

# Implications of the Growth of China and India for the Middle East and North Africa

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*The Middle East and North Africa (MENA) region is expected to benefit more than most other regions from continued rapid growth in China and India. This paper analyzes the trade-related implications of this growth for the MENA countries using a global general equilibrium model, modified to take into account the focus of China and, increasingly, India on exports of manufactures from global production chains. We find that most of the gains to the MENA region come from improvements in the terms of trade, particularly linked to increasing demand for energy. Increased competition from China and India in third markets, coupled with increased domestic demand due to the terms of trade improvement, would reduce aggregate exports by MENA countries, although exports from the non-oil economies will likely expand. In the oil-exporting countries of the Middle East, Dutch-disease effects increase the importance of policies to promote adjustment to the changing world environment and to take advantage of the opportunities created by the growth of China and India.*

## Introduction

A key feature of the economic growth of China and India has been even more rapid growth in their trade – arguably the strongest and most direct channel through which China’s, and more recently India’s, growth are affecting other developing countries. China accounted for almost eight percent of world exports of goods and services in 2007—substantially more than her share of world GDP at market prices (estimated at 5.9 percent).<sup>1</sup> China’s openness is high for a large economy, in part because as much as a third of the value of exports comes from imported inputs (Winters and Yusuf 2007). India is smaller and less open, with 1.3 percent of world exports and 2.2 percent of world GDP in 2007. With annual export growth of nearly 20 percent per year over the period 1995 to 2005, China and India together accounted for 12.8 percent of the total growth in world exports, over fifty percent more than the 8 percent contributed by the United States. While the turbulence associated with the current financial crisis seems likely to cause substantial fluctuations, the underlying trend rates of growth in China and India seem likely to remain strong.

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<sup>1</sup> Source: World Bank, Development Data Platform (DDP) system, August 2009.

Another important feature of the growth of China and India has been the growth in their demand for natural resources, and particularly energy. This structural increase in world demand for energy contributed to the sharp increases in energy prices prior to the emergence of the global financial crisis in mid-2008, and is likely to have major, long term favorable impacts on the economies of the Middle East and North Africa (MENA) region. However, the resulting “Dutch disease” implications for the competitiveness of the traded goods sectors in MENA are likely to be of concern to many.

The purpose of this paper is to analyze the key implications through trade and commodity prices of the growth of China and India for MENA countries. Unfortunately, available modeling databases provide insufficient information on the countries in the Middle-East for our purposes. To achieve our goals, it was necessary to add data on a number of countries and regions to the database. This was a major undertaking given the need to balance both bilateral trade flows and the macroeconomic aggregates for the newly identified regions. As a result of this effort we were able to separately identify a number of countries in the MENA region including Algeria, Israel, Jordan, Lebanon and Syria.

The paper is structured as follows. We begin by examining the nature of the trade linkages between MENA and China and India, and review the available literature on the nature and magnitude of these effects. Then we consider some projections to 2020 showing the nature of the changes in a world economy heavily influenced by the higher growth rates of large developing countries. We present simulation results next, showing the implications of higher growth in China and India for the MENA countries. Finally, we offer some concluding remarks and caveats.

## **Messages from the Literature**

If we hold policy settings constant, the impact of growth in China and India on MENA countries’ trade can usefully be divided into four channels: (i) increases in opportunities for MENA countries to export to China and India; (ii) increases in opportunities for MENA countries to import from China and India; (iii) increases in third-market export competition from China and India, and (iv) indirect trade impacts.

The first interaction is typically seen as a gain, while the second one is frequently seen politically as a loss, although both of these interactions unambiguously involve gains to MENA countries. The third interaction is frequently the subject of a great deal of attention and angst as it invariably involves a loss to the MENA countries. The fourth interaction is ambiguous in sign. If increased imports by China and India raise the prices of goods that are also imported by MENA countries, then the effect can be adverse. If, by contrast, the imports of China and India substitute for goods supplied by MENA, then MENA could expect to gain from increases in the demand for these imports (e.g. increases in demand for oil).

### **(i) Increases in opportunities to export to China and India**

Opportunities to export to China and India are expanding extremely rapidly. Since 1995 China has accounted for nearly 40 percent of global growth in imports of fuels and minerals. Most of this increase represents a net increase in demand as millions of Chinese consumers, and more recently Indian consumers, have grown richer, and increased their consumption of resource-intensive goods. In metals and coal, China ranks first, with shares of 15 to 33 percent of world consumption.

