developed countries. Since one of the main motives of Pakistan for involvement in the Doha Round is the promotion of its cotton and textile related exports, special emphasis is placed on this sector whilst interpreting the industry results of these simulations. The following shocks correspond to the two sets of simulations:

1. a reduction in ad-valorem bound tariffs on 38 non-agricultural products of Pakistan using the Swiss formula coefficient of 30, as per the proposal of developing countries; and
2. the same simulation as above but with a Swiss formula coefficient of 15, as per the proposal of developed countries.

Bound tariffs on non-agricultural products were reduced in the first two sets of simulations as follows. Average bound and applied duties on Pakistan's non-agricultural products, aggregated into 12 sectors, for the year 2006 were taken from *World Tariff Profiles 2006* (or WTO 2007a).⁹ However, the database of our model contained 38 non-agricultural products. To make the data compatible, 12 non-agricultural sectors from the WTO data were mapped to 38 sectors in our database (see *Table A2* in the appendix). After that, the bound tariffs taken from WTO (2007a) for 38 non-agricultural products were cut according to the coefficient of the Swiss

⁹ Uncertainty abounds to date on the year forming the base for the proposed reductions in bound tariffs. Consequently, it was decided to make the latest bound and applied tariff duties on non-agricultural products (for the year 2006) the basis for commencing the tariff reductions in our simulations.

formula (30 and then 15). The new reduced bound tariff for each product was compared with the corresponding applied tariff for the year 2006 (taken from WTO (2007a) and mapped to 38 non-agricultural products in our database). The new applied tariff was then calculated as the minimum between the initial applied tariff and the reduced bound tariff for the year 2006. In other words, the applied tariff was lowered only to the extent that the new bound tariff was low enough to be restraining. When the initial bound tariff was substantially higher than the applied tariff, the applied duty might have remained unchanged.

Now the tariff shock applied to each non-agricultural product in our model's database was calculated as the difference (in the form of percentage change) in the initial tariff and the new applied tariff. The estimation of the tariff shocks for the two sets of simulations has been presented in *Tables A3* and *A4* in the appendix. An examination of these tables suggests that under the proposal of developing countries, applied tariffs of only eight non-agricultural products (mainly related to Pakistan's cotton and textile related exports) fall owing to the high binding overhang. In contrast, the proposal of developed countries leads to a reduction in applied tariffs of 32 non-agricultural products. The implications of this phenomenon will be discussed in the next section on the simulations results. Finally, it is of note that 99.1 per cent non-agricultural tariff lines are bound and non-ad-valorem duties form only 0.7 per cent of total tariff lines in Pakistan (WTO 2007a). As a result, the results of the two sets of simulations, which involve reducing ad-valorem tariffs, should be able to capture the true tariff structure of Pakistan's economy. So as to carry out the three sets of simulations, a set of assumptions is used to close the model similar to any ORANI type model (see, for example, Dixon, et al. 1982 and Butt and Bandara 2008).

VI. THE SIMULATIONS RESULTS

This section presents the results of the two sets of simulations explained in the previous section.

1. Macroeconomic Results

Albeit the varying magnitudes of shocks under the two sets of simulations, the projected macroeconomic effects exhibit somewhat similar patterns in both the simulated scenarios (see *Table 5*). The most obvious impact of removing tariffs is to increase import volume by reducing their duty-paid or basic prices. The lower import prices lead to lower production costs and, hence, a decline in domestic price indices, such as the consumer price index (CPI), the GDP prices index and the export price index. As a result, Pakistan's real exchange rate, depreciates and real trade balance improves, with the export volume index increasing by more than the import volume index, leading to an increase in real GDP. (Since aggregate real consumption, investment and government expenditures are held constant in the short-run, exports and imports are the only expenditure aggregates contributing to real GDP – see the memorandum of *Table 4*). Finally, the fiscal position of the government worsens slightly owing to the lost tariff revenue.

Table 5: Macroeconomic Impacts of Tariff Cuts

Description	Simulation 1 (developing countries' proposal)	Simulation 2 (developed countries' proposal)
	Change (%)	Change (%)
Real GDP	0.02	0.04
Consumer price index	-0.02	-0.47
GDP price index	-0.09	-0.78
Export price index	-0.04	-0.10
Real devaluation*	0.09	0.79
Export volume index	0.44	1.07
Import volume index, c.i.f. weights	0.26	0.64
Real trade balance (ordinary change in Rs million)**	176.30	412.90
Aggregate tariff revenue (ordinary change in Rs million)**	-1,063.03	-4,383.62
Memorandum: Contributions to real GDP from expenditure side		
Exports	0.07	0.16
Imports	-0.05	-0.12
Total	0.02	0.04

* Positive value indicates real devaluation.

** Denotes ordinary change in the base-year (1990-91) currency.

While real GDP is projected to expand in both the scenarios, the anticipated gains are higher under the proposal advocated by developed countries (Simulation 2) than those under the proposal put forward by developing countries (Simulation 1). For example, real GDP is projected to increase by 0.02 per cent if the proposal of developing countries is accepted. This increase is lower than the corresponding increase of 0.04 per cent projected under the proposal of developed countries. The improvements in real GDP growth under the proposal of developing countries originate from the increasing intensities of the underlying tariff shocks. Since the tariff reduction as per the proposal of developed countries is higher than that under the proposal of developing countries, the projected gains are higher in terms of real GDP. In sum, among the scenarios considered, the proposal of developed countries may lead to a higher (i) reduction in non-agricultural tariffs; (ii) decline in production costs; (iii) real devaluation of the country's currency; (iv) improvement in real trade balance; and (v) increase in real GDP. Nevertheless, the fiscal position of the government appears to become worse under the proposal of developed countries due to a higher loss of tariff revenue.

2. Industry Results

The simulations results can be examined in a systematic manner by means of the Fan decomposition, which was introduced by Fan Ming-Tai in Zheng and Fan (1999). This decomposition shows how the change in demand for a locally produced commodity can be divided into the *local market effect*, the *domestic share effect* and the *export effect*. The local

market effect refers to a change in local usage of a commodity, whether domestically-produced or imported. Since the local market effect is based only on the domestic activity, its magnitude is the same for a local commodity or its imported counterpart. The domestic share effect implies a change in local usage of a commodity from domestically-produced commodities to imports (and vice versa) caused by a change in their relative prices. The export effect shows a shift in exports of a domestic commodity. The projected percentage changes in each domestic industry's output owing to these three effects in the three simulated scenarios are presented in *Figures 3a* and *3b*.

It has been mentioned previously that due to the high binding overhang, applied tariffs of only eight non-agricultural products (primarily related to Pakistan's cotton and textile related exports) fell under the proposal of developing countries. *Figure 3a* shows that the tariff shocks implemented under this proposal are likely to have an insignificant effect on the majority of industries in Pakistan, with only four industries experiencing a positive growth in output (0.31 per cent on average), 47 industries recording no change in output and four industries exhibiting a reduction in output (-0.22 per cent on average). The expanding industries comprise three export industries—two cotton and textile related industries, Garments, and Art Silk; and Carpets—and a single non-export manufacturing industry, Electric Equipment. Tariffs on the products of these industries (apart from Art Silk) were not reduced in the simulation. While the three export industries increase output primarily on account of increased exports (positive export effect), the Electric Equipment industry expands solely due to the positive local market effect by selling more to domestic buyers. The majority of the cotton and textile related industries (including the ones whose tariffs were reduced) are among the 47 industries that experience no change in output. Among these industries, export industry Cotton Cloth loses sales to competing imports (negative domestic share effect) but this effect is counteracted by positive export and local market effects. Finally, the four industries with output contraction are non-export industries (three import-substitution manufacturing industries, namely Other Transport Equipment, Basic Metallic Products, and Bricks Tiles and Cement; and a services industry, Construction) whose output contracts mainly because of the negative local market effect and, in the case of Other Transport Equipment, the negative local market and domestic share effects.