An important factor to take into account in analyzing this issue is the reduction in the cost of energy-intensive goods when energy efficiency increases—a factor that blunts the edge of energy efficiency as an approach to reducing energy consumption. As pointed out by Shalizi (2007, p137), changes in the energy intensity of growing economies can have a large impact on the demand for energy. The energy intensity of China's economy appears to have declined by two-thirds between 1980 and 2003, while energy intensity in India remained approximately unchanged. Both the likely path of energy efficiency and its implications for industrial structure and the derived demand for petroleum will clearly be important in assessing the implications of growth of China and India for the MENA region.

### **(ii) Increases in opportunities to import from China and India**

The expansion of China's and India's trade is quite different from the expansion of developing country exports considered in much of the traditional development literature that focused on the deterioration in the terms of trade associated with expanding exports of primary commodities. China's and India's trade growth involves, for instance, two-way trade in manufactures *and* services, which make the importing countries the beneficiaries of improvements in efficiency in their trading partners (Martin 1993). Exports by China and India also involve fragmentation and global production sharing, where part of the production process is undertaken in one economy, and subsequent stages are undertaken in another (Ando and Kimura 2003; Gaulier, Lemoine and Unal-Kesenci 2004). This can also make participants beneficiaries from, rather than victims of, improvements in the competitiveness of their trading partners.

The growth of China and India has therefore created enormous opportunities for their trading partners to benefit economically from imports of lower-priced and higher-quality goods. While this is frequently seen as a political cost, it is a potentially very important source of economic gains. Amiti and Freund (2007) find that the prices of China's exports to the USA fell by 1.6 percent per year between 1997 and 2005. Another notable feature of China's exporting has been technological upgrading. Devlin, Estevadeordal, and Rodríguez-Clare (2006) show how high-technology goods partly have displaced low-tech ones within the set of manufactured exports. This upgrading reflects both imports of more sophisticated products and local improvements in product quality (Branstetter and Lardy 2006). Similar improvements in the quality and variety of services exports have helped fuel explosive growth in exports of services from India in particular.

In addition, the trade patterns of growing countries tend to be quite dynamic. New trade theory recognizes that export expansion does not involve just increases in exports of the same products and services. Rapidly growing economies expand the range of products and services they export, improve the quality of exports, and export to additional markets as their exports grow (Evenett and Venables 2002; Hummels and Klenow 2005). These developments generate benefits to the exporting economies and their trading partners as shown by Dimaranan, Ianchovichina and Martin (2007).

Improvements in the quality of exports from an emerging market supplier increase the demand for their exports at any given price level, and hence tend to lead to increases in the actual prices received for imports from these suppliers. Higher quality goods allow importers to meet their needs with a smaller quantity of the good, and/or to consume more in response to a lower effective price of the good. The result is an improvement in the terms of trade, and in real incomes, of both the emerging exporter and the importer when the terms of trade are measured in appropriate units<sup>2</sup>. Moreover, the increase in the number of goods supplied by the emerging market generates a benefit to countries that value an increase in the variety of goods available to them—a phenomenon frequently captured using formulations such as Dixit-Stiglitz preferences (see, for example, Hummels and Klenow, 2005).

The magnitude of these gains depends upon the extent of the improvement in quality, on the increase in the number of varieties of products being exported, and on the extent to which importers value increases in the variety of goods imported. If policy settings allow imported inputs to be used in partner countries, improvements in the variety and quality of imported inputs can be a particularly important source of dynamism in the manufacturing sector (Amiti and Konings 2007).

### **(iii) Third market competition**

The trade impacts of emerging economies today are very different from those that have typically been analyzed when considering the impacts of growth in primary-producing developing countries. In the traditional literature, a rapidly-growing developing country was typically a supplier to a common set of industrial country markets of a raw agricultural or mineral commodity produced by other developing countries. Although this literature was subsequently extended to take into account the rapid growth in exports of manufactures from developing countries, it continued to focus only on export competition from developing countries in third markets, where only negative impacts from the growth of other developing countries' exports are feasible. In this paper we emphasize the fact that third-market competition is one of four interactions determining the impact of high growth in China and India. To the extent that the trade interactions between China and India and other countries involve third-market competition, the countries facing increased competition stand to lose. As found by Freund and Ozden (2009) and by Hanson and Robertson (2009), some industries in some countries can and will lose from increased

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<sup>2</sup> In the exporting country, the terms of trade should be measured in actual units. In the importing country, the terms of trade should be measured in effective units.

competition from the Giants.<sup>3</sup> A key question is which countries and which industries will face the most serious competition?

The answer to this question depends a great deal on the extent to which the pattern of exports from China and India overlap with MENA's. While both China and India have been quite successful in expanding their exports and imports, they have done this in *very* different ways (Dimaranan, Ianchovichina and Martin 2007). At the broadest level, India has relied much more heavily than China on exports of services. India's share of commercial services in total goods and services exports has been much higher than China's, not just since the rapid expansion of exports of computing services around 2000, but for the entire period since 1992 during which comparable estimates are available. However, both countries still have relatively small world shares (1.8 percent and 2.8 percent of world services exports, respectively) and services trade alone is unlikely to transform India's economic performance (Winters and Yusuf 2007).

Even within merchandise trade, China's and India's export patterns have been radically different at the six-digit level of the Harmonized System, with only one product – refined petroleum – appearing on the two countries' top-25 lists of products, which accounted for 58.4 percent of India's merchandise exports and 38.4 percent of China's in 2004. While both China's and India's merchandise exports have been dominated by manufactures (World Bank 2003) and their shares of manufactured intermediate inputs in non-fuel imports in 2004 were very similar, the composition of these manufactures and the approach to their production differs considerably. The share of parts and components in China's merchandise imports was much higher than India's, as might be expected given China's much greater role in global production sharing, and India's greater reliance on exports of services, which typically involve smaller shares of imported inputs.

The two countries differ substantially in the importance of final goods in their exports (Dimaranan, Ianchovichina and Martin 2007). China has relied primarily on exports of final manufactured products, frequently as part of production sharing networks, while India has focused much more on exports of intermediate inputs. India's exports are frequently of capital- and skill-intensive goods, while China has emphasized exports of labor-intensive goods, and professional services — although these are increasingly sophisticated (Rodrik 2006).

The differences in export patterns reduce the risk of a collision in which the exports of China and India are simultaneously depressed. Still recent research suggests that China's export bundle overlaps with that of developed countries much more substantially than one would expect given either its level of development or its size, and this similarity has increased with time (Schott 2008). China's rank in terms of the

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<sup>3</sup> Lederman, Olarreaga and Perry (2009) report that aggregate gains have been accompanied by some pain as some industries, firms, and sub-regions have been negatively affected by the rapid growth of the two Asian economies. Some of their background studies found this to be the case, for example, in industrial and electrical machinery, electronics, furniture, textiles, and transport equipment, mainly in Mexico and to some extent in Central American countries. But most of the deterioration in the position of LAC exports in third markets relative to China's and India's has to do more with domestic supply-side conditions than with lower demand for LAC products due to China and India's increase in market shares.

similarity of its export bundle with the OECD jumped from nineteen in 1972 to four in 2001. No other country's growth in product penetration comes close to the increase observed for China. Quality differences between Chinese and developed countries' exports however suggest that competition between China and the developed world may not be as direct as suggested by the overlap of their export baskets.

One simple indicator of the extent to which the exports of two regions compete is the correlation between their export shares. We considered this correlation for each exporter, and found that the correlations were very close to 0.5 between each region. The specific correlation coefficients are:

	MENA	India	China
MENA	1.000	0.497	0.423
India		1.000	0.501
China			1.000

From this table, it appears that the correlation between Indian and Chinese export shares is just over a half. The correlations between MENA export shares and those for India and China are even lower, at 0.497 and 0.423. These statistics give some confidence that the competition between MENA and India and/or China is likely to be much smaller than casual reasoning might suggest.

An important concern for MENA and other countries will be the extent to which India and, especially China, move up market into their "product space". India and China have demonstrated its ability to upgrade their performance in specific sectors. China's export growth has been accompanied by tremendous growth in product variety. While China was present in 9 percent of all manufacturing product categories in 1972, it was present in 70 percent of categories by 2001 (Schott 2008). This growth at the extensive margin is an important factor, which we take into account when evaluating the implications of rapid growth in China and India on the MENA countries.

#### **(iv) Indirect trade impacts**

The rapid growth of imports by China and India is likely to change the prices of many goods of interest to MENA countries, even if they do not directly trade these goods with the two countries. The signs of these effects are ambiguous, because they depend on a number of factors including the relationship between the mix of these products and those exported by MENA.

The rising exports of manufactures and services from the giants are likely to affect MENA countries even in cases when they do not compete directly. As China and India increase the quality and quantity of their exports, we would expect a decline in their prices relative to factor prices. Productivity growth or more efficient use of factors in China and India is raising their output, and hence putting downward pressure on their prices. As a result, MENA countries could benefit from lower prices on their imports of these goods.