The tariff reduction under the proposal of developed countries is likely to have a considerable effect on most of the industries (see *Figure 3b*). Under this proposal, 20 industries are projected to expand output, 24 industries appear to experience no change in output and 16 industries are expected to record a decline in output. As regards the 20 industries with positive output growth, the most successful industries are all the 14 export industries—including the seven cotton and textile related non-agricultural industries (Ginned Cotton, Cotton Cloth, Garments, Art Silk, Made-up Textile Goods, Cotton Yarn, and Knitwear)—that have the capability of utilising the reduced industry costs and output prices to expand their exports (positive export effect). The relatively less successful industries in this group are some agricultural and services industries that have succeeded in selling more to other expanding domestic industries and final demanders on account of the growing economy (positive local market effect).

In contrast, the industries with output contraction are mostly non-export import-substitution manufacturing industries and, to some extent, Forestry, Mining, and Construction industries,

serving primarily the domestic market. Their local demand has generally shifted toward cheaper competing imports (negative domestic share effect) and the only option for them is selling more to expanding domestic industries and, to a degree, final demanders. Among these industries, many industries have not only lost grounds to competing imports (negative domestic share effect) but have also recorded a decline in demand due to reduced economic activity of their main users (negative local market effect). Nevertheless, the worst performers in the group of losing industries are non-export import-substitution manufacturing industries, such as Other Transport Equipment, Other Metallic Products, Basic Metallic Products, Other Non-Metallic Mineral Products, Paper and Paper Products, and Electric Equipment.

Some distinct features emerge from a comparison of the results of the two sets of simulations. Firstly, the numbers of winning as well as losing industries are positively associated with the intensity of the tariff reduction. Secondly, the magnitudes of output growth/contraction (in absolute terms) of the successful and unsuccessful industries are also linked positively to the scale of the tariff shocks. While the model used in this study does not explicitly capture income inequalities, it may be deduced from these results that the higher the reduction in Pakistan's non-agricultural tariffs, the more will be inter-industry income/output inequalities between export industries (which benefit from tariff cuts) and non-export industries, particularly import-substitution manufacturing industries (which are affected adversely by tariff cuts). Thirdly, except for the degree of the impact, the pattern of the industry results remains somewhat the same in these simulations. In both the simulations, the most successful industries are all the key export industries and the most unsuccessful industries are non-export import-substitution industries serving mainly the domestic market. The previous CGE studies on Pakistan (see *Table 3*) have not been able to capture these results due to the simplicity of their simulations – which are not based on Doha Round proposals – and the highly aggregated production sectors in their databases.

Finally, our CGE experiment suggests that not only are developing countries likely to benefit—in terms of increased exports and real GDP—from tariff reductions, but that the overall benefits to their economies will plausibly be higher under the tariff-cut proposal advanced by developed countries than that insisted upon by developing countries. At the industry level, the proposal of developed countries will probably have insignificant effects on the majority of the export and non-export industries. In contrast, the proposal of developed countries is likely to provide a significant boost to all the export industries including the key export sector which is related to cotton and textiles. However, non-export import-substitution manufacturing industries are the foremost losers if the proposal of developed countries is implemented. As a result, the gap between the winning and losing industries, and the resulting inter-industry income/output inequalities between export industries and non-export import substitution industries, will possibly increase under the tariff cuts proposed by developed countries than those advocated by developing countries. This can be explained using the role of protectionist lobby groups in public policy making in developing countries. These groups are very strong in these countries and their interests are represented in trade negotiations through their political representations. Therefore, their interests are strongly represented in the developing countries proposal.

Figure 3a: Percentage Change in Industry Output under Simulation 1 – Sorted by Increase in Output

Figure 3b: Percentage Change in Industry Output under Simulation 2 – Sorted by Increase in Output

Note: An explanation of the industry code names is provided in Table A1 in the appendix.

3. Regional Results

The reductions in tariffs on non-agricultural products are projected to expand the existing regional disparities between the largest region—Punjab—and the smaller regions—Sindh, NWFP and Balochistan—in both the simulated scenarios; and the degree of the tariff reduction is positively associated with the projected regional disparities (see *Table 6*). Punjab is the only region whose output growth surpasses the national output growth in both the scenarios. Among the smaller regions, the two most disadvantaged regions, NWFP and Balochistan, are likely to be most affected by the tariff cuts. For example, the regional output growth of Punjab is expected to be 0.12 per cent in the first scenario and 0.07 per cent in the second scenario. The corresponding values for Sindh, NWFP and Balochistan are likely to be 0.01 per cent, 0.00 per cent and -0.01 per cent under the first scenario and -0.01 per cent, -0.07 per cent and -0.09 per cent under the second scenario. It is of note that while Butt (2006) and Butt and Bandara (2008) have found a positive link between tariff cuts and regional disparities in Pakistan, their studies are not based on Doha Round proposals. As a result, unlike this study, they have not been able to differentiate between the impacts on regional disparities under the Swiss formula proposals.

Table 6: Regional Macro Results

Region	Growth in real gross regional product at factor cost (%)		Growth differentials between regional product at factor cost and Real GDP of Pakistan at factor cost (percentage points)	
	Simulation 1	Simulation 2	Simulation 1	Simulation 2
Punjab	0.02	0.07	0.01	0.05
Sindh	0.01	-0.01	0.00	-0.03
NWFP	0.00	-0.07	-0.01	-0.09
Balochistan	-0.01	-0.09	-0.02	-0.11
Real GDP of Pakistan at factor cost (%)				
Simulation 1	0.01		Simulation 2	0.02

The projected differences in the regional output growth stem from dissimilarities in the economic structure of the four regions and can be systematically explained with the help of a table called ‘regional advantage matrix’ (see *Tables 7 and 8*). A region has a positive regional advantage if the regional real output growth exceeds the national real output growth, and vice versa. Columns of the regional advantage matrix add up to the difference between the regional and national GDP growth at factor cost. Rows of the matrix explain to what industries the difference may be attributed. An industry’s contribution to the difference between the regional and national growth depends upon the combination of three factors. An industry makes a positive contribution to a region if its output growth is higher than the national real GDP growth and the region is over-represented in the industry relative to the national economy (that is, the industry’s share in the region is larger than its share in the national economy); or if its output increases by less than the national real GDP and the region is under-represented in the industry relative to the national economy; or—in relation to a local industry—its output in the

region increases (decreases) by more (by less) than its national output. In sum, while winning regions have more than their share of faster-growing industries and/or have less than their share of slower-growing or shrinking industries, losing regions specialise in slower-growing or contracting industries and/or have less than their share of faster-growing industries. In the following sections, we use two regional advantages matrices to explain the predicted differences in the regional output growth in the two simulated scenarios.

6. *Determinants of the Regional Growth in the First Simulated Scenario*

As regards the determinants of the projected differences in the relative regional output growth in the first simulation, *Table 7* shows that Punjab is the only region which experiences positive regional advantage—the difference between the regional and national GDP growth at factor cost—(0.01 percentage points), whereas Sindh, NWFP and Balochistan record regional advantages of 0.00 percentage points, -0.01 percentage points and -0.02 percentage points, respectively. It is also evident from *Table 7* that while the majority of the 10 local industries (which have been shaded in the table) make positive or zero contributions toward the regional advantage in Punjab, most of them make negative or zero contributions toward the regional advantages in the smaller regions, particularly NWFP and Balochistan. Since the performance of a local industry in a region depends on the share and performance of national industries in that region, it can be concluded that that while Punjab has more than its share of the faster-growing national industries (relative to the national real GDP growth) and/or has less than its share of the slower-growing¹⁰ national industries, the remaining three regions have specialised in the slower-growing national industries and/or have less than their share of the faster-growing national industries.

With regards to the role of the national industries in shaping the regional output differences, a joint examination of *Figure 3a*, *Table 7* and the database of the regional extension of the model reveals that Punjab's regional growth exceeds the national real GDP growth after the tariff cuts proposed by developing countries because it is under-represented in some non-export import-substitution manufacturing industries (particularly Other Transport Equipment, Basic Metallic Products, and Bricks, Tiles and Cement) which grow slower than national real GDP. It is disadvantaged primarily by its under-representation in three faster-growing industries – two export industries, Garments and Carpets, and one non-export import-substitution manufacturing industry, Electric Equipment. As a result, outputs of the majority of the local industries in Punjab—especially Construction, Trade and Transport, and Unspecified Services—also increase (decrease) by more (by less) than their outputs at the national level, thus adding more positive points to the regional advantage.

Sindh benefits from its over-representation in the four faster-growing industries, namely Garments, Carpets, Electric Equipment and Art Silk. However, its regional growth becomes slightly lower than that of Punjab because of its over-representation in three slower growing industries, Other Transport Equipment, Basic Metallic Products, and Bricks, Tiles and Cement. The regional advantage of NWFP becomes negative mainly because of its under-representation in the four faster-growing industries (Garments, Carpets, Electric Equipment and Art Silk)

¹⁰ From now on the term 'slower growing industries' will be used for the industries with negative output growth as well as the industries that grow slower than national real GDP.

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Table 7: Regional Advantage Matrix – Simulation 1