Energy and mineral products are different in that their supply is constrained by a fixed factor, energy resources. As incomes rise, the demand for energy grows strongly,

and this tends to push up the price of energy products relative to factor prices. Thus MENA oil exporters enjoy substantial benefits from the impact of China and India on the prices of their exports. In our baseline simulation, this effect is muted, but not completely offset, by the increase in the productivity of energy production itself assumed in the analysis.

For agricultural goods, there are several competing influences on prices. The first is the technological change effect described above for manufactures and services, which tends to lower prices. A second is the presence of a fixed factor, land, in agricultural production, which tends to raise prices because world income demand for these goods has risen, just as in the case of energy products. A third factor is the well-known Engel effect – that demand for agricultural products, and particularly basic foods, tends to rise more slowly than income. A fourth factor that can be important in influencing agricultural prices is the Rybczynski effect—if growth is associated with increases in the capital-labor ratio, it will tend to reduce agricultural output and raise agricultural prices.

Dimaranan, Ianchovichina and Martin (2007) find that higher growth in China and India implies increases in output of farm and forestry products in other countries and in output of energy, mineral and other resource-based products in countries endowed with natural resources. As these two countries achieve major gains in their market shares in manufacturing, most other countries experience declines in manufacturing output relative to base, especially in clothing and electronics, which are sensitive to increased competition. Therefore, even if China and India's success is generally good news for other economies, there are adjustment costs that will be borne by different stakeholders within those countries.

### **Methodological Approaches**

A number of approaches can be used to address questions about the impact on world trade of China and India's growth. Some like DfID (2005) and Jenkins and Edwards (2006) focus on bilateral trade links. While useful for analyzing the direct trade impacts, this approach ignores the strong spillover effects that may occur if countries compete in the same markets or products. A second set of studies on the topic, including Lall and Weiss (2004), Goldstein *et al.* (2006) and Stevens and Kennan (2006), consider global markets and compare the trade patterns of China with those of their countries of interest. They argue that countries with export patterns similar to China's are likely to suffer losses as China grows, whereas those whose exports match China's imports are likely to receive a boost. Although informative, this approach ignores the two-way trade that is prevalent in trade in manufactures and services, and the possibility of gains from this trade even in cases where net trade patterns are similar.

A third group of studies uses case studies to analyze developments in particular industries or markets. This approach can be extremely illuminating, although it does not readily lend itself to adding up to an overall picture. Yusuf, Nabeshima, and Perkins (2007), using an approach drawing on the new economic geography, consider the future pattern of manufacturing production and exports to be likely central to development in both countries. Although services will be important to India, they do not consider them

presaging a completely new development model; and China's appetite for primary imports seems bound to continue growing.

Yusuf *et al.* (2007) believe that these features will combine to favor certain mid-tech and high-tech sectors including autos, electronics, and domestic appliances – and in the future, pharmaceuticals and engineering—and presents case studies of these sectors. Given rapid growth of skilled labor it is possible for China to become a major force in some sophisticated sectors. Competing demand for skills in public service, general management and education could delay the emergence of such technological leadership for some time. The second driver implies the continuation of low-skilled, labor-intensive manufacturing, but this is most likely to take place inland where large numbers of farm workers could be trained for industrial work. Although India has had export success in textiles and clothing, is a growing force in pharmaceuticals, and shows potential in steel, white goods, and electronics. These studies can be used to assess likely sectoral impacts of the growth in China and India on other countries, but it is difficult to add up their effects across sectors.

A fourth group of studies examine the trade linkages between China and India and their target countries, some key impacts, and the policy responses needed to best adapt to the growth of the emerging giants. Broadman (2007) is an excellent example of this type of study. It finds, for instance, that the share of Asia in the exports of sub-Saharan Africa has risen from 14 percent in 2000 to 27 percent today. This study also highlights the importance of the barriers to trade—in both Africa and Asia—that prevent both Africa and emerging Asia from taking greater advantage of the potential synergies between them. In addition, this study uses the gravity model to investigate the resistances to trade between China, India and Africa. A recent survey paper by Abdel-Khalik and Korayem (2007) focuses on the linkages between China and the Middle East.

A fifth group of studies, including Dimaranan, Ianchovichina and Martin (2007), McDonald, Robinson and Thierfelder (2008) and Ianchovichina, Ivanic and Martin (2008), address these problems by employing computable general equilibrium models. These models ensure consistency while including important industry detail – each region's exports of particular goods equal total imports of these goods into other regions (less shipping costs); global investment equals the sum of regional savings; regional output determines regional income; global supply and demand for individual goods balance; and in each country/region demand for a factor equals its supply. These accounting relationships and the behavioral linkages in the model constrain the outcomes in important ways not found in partial equilibrium analyses—increased exports from one country must be accommodated by increased imports by other countries; broad-based increases in productivity that raise competitiveness also raise factor prices and help offset the original increase in competitiveness.