Industry contributions in percentage points to the regional advantage of each region– sorted by magnitudes of contributions							
Industry	Punjab	Industry	Sindh	Industry	NWFP	Industry	Balochistan
44 MfOtrTrspEqp	0.0042	27 MfGarments	0.0063	44 MfOtrTrspEqp	0.0041	23 MfArtSilk	0.0014
50 Construction	0.0021	51 TradeTransp	0.0031	40 MfBasMetlPrd	0.0007	40 MfBasMetlPrd	0.0008
51 TradeTransp	0.0010	26 MfCarpets	0.0007	3 CrpCotnPht	0.0005	3 CrpCotnPht	0.0005
52 SrvcUnspcifd	0.0007	56 BnkngInsure	0.0006	24 MfMupTxtOtrG	0.0002	38 MfBrkTilCmnt	0.0002
40 MfBasMetlPrd	0.0004	43 MfElcEqp	0.0004	20 MfGindCotnLn	0.0001	24 MfMupTxtOtrG	0.0002
38 MfBrkTilCmnt	0.0004	3 CrpCotnPht	0.0003	22 MfCotnCloth	0.0000	14 MfMilling	0.0001
48 ElcAWtrwrks	0.0003	25 MfKnitwear	0.0001	28 MfLthrAPrd	0.0000	16 MfSugar	0.0001
12 Mining	0.0001	23 MfArtSilk	0.0001	32 MfPhrmcutics	0.0000	4 CrpSugCane	0.0001
60 OtrSoACuSrvc	0.0001	55 CommSrvc	0.0000	16 MfSugar	0.0000	20 MfGindCotnLn	0.0001
42 MfOtrNlcMch	0.0001	6 CrpOtr	0.0000	12 Mining	0.0000	22 MfCotnCloth	0.0000
58 Education	0.0001	41 MfOtrMtPrdJ	0.0000	46 MfOterHndCrf	0.0000	54 TrnsptAir	0.0000
59 HealthCare	0.0001	20 MfGindCotnLn	0.0000	33 MfFrtlsrAPst	0.0000	28 MfLthrAPrd	0.0000
21 MfCotnYarn	0.0000	21 MfCotnYarn	0.0000	29 MfFootwear	0.0000	46 MfOterHndCrf	0.0000
30 MfWdAWdPrdAF	0.0000	2 CrpWheat	0.0000	1 CrpRicePad	0.0000	34 MfChACnsrPrd	0.0000
55 CommSrvc	0.0000	54 TrnsptAir	0.0000	49 GasSupply	0.0000	29 MfFootwear	0.0000
32 MfPhrmcutics	0.0000	11 Fishing	0.0000	2 CrpWheat	0.0000	33 MfFrtlsrAPst	0.0000
22 MfCotnCloth	0.0000	36 MfRbrAPlsPrd	0.0000	57 PubAdmnAdefc	0.0000	32 MfPhrmcutics	0.0000
34 MfChACnsrPrd	0.0000	29 MfFootwear	0.0000	6 CrpOtr	0.0000	53 TrnsptWater	0.0000
49 GasSupply	0.0000	37 MfOtrCh	0.0000	35 MfRefPetrol	0.0000	19 MfCigTobacco	0.0000
24 MfMupTxtOtrG	0.0000	53 TrnsptWater	0.0000	13 MfVegOiletc	0.0000	2 CrpWheat	0.0000
14 MfMilling	0.0000	7 CrpPulsAGram	0.0000	34 MfChACnsrPrd	0.0000	36 MfRbrAPlsPrd	0.0000
16 MfSugar	0.0000	5 CrpTobacco	0.0000	8 CrpOilSeeds	0.0000	7 CrpPulsAGram	0.0000
39 MfOtrNmtMPrd	0.0000	9 Livestock	0.0000	15 MfBakeryPrd	0.0000	13 MfVegOiletc	0.0000
28 MfLthrAPrd	0.0000	8 CrpOilSeeds	0.0000	17 MfOtrFdPrd	0.0000	35 MfRefPetrol	0.0000
46 MfOterHndCrf	0.0000	47 MfSprtGds	0.0000	31 MfPprAPprPrd	0.0000	15 MfBakeryPrd	0.0000
1 CrpRicePad	0.0000	45 MfSrgInstrmt	0.0000	47 MfSprtGds	0.0000	5 CrpTobacco	0.0000
57 PubAdmnAdefc	0.0000	10 Forestry	0.0000	19 MfCigTobacco	0.0000	17 MfOtrFdPrd	0.0000
35 MfRefPetrol	0.0000	18 MfBeverages	0.0000	45 MfSrgInstrmt	0.0000	47 MfSprtGds	0.0000
5 CrpTobacco	0.0000	13 MfVegOiletc	0.0000	18 MfBeverages	0.0000	8 CrpOilSeeds	0.0000
4 CrpSugCane	0.0000	31 MfPprAPprPrd	0.0000	7 CrpPulsAGram	0.0000	9 Livestock	0.0000
15 MfBakeryPrd	0.0000	17 MfOtrFdPrd	0.0000	10 Forestry	0.0000	45 MfSrgInstrmt	0.0000
10 Forestry	0.0000	19 MfCigTobacco	0.0000	37 MfOtrCh	0.0000	18 MfBeverages	0.0000
17 MfOtrFdPrd	0.0000	14 MfMilling	0.0000	9 Livestock	0.0000	31 MfPprAPprPrd	0.0000
31 MfPprAPprPrd	0.0000	15 MfBakeryPrd	0.0000	39 MfOtrNmtMPrd	0.0000	10 Forestry	0.0000
18 MfBeverages	0.0000	49 GasSupply	0.0000	53 TrnsptWater	0.0000	11 Fishing	0.0000
19 MfCigTobacco	0.0000	30 MfWdAWdPrdAF	0.0000	4 CrpSugCane	0.0000	37 MfOtrCh	0.0000
33 MfFrtlsrAPst	0.0000	57 PubAdmnAdefc	0.0000	36 MfRbrAPlsPrd	0.0000	60 OtrSoACuSrvc	0.0000
9 Livestock	0.0000	35 MfRefPetrol	0.0000	41 MfOtrMtPrdJ	0.0000	1 CrpRicePad	0.0000
13 MfVegOiletc	0.0000	1 CrpRicePad	0.0000	54 TrnsptAir	0.0000	57 PubAdmnAdefc	0.0000
45 MfSrgInstrmt	0.0000	33 MfFrtlsrAPst	0.0000	11 Fishing	0.0000	59 HealthCare	0.0000
8 CrpOilSeeds	0.0000	39 MfOtrNmtMPrd	0.0000	5 CrpTobacco	0.0000	39 MfOtrNmtMPrd	0.0000
11 Fishing	0.0000	4 CrpSugCane	0.0000	30 MfWdAWdPrdAF	-0.0001	41 MfOtrMtPrdJ	0.0000
37 MfOtrCh	0.0000	46 MfOterHndCrf	0.0000	25 MfKnitwear	-0.0001	58 Education	0.0000
47 MfSprtGds	0.0000	28 MfLthrAPrd	0.0000	14 MfMilling	-0.0001	30 MfWdAWdPrdAF	0.0000
7 CrpPulsAGram	0.0000	34 MfChACnsrPrd	0.0000	58 Education	-0.0001	43 MfElcEqp	0.0000
53 TrnsptWater	0.0000	16 MfSugar	0.0000	42 MfOtrNlcMch	-0.0001	42 MfOtrNlcMch	-0.0001
36 MfRbrAPlsPrd	0.0000	59 HealthCare	0.0000	60 OtrSoACuSrvc	-0.0001	25 MfKnitwear	-0.0001
41 MfOtrMtPrdJ	0.0000	32 MfPhrmcutics	-0.0001	59 HealthCare	-0.0001	6 CrpOtr	-0.0001
54 TrnsptAir	0.0000	12 Mining	-0.0001	55 CommSrvc	-0.0001	55 CommSrvc	-0.0001
29 MfFootwear	0.0000	22 MfCotnCloth	-0.0001	21 MfCotnYarn	-0.0001	49 GasSupply	-0.0001
2 CrpWheat	0.0000	42 MfOtrNlcMch	-0.0001	43 MfElcEqp	-0.0003	21 MfCotnYarn	-0.0002
6 CrpOtr	0.0000	58 Education	-0.0001	48 ElcAWtrwrks	-0.0006	48 ElcAWtrwrks	-0.0003
23 MfArtSilk	0.0000	60 OtrSoACuSrvc	-0.0001	56 BnkngInsure	-0.0006	56 BnkngInsure	-0.0006
20 MfGindCotnLn	0.0000	24 MfMupTxtOtrG	-0.0002	26 MfCarpets	-0.0009	12 Mining	-0.0006
25 MfKnitwear	0.0000	48 ElcAWtrwrks	-0.0002	23 MfArtSilk	-0.0010	26 MfCarpets	-0.0009
56 BnkngInsure	-0.0001	52 SrvcUnspcifd	-0.0003	38 MfBrkTilCmnt	-0.0010	52 SrvcUnspcifd	-0.0023
26 MfCarpets	-0.0001	38 MfBrkTilCmnt	-0.0004	52 SrvcUnspcifd	-0.0017	44 MfOtrTrspEqp	-0.0027
43 MfElcEqp	-0.0002	40 MfBasMetlPrd	-0.0012	50 Construction	-0.0026	27 MfGarments	-0.0031
3 CrpCotnPht	-0.0003	50 Construction	-0.0022	27 MfGarments	-0.0031	50 Construction	-0.0040
27 MfGarments	-0.0024	44 MfOtrTrspEqp	-0.0089	51 TradeTransp	-0.0077	51 TradeTransp	-0.0097
Total contributions*	0.01		0.00		-0.01		-0.02
Growth in real gross regional product at factor cost	0.02		0.01		0.00		-0.01
Less growth in real national GDP at factor cost	0.01		0.01		0.01		0.01
= Regional advantage	0.01		0.00		-0.01		-0.02

* Some totals of the contributions made by the national and local industries may not add up to the totals presented in this row because the contributions have been showed up to four digits only.
Note: the 14 key export industries are printed in italic type; and the 10 local industries are shaded.

and its over-representation in the slower growing industry Bricks, Tiles and Cement. Finally, Balochistan experiences the highest contraction in its regional output primarily on account of its under-representation in two faster-growing industries (Garments and Carpets) and its over-representation in the slower-growing industry Other Transport Equipment.

7. Determinants of the Regional Growth in the Second Simulated Scenario

The intensity and the coverage of tariff shocks are significantly higher in the second simulated scenario than those in the first scenario. As a result, the extent of regional disparities between Punjab and the smaller regions increases considerably in the second simulated scenario, with the regional advantages of Punjab, Sindh, NWFP and Balochistan becoming 0.05 percentage points, -0.03 percentage points, -0.09 percentage points and -0.11 percentage points, respectively (see *Table 8*). As in the first simulated scenario, most local industries make positive or zero contributions toward the regional advantage in Punjab, whereas most of them make negative or zero contributions toward the regional advantages in the smaller regions, especially NWFP and Balochistan. This indicates that, like the first simulated scenario, Punjab has more than its share of the faster-growing national industries and/or has less than its share of the slower-growing national industries, with the remaining three regions specialising in the slower-growing national industries and/or having less than their share of the faster-growing national industries, as explained below.

Punjab records the highest and positive regional advantage because it is over-represented in two faster-growing agricultural industries (Cotton Crop and Wheat Crop) and is under-represented in a large number of slower-growing non-export import-substitution manufacturing industries, particularly Other Transport Equipment, Basic Metallic Products, Bricks, Tiles and Cement, Electric Equipment, Other Metallic Products, Paper and Paper Products, and Wood and Wood Products. Although Punjab receives negative contributions to its regional advantage owing to its under-representation in six export industries (four cotton and textile related export industries, namely Garments, Cotton Cloth, Knitwear, and Art Silk; and two other export industries, Carpets, and Leather Products) but the positive contributions of the aforementioned industries far exceed these negative contributions.

While Sindh gains from its representation in eight faster-growing export industries (five cotton and textile related export industries, Garments, Cotton Cloth, Knitwear, Cotton Yarn, Art Silk, and Made-up Textile Goods; and two other export industries, Carpets, and Leather Products), its regional advantage becomes negative predominantly because of its over-representation in most slower-growing non-export import-substitution manufacturing industries, such as Other Transport Equipment, Basic Metallic Products, Electric Equipment, Other Metallic Products, Bricks, Tiles and Cement, Paper and Paper Products, and Rubber and Plastic Products. While the smaller regions, NWFP and Balochistan, benefit from their under-representation in almost all the slower-growing non-export manufacturing industries (as in the case of Punjab), they turn out to be the main losers in the wake of the tariff cuts because both of them are under-represented in nearly all the faster-growing export industries (excluding Transport Water and Transport Air in relation to NWFP and Art Silk in respect of Balochistan), NWFP is over-represented in slower-growing industry Forestry and Balochistan is over-represented in slower-growing industries Forestry, and Mining.

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Table 8: Regional Advantage Matrix – Simulation 2

Industry contributions in percentage points to the regional advantage of each region– sorted by magnitudes of contributions							
Industry	Punjab	Industry	Sindh	Industry	NWFP	Industry	Balochistan
51 TradeTransp	0.011	27 <i>MfGarments</i>	0.012	44 MfOtrTrspEqp	0.007	40 MfBasMetlPrd	0.005
50 Construction	0.010	22 <i>MfCotnCloth</i>	0.004	40 MfBasMetlPrd	0.005	23 <i>MfArtSilk</i>	0.003
44 MfOtrTrspEqp	0.007	10 Forestry	0.001	43 MfElcEqp	0.003	41 MfOtrMtPrdJ	0.002
52 SrvcUnspcfd	0.006	26 <i>MfCarpets</i>	0.001	31 MfPprAPprPrd	0.002	38 MfBrkTilCmnt	0.001
40 MfBasMetlPrd	0.002	25 <i>MfKnitwear</i>	0.001	41 MfOtrMtPrdJ	0.001	6 CrpOtr	0.001
10 Forestry	0.002	56 BnkngInsure	0.001	17 MfOtrFdPrd	0.001	17 MfOtrFdPrd	0.001
48 ElcAWtrwrks	0.002	28 <i>MfLthrAPrd</i>	0.000	36 MfRbrAPlsPrd	0.001	4 CrpSugCane	0.000
38 MfBrkTilCmnt	0.002	21 <i>MfCotnYarn</i>	0.000	54 <i>TrnsptAir</i>	0.000	43 MfElcEqp	0.000
43 MfElcEqp	0.001	37 MfOtrCh	0.000	14 MfMilling	0.000	16 MfSugar	0.000
3 CrpCotnPht	0.001	33 MfFrtlsrAPst	0.000	53 <i>TrnsptWater</i>	0.000	13 MfVegOiletc	0.000
41 MfOtrMtPrdJ	0.001	23 <i>MfArtSilk</i>	0.000	12 Mining	0.000	35 MfRefPetrol	0.000
31 MfPprAPprPrd	0.001	24 <i>MfMupTxtOtrG</i>	0.000	35 MfRefPetrol	0.000	34 MfChACnsrPrd	0.000
30 MfWdAWdPrdAF	0.001	49 GasSupply	0.000	13 MfVegOiletc	0.000	29 MfFootwear	0.000
12 Mining	0.001	46 MfOterHndCrf	0.000	16 MfSugar	0.000	1 CrpRicePad	0.000
42 MfOtrNclMch	0.001	15 MfBakeryPrd	0.000	49 GasSupply	0.000	19 MfCigTobacco	0.000
21 <i>MfCotnYarn</i>	0.001	11 Fishing	0.000	5 CrpTobacco	0.000	32 MfPhrmcutics	0.000
55 <i>CommSrv</i>	0.000	14 MfMilling	0.000	9 Livestock	0.000	7 CrpPulsAGram	0.000
60 OtrSoACuSrv	0.000	29 MfFootwear	0.000	57 PubAdmnAdefc	0.000	18 MfBeverages	0.000
58 Education	0.000	1 CrpRicePad	0.000	29 MfFootwear	0.000	11 Fishing	0.000
2 CrpWheat	0.000	18 MfBeverages	0.000	34 MfChACnsrPrd	0.000	5 CrpTobacco	0.000
36 MfRbrAPlsPrd	0.000	7 CrpPulsAGram	0.000	32 MfPhrmcutics	0.000	15 MfBakeryPrd	0.000
56 BnkngInsure	0.000	19 MfCigTobacco	0.000	18 MfBeverages	0.000	9 Livestock	0.000
59 HealthCare	0.000	32 MfPhrmcutics	0.000	7 CrpPulsAGram	0.000	8 CrpOilSeeds	0.000
45 <i>MfSrgInstrmt</i>	0.000	5 CrpTobacco	0.000	19 MfCigTobacco	0.000	57 PubAdmnAdefc	0.000
39 MfOtrNmtMPrd	0.000	13 MfVegOiletc	0.000	1 CrpRicePad	0.000	46 MfOterHndCrf	0.000
17 MfOtrFdPrd	0.000	57 PubAdmnAdefc	0.000	15 MfBakeryPrd	0.000	60 OtrSoACuSrv	0.000
54 <i>TrnsptAir</i>	0.000	8 CrpOilSeeds	0.000	11 Fishing	0.000	58 Education	0.000
47 <i>MfSprtGds</i>	0.000	55 <i>CommSrv</i>	0.000	46 MfOterHndCrf	0.000	14 MfMilling	0.000
6 CrpOtr	0.000	9 Livestock	0.000	8 CrpOilSeeds	0.000	59 HealthCare	0.000
20 <i>MfGindCotnLn</i>	0.000	34 MfChACnsrPrd	0.000	4 CrpSugCane	0.000	37 MfOtrCh	0.000
49 GasSupply	0.000	4 CrpSugCane	0.000	6 CrpOtr	0.000	47 <i>MfSprtGds</i>	0.000
53 <i>TrnsptWater</i>	0.000	20 <i>MfGindCotnLn</i>	0.000	37 MfOtrCh	0.000	24 <i>MfMupTxtOtrG</i>	0.000
35 MfRefPetrol	0.000	16 MfSugar	0.000	39 MfOtrNmtMPrd	0.000	20 <i>MfGindCotnLn</i>	0.000
8 CrpOilSeeds	0.000	53 <i>TrnsptWater</i>	0.000	47 <i>MfSprtGds</i>	0.000	2 CrpWheat	0.000
16 MfSugar	0.000	35 MfRefPetrol	0.000	24 <i>MfMupTxtOtrG</i>	0.000	28 <i>MfLthrAPrd</i>	0.000
34 MfChACnsrPrd	0.000	47 <i>MfSprtGds</i>	0.000	20 <i>MfGindCotnLn</i>	0.000	53 <i>TrnsptWater</i>	0.000
4 CrpSugCane	0.000	12 Mining	0.000	33 MfFrtlsrAPst	0.000	33 MfFrtlsrAPst	0.000
57 PubAdmnAdefc	0.000	30 MfWdAWdPrdAF	0.000	28 <i>MfLthrAPrd</i>	0.000	42 MfOtrNclMch	0.000
9 Livestock	0.000	59 HealthCare	0.000	2 CrpWheat	0.000	45 <i>MfSrgInstrmt</i>	0.000
32 MfPhrmcutics	0.000	54 <i>TrnsptAir</i>	0.000	45 <i>MfSrgInstrmt</i>	0.000	36 MfRbrAPlsPrd	0.000
7 CrpPulsAGram	0.000	39 MfOtrNmtMPrd	0.000	25 <i>MfKnitwear</i>	-0.001	25 <i>MfKnitwear</i>	-0.001
19 MfCigTobacco	0.000	45 <i>MfSrgInstrmt</i>	0.000	58 Education	-0.001	39 MfOtrNmtMPrd	-0.001
1 CrpRicePad	0.000	6 CrpOtr	0.000	60 OtrSoACuSrv	-0.001	54 <i>TrnsptAir</i>	-0.001
18 MfBeverages	0.000	42 MfOtrNclMch	-0.001	59 HealthCare	-0.001	30 MfWdAWdPrdAF	-0.001
11 Fishing	0.000	58 Education	-0.001	42 MfOtrNclMch	-0.001	26 <i>MfCarpets</i>	-0.001
33 MfFrtlsrAPst	0.000	60 OtrSoACuSrv	-0.001	26 <i>MfCarpets</i>	-0.001	55 <i>CommSrv</i>	-0.001
15 MfBakeryPrd	0.000	2 CrpWheat	-0.001	55 <i>CommSrv</i>	-0.002	31 MfPprAPprPrd	-0.002
5 CrpTobacco	0.000	17 MfOtrFdPrd	-0.001	30 MfWdAWdPrdAF	-0.002	49 GasSupply	-0.002
29 MfFootwear	0.000	36 MfRbrAPlsPrd	-0.001	21 <i>MfCotnYarn</i>	-0.002	56 BnkngInsure	-0.002
24 <i>MfMupTxtOtrG</i>	0.000	48 ElcAWtrwrks	-0.001	3 CrpCotnPht	-0.002	3 CrpCotnPht	-0.002
46 MfOterHndCrf	0.000	51 TradeTransp	-0.001	23 <i>MfArtSilk</i>	-0.002	48 ElcAWtrwrks	-0.002
14 MfMilling	0.000	3 CrpCotnPht	-0.001	56 BnkngInsure	-0.002	22 <i>MfCotnCloth</i>	-0.002
13 MfVegOiletc	0.000	31 MfPprAPprPrd	-0.002	22 <i>MfCotnCloth</i>	-0.002	21 <i>MfCotnYarn</i>	-0.003
23 <i>MfArtSilk</i>	0.000	38 MfBrkTilCmnt	-0.002	38 MfBrkTilCmnt	-0.004	12 Mining	-0.003
37 MfOtrCh	0.000	41 MfOtrMtPrdJ	-0.003	48 ElcAWtrwrks	-0.004	44 MfOtrTrspEqp	-0.005
28 <i>MfLthrAPrd</i>	0.000	43 MfElcEqp	-0.004	27 <i>MfGarments</i>	-0.006	27 <i>MfGarments</i>	-0.006
26 <i>MfCarpets</i>	0.000	52 SrvcUnspcfd	-0.004	10 Forestry	-0.008	10 Forestry	-0.012
25 <i>MfKnitwear</i>	0.000	50 Construction	-0.007	52 SrvcUnspcfd	-0.011	52 SrvcUnspcfd	-0.012
22 <i>MfCotnCloth</i>	-0.001	40 MfBasMetlPrd	-0.007	50 Construction	-0.020	50 Construction	-0.021
27 <i>MfGarments</i>	-0.005	44 MfOtrTrspEqp	-0.015	51 TradeTransp	-0.033	51 TradeTransp	-0.036
Total contributions*	0.05		-0.03		-0.09		-0.11
Growth in real gross regional product at factor cost	0.07		-0.01		-0.07		-0.09
Less growth in real national GDP at factor cost	0.02		0.02		0.02		0.02
= Regional advantage	0.05		-0.03		-0.09		-0.11

* Some totals of the contributions made by the national and local industries may not add up to the totals presented in this row because the contributions have been showed up to four digits only. Note: the 14 key export industries are printed in italic type; and the 10 local industries are shaded.

VII. CONCLUSION AND POLICY IMPLICATIONS

The results of our study add new dimensions to the debate between developed and developing countries in the Doha Round of trade negotiations on the possible national and regional effects of increasing NAMA – one of the main stumbling blocks bringing the whole negotiation process to a deadlock. Each group of countries is seeking NAMA which is higher than the NAMA the other group is willing to provide. In respect of the NAMA sought from developing countries, developed countries are asking for the application of a Swiss formula coefficient of 15 to reduce bound tariff rates on non-agricultural products of developing countries, whereas these countries want this coefficient to be 30 which would result in a lower reduction in their bound tariffs.

Using Pakistan as a case study, the results of our CGE experiment suggest that not only are developing countries likely to benefit—in terms of increased exports and real GDP—from tariff reductions, but that the overall benefits to their economies will plausibly be higher under the tariff-cut proposal advanced by developed countries than that insisted upon by developing countries. At the industry level, the proposal of developing countries will probably have insignificant effects on the majority of the export and non-export industries. In contrast, the proposal of developed countries is likely to provide a significant boost to all the export industries. However, non-export import-substitution manufacturing industries are the foremost losers if the proposal of developed countries is implemented. As noted in the previous section, this can be explained by the role protectionist lobby groups play in policy making in these countries. None of the previous CGE studies on Pakistan has been able to capture these results.

The degree of tariff reductions is also found to be positively associated with regional disparities. In the case of Pakistan, the existing regional disparities between the largest region and the three smaller regions are projected to be higher under the proposal of developed countries than under that of developing countries. These findings will provide guidance for other countries. As noted in the introductory section, there are many developing countries which are facing regional disparities and conflicts while they are undertaking trade liberalisation program. It is important for these countries to undertake trade reforms while taking measures to reduce regional disparities and tensions.

These findings may have important policy implications for the NAMA negotiations in the Doha Round. Developed countries, particularly the US and EU, are campaigning for a Swiss formula coefficient of 10 for developed countries and 15 for developing countries, whereas developing countries want these coefficients to be 5 and 30. Since opening up NAMA is expected to be beneficial, at least on overall basis, to the opening country, developed and developing countries may choose from the two proposed coefficients the coefficient that leads to the highest possible increase in NAMA. That is, a coefficient of 5 for developed countries and 15 for developing countries. This may end the present gridlock on NAMA discussions and soften the stance of developed and developing countries on agricultural issues, particularly domestic protection. Finally, developing countries should have in place as soon as possible policies and programs aimed at reducing plausible regional disparities in the wake of the conclusion of the Doha Round. It may not be unreasonable to seek in the Doha Round financial and/or technical help from developed countries to ameliorate these disparities.

APPENDIX

*Table A1: Names of National and Local Commodities/Industries in the
Database of the Model*

No.	Code name	Explanation
National industries		
<i>Agricultural products</i>		
1	1 CrpRicePad	1) Crops: Rice (paddy)
2	2 CrpWheat	2) Crops: Wheat
3	3 CrpCotnPht	3) Crops: Cotton (phutty)
4	4 CrpSugCane	4) Crops: Sugarcane
5	5 CrpTobacco	5) Crops: Tobacco
6	6 CrpOtr	6) Crops: Other crops
7	7 CrpPulsAGram	7) Crops: Pulses and grams
8	8 CrpOilSeeds	8) Crops: Oil seeds
9	9 Livestock	9) Livestock
<i>Non-agricultural products (as defined in WTO, 2007a)</i>		
1	10 Forestry	10) Forestry
2	11 Fishing	11) Fishing
3	12 Mining	12) Mining and quarrying
4	13 MfVegOiletc	13) MF: Vegetable oils etc.
5	14 MfMilling	14) MF: Milling
6	15 MfBakeryPrd	15) MF: Bakery products
7	16 MfSugar	16) MF: Sugar
8	17 MfOtrFdPrd	17) MF: Other food products
9	18 MfBeverages	18) MF: Beverages
10	19 MfCigTobacco	19) MF: Cigarettes and tobacco
11	20 MfGindCotnLn	20) MF: Ginned cotton (lint)
12	21 MfCotnYarn	21) MF: Cotton yarn
13	22 MfCotnCloth	22) MF: Cotton cloth
14	23 MfArtSilk	23) MF: Art silk
15	24 MfMupTxtOtrG	24) MF: Made up textile goods and other textile products
16	25 MfKnitwear	25) MF: Knitwear
17	26 MfCarpets	26) MF: Carpets
18	27 MfGarments	27) MF: Ready-made Garments
19	28 MfLthrAPrd	28) MF: Leather and leather products
20	29 MfFootwear	29) MF: Footwear
21	30 MfWdAWdPrdAF	30) MF: Wood, wooden products and furniture
22	31 MfPprAPprPrd	31) MF: Paper and paper products
23	32 MfPhrmcotics	32) MF: Pharmaceuticals
24	33 MfFrtlsrAPst	33) MF: Fertilisers and pesticides
25	34 MfChACnsrPrd	34) MF: Chemicals and consumer products
26	35 MfRefPetrol	35) MF: Refined petroleum
27	36 MfRbrAPlsPrd	36) MF: Rubber and plastic products
28	37 MfOtrCh	37) MF: Other chemicals
29	38 MfBrkTilCmnt	38) MF: Cement, bricks and tiles
30	39 MfOtrNmtMPrd	39) MF: Other non-metallic mineral products
31	40 MfBasMetlPrd	40) MF: Basic metal products
32	41 MfOtrMtPrdJ	41) MF: Other metal products including jewellery
33	42 MfOtrNlecMch	42) MF: Other non-electrical machinery
34	43 MfElcEqp	43) MF: Electrical equipment etc.
35	44 MfOtrTrspEqp	44) MF: Other transport equipment
36	45 MfSrgInstrmt	45) MF: Surgical instruments
37	46 MfOterHndCrf	46) MF: Other manufacturing products and handicraft
38	47 MfSprtGds	47) MF: Sports goods
<i>Services</i>		
1	53 TrnsptWater	53) Transport: Water
2	54 TrnsptAir	54) Transport: Air
3	57 PubAdmnAdefc	57) Public administration and defence
Local industries		
4	48 ElcAWtrwrks	48) Electricity and waterworks
5	49 GasSupply	49) Gas supply
6	50 Construction	50) Construction: Buildings and land improvement
7	51 TradeTransp	51) Trade and transport (margin commodity)
8	52 SrvcUnspcfd	52) Services not elsewhere specified
9	55 CommSrv	55) Communication services
10	56 BnkngInsure	56) Banking and insurance
11	58 Education	58) Education
12	59 HealthCare	59) Health care
13	60 OtrSoACuSrv	60) Other social and cultural services

Note: (i) the 14 key export industries are printed in italic type; and ‘MF’ stands for ‘Manufacturing’.

Table A2: Mapping of 12 Non-Agricultural Product Groups to 38 Non-Agricultural Products in the Model's Database

No. 12 Non-agricultural products as per WTO (2007a)	Average final bound duty as per WTO (2007a) (%)	38 Non-agricultural products in the model's database	Average final bound duty after mapping (%)
1 Wood, paper, etc.	57.90	10) Forestry	57.90
2 Fish and fish products	65.00	11) Fishing	65.00
3 Minerals and metals	64.70	12) Mining and quarrying	64.70
4 Manufactures, not elsewhere specified	64.70	13) MF: Vegetable oils etc.	64.70
5 Manufactures, not elsewhere specified	64.70	14) MF: Milling	64.70
6 Manufactures, not elsewhere specified	64.70	15) MF: Bakery products	64.70
7 Manufactures, not elsewhere specified	64.70	16) MF: Sugar	64.70
8 Manufactures, not elsewhere specified	64.70	17) MF: Other food products	64.70
9 Manufactures, not elsewhere specified	64.70	18) MF: Beverages	64.70
10 Manufactures, not elsewhere specified	64.70	19) MF: Cigarettes and tobacco	64.70
11 Clothing	25.00	20) MF: Ginned cotton (lint)	25.00
12 Clothing	25.00	21) MF: Cotton yarn	25.00
13 Clothing	25.00	22) MF: Cotton cloth	25.00
14 Clothing	25.00	23) MF: Art silk	25.00
15 Textiles	23.30	24) MF: Made up textile goods & other textile products	23.30
16 Clothing	25.00	25) MF: Knitwear	25.00
17 Manufactures, not elsewhere specified	64.70	26) MF: Carpets	64.70
18 Clothing	25.00	27) MF: Ready-made Garments	25.00
19 Leather, footwear, etc.	66.40	28) MF: Leather and leather products	66.40
20 Leather, footwear, etc.	66.40	29) MF: Footwear	66.40
21 Wood, paper, etc.	57.90	30) MF: Wood, wooden products and furniture	57.90
22 Wood, paper, etc.	57.90	31) MF: Paper and paper products	57.90
23 Chemicals	57.00	32) MF: Pharmaceuticals	57.00
24 Chemicals	57.00	33) MF: Fertilisers and pesticides	57.00
25 Chemicals	57.00	34) MF: Chemicals and consumer products	57.00
26 Petroleum	66.40	35) MF: Refined petroleum	66.40
27 Manufactures, not elsewhere specified	64.70	36) MF: Rubber and plastic products	64.70
28 Chemicals	57.00	37) MF: Other chemicals	57.00
29 Manufactures, not elsewhere specified	64.70	38) MF: Cement, bricks and tiles	64.70
30 Minerals and metals	64.70	39) MF: Other non-metallic mineral products	64.70
31 Minerals and metals	64.70	40) MF: Basic metal products	64.70
32 Minerals and metals	64.70	41) MF: Other metal products including jewellery	64.70
33 Non-electrical machinery	61.10	42) MF: Other non-electrical machinery	61.10
34 Electrical machinery	64.10	43) MF: Electrical equipment etc.	64.10
35 Transport equipment	61.60	44) MF: Other transport equipment	61.60
36 Manufactures, not elsewhere specified	64.70	45) MF: Surgical instruments	64.70
37 Manufactures, not elsewhere specified	64.70	46) MF: Other manufacturing products and handicraft	64.70
38 Manufactures, not elsewhere specified	64.70	47) MF: Sports goods	64.70

*Table A3: Estimation of Tariff Shocks to Pakistan's 38 Non-Agricultural
Products using the Swiss Formula Coefficient
Proposed by Developing Countries*

No.	Code name of Non-agricultural Product	(a) Initial Bound Tariff in 2006 (%)	(b) Initial Applied Tariff in 2006 (%)	(c) Reduced Bound Tariff (%) (Using Swiss Formula Coefficient of 30)	(d) New Applied Tariff = Minimum between (b) and (c)	(e) Tariff Shock = (d – b) / b × 100)
1	10 Forestry	57.90	17.30	19.76	17.30	0.00
2	11 Fishing	65.00	10.60	20.53	10.60	0.00
3	12 Mining	64.70	13.60	20.50	13.60	0.00
4	13 MfVegOiletc	64.70	12.80	20.50	12.80	0.00
5	14 MfMilling	64.70	12.80	20.50	12.80	0.00
6	15 MfBakeryPrd	64.70	12.80	20.50	12.80	0.00
7	16 MfSugar	64.70	12.80	20.50	12.80	0.00
8	17 MfOtrFdPrd	64.70	12.80	20.50	12.80	0.00
9	18 MfBeverages	64.70	12.80	20.50	12.80	0.00
10	19 MfCigTobacco	64.70	12.80	20.50	12.80	0.00
11	20 MfGindCotnLn	25.00	24.80	13.64	13.64	-45.01
12	21 MfCotnYarn	25.00	24.80	13.64	13.64	-45.01
13	22 MfCotnCloth	25.00	24.80	13.64	13.64	-45.01
14	23 MfArtSilk	25.00	24.80	13.64	13.64	-45.01
15	24 MfMupTxtOtrG	23.30	16.40	13.11	13.11	-20.03
16	25 MfKnitwear	25.00	24.80	13.64	13.64	-45.01
17	26 MfCarpets	64.70	12.80	20.50	12.80	0.00
18	27 MfGarments	25.00	24.80	13.64	13.64	-45.01
19	28 MfLthrAPrd	66.40	16.30	20.66	16.30	0.00
20	29 MfFootwear	66.40	16.30	20.66	16.30	0.00
21	30 MfWdAWdPrdAF	57.90	17.30	19.76	17.30	0.00
22	31 MfPprAPprPrd	57.90	17.30	19.76	17.30	0.00
23	32 MfPhrmcutics	57.00	9.80	19.66	9.80	0.00
24	33 MfFrtlsrAPst	57.00	9.80	19.66	9.80	0.00
25	34 MfChACnsrPrd	57.00	9.80	19.66	9.80	0.00
26	35 MfRefPetrol	66.40	14.10	20.66	14.10	0.00
27	36 MfRbrAPlsPrd	64.70	12.80	20.50	12.80	0.00
28	37 MfOtrCh	57.00	9.80	19.66	9.80	0.00
29	38 MfBrkTilCmnt	64.70	12.80	20.50	12.80	0.00
30	39 MfOtrNmtMPrd	64.70	13.60	20.50	13.60	0.00
31	40 MfBasMetlPrd	64.70	13.60	20.50	13.60	0.00
32	41 MfOtrMtPrdJ	64.70	13.60	20.50	13.60	0.00
33	42 MfOtrNelcMch	61.10	9.70	20.12	9.70	0.00
34	43 MfElcEqp	64.10	15.20	20.44	15.20	0.00
35	44 MfOtrTrspEqp	61.60	28.00	20.17	20.17	-27.95
36	45 MfSrgInstrmt	64.70	12.80	20.50	12.80	0.00
37	46 MfOterHndCrf	64.70	12.80	20.50	12.80	0.00
38	47 MfSprtGds	64.70	12.80	20.50	12.80	0.00

Note: (i) an explanation of the code names of the products is provided in *Table A1*; (ii) the 11 key non-agricultural export industries in our model's database are printed in italic type; and (iii) 'Mf' stands for 'Manufacturing'.

Table A4: Estimation of Tariff Shocks to Pakistan's 38 Non-Agricultural Products using the Swiss Formula Coefficient Proposed by Developed Countries

No.	Code name of Non-agricultural Product	(a) Initial Bound Tariff in 2006 (%)	(b) Initial Applied Tariff in 2006 (%)	(c) Reduced Bound Tariff (%) (Using Swiss Formula Coefficient of 15)	(d) New Applied Tariff = Minimum between (b) and (c)	(e) Tariff Shock = $((d - b) / b \times 100)$
1	10 Forestry	57.90	17.30	11.91	11.91	-31.14
2	11 Fishing	65.00	10.60	12.19	10.60	0.00
3	12 Mining	64.70	13.60	12.18	12.18	-10.46
4	13 MfVegOiletc	64.70	12.80	12.18	12.18	-4.87
5	14 MfMilling	64.70	12.80	12.18	12.18	-4.87
6	15 MfBakeryPrd	64.70	12.80	12.18	12.18	-4.87
7	16 MfSugar	64.70	12.80	12.18	12.18	-4.87
8	17 MfOtrFdPrd	64.70	12.80	12.18	12.18	-4.87
9	18 MfBeverages	64.70	12.80	12.18	12.18	-4.87
10	19 MfCigTobacco	64.70	12.80	12.18	12.18	-4.87
11	20 MfGindCotnLn	25.00	24.80	9.38	9.38	-62.20
12	21 MfCotnYarn	25.00	24.80	9.38	9.38	-62.20
13	22 MfCotnCloth	25.00	24.80	9.38	9.38	-62.20
14	23 MfArtSilk	25.00	24.80	9.38	9.38	-62.20
15	24 MfMupTxtOtrG	23.30	16.40	9.13	9.13	-44.36
16	25 MfKnitwear	25.00	24.80	9.38	9.38	-62.20
17	26 MfCarpets	64.70	12.80	12.18	12.18	-4.87
18	27 MfGarments	25.00	24.80	9.38	9.38	-62.20
19	28 MfLthrAPrd	66.40	16.30	12.24	12.24	-24.93
20	29 MfFootwear	66.40	16.30	12.24	12.24	-24.93
21	30 MfWdAWdPrdAF	57.90	17.30	11.91	11.91	-31.14
22	31 MfPprAPprPrd	57.90	17.30	11.91	11.91	-31.14
23	32 MfPhrmcutics	57.00	9.80	11.88	9.80	0.00
24	33 MfFrtlsrAPst	57.00	9.80	11.88	9.80	0.00
25	34 MfChACnsrPrd	57.00	9.80	11.88	9.80	0.00
26	35 MfRefPetrol	66.40	14.10	12.24	12.24	-13.22
27	36 MfRbrAPlsPrd	64.70	12.80	12.18	12.18	-4.87
28	37 MfOtrCh	57.00	9.80	11.88	9.80	0.00
29	38 MfBrkTilCmnt	64.70	12.80	12.18	12.18	-4.87
30	39 MfOtrNmtMPrd	64.70	13.60	12.18	12.18	-10.46
31	40 MfBasMetlPrd	64.70	13.60	12.18	12.18	-10.46
32	41 MfOtrMtPrdJ	64.70	13.60	12.18	12.18	-10.46
33	42 MfOtrNclMch	61.10	9.70	12.04	9.70	0.00
34	43 MfElcEqp	64.10	15.20	12.16	12.16	-20.03
35	44 MfOtrTrspEqp	61.60	28.00	12.06	12.06	-56.92
36	45 MfSrgInstrmt	64.70	12.80	12.18	12.18	-4.87
37	46 MfOterHndCrf	64.70	12.80	12.18	12.18	-4.87
38	47 MfSprtGds	64.70	12.80	12.18	12.18	12.18

Note: (i) an explanation of the code names of the products is provided in *Table A1*; (ii) the 11 key non-agricultural export industries in our model's database are printed in italic type; and (iii) 'Mf' stands for 'Manufacturing'.

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