Dimaranan, Ianchovichina and Martin (2007) study the impact of accelerated growth via productivity improvements in China and India on global economic growth to 2020 using a scenario consistent with the World Bank's "central projections". They find three broad effects on other countries: (i) countries' exports face fiercer competition

because the Giants' costs fall; (ii) their imports from China and India become cheaper; (iii) and they benefit from aggregate demand increases in China, India and elsewhere as real incomes increase in response to efficiency improvements.<sup>4</sup> The balance of these forces varies from country to country, but because most countries import significant amounts from China and India and all get a share of the increase in demand, most countries gain overall, except some countries in Southeast Asia, rest of South Asia, and in the developed world, the EU. In the EU the rise in the price of energy causes consumption of energy, already heavily taxed in Europe, to decline further. This more than explains the loss of \$7.3bn in allocative efficiency—enough to outweigh the \$3bn gain from the terms-of-trade improvement and to create a small overall welfare loss.

Chinese exports to other markets increase, while other countries' exports—especially manufactured products—decline. The MENA region as a whole increases exports to China and India across the board, but loses market share in the EU and other markets. MENA appears to have an opportunity to strengthen its trade ties with China and India. In the absence of policy measures to boost competitiveness, however, overall exports from the MENA region are expected to decline by 1.5% relative to baseline by 2020 (Dimaranan, Ianchovichina and Martin 2007). The message of this work is that many MENA countries will have to find ways of improving competitiveness.<sup>5</sup>

This short survey of the burgeoning literature on the growth of China and India reveals a number of lessons on how to assess the likely implications of the Giants' growth for MENA countries. One lesson is to pay attention to the structure of MENA countries' trade and its complementarity or competitiveness with the Giants. Another is to examine the nature of the direct and indirect trade links between them—in order to assess the extent to which gains from expanded bilateral trade can offset losses from competition in third markets. The implications of the growth of China and India for the prices of resources, and particularly energy and mineral resources, are likely to require particular examination. A key objective is to help identify key policy responses—both to take advantage of the opportunities created by the growth of China and India, and to avoid potential disruptions.

### ***Methodology, Data and Simulation Design***

Just like Dimaranan, Ianchovichina and Martin (2007), we use the modified version of the standard GTAP model in Ianchovichina (2004), to analyze the consequences of higher growth in China and India on the MENA countries.<sup>6</sup> This version of the GTAP model features China's duty exemption system which has been a key reason for the rapid integration of China into global production networks, and the duty drawbacks in India which have allowed for much deeper integration by India into global production sharing than has been the case in the past. A paper by Ianchovichina (2004) shows that failing to

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<sup>4</sup> The findings of McDonald, Robinson and Thierfelder (2008) are consistent with these conclusions.

<sup>5</sup> According to an update of a study by Yeats and Ng (2000), many Arab countries lost international competitiveness in the mid- to late-90s.

<sup>6</sup> This applied general equilibrium model is documented comprehensively in Hertel (1997) and in the GTAP Data Base documentation (Dimaranan 2006).

take into account the presence of a duty drawback or exemption system can lead to serious over-estimation of the impacts of trade liberalization.

The duty exemption model allows for two separate activities in each industry. Production of exports is represented as an activity for which imported intermediate inputs are available duty-free. Production for the domestic market uses the same technology, but requires payment of duties on intermediate inputs. Firms engaging in production for either the domestic market or the export market purchase both imported and domestic intermediate inputs which are imperfect substitutes following the Armington structure.

Factor inputs of land, capital, skilled and unskilled labor, and in some sectors a natural resource factor, are included in the analysis. The model takes into account the role of intersectoral factor mobility and overall resource constraints in determining sectoral output supply. Product differentiation between imported and domestic goods and among imports from different regions allow for two-way trade in each product category, depending on the ease of substitution between products from different regions.

The model includes the explicit treatment of international trade and transport margins, a “global” bank designed to mediate between world savings and investment, and a relatively sophisticated consumer demand system designed to capture differential price and income responsiveness across countries. As mentioned earlier the accounting relationships and the behavioral linkages in this general equilibrium model constrain the outcomes in important ways not found in partial equilibrium analyses.

Our interest in the MENA countries required us to extend the GTAP 7p3 Data base beyond the 93 countries and/or regions represented in it, while we aggregated the 57 sectors of the GTAP 7p3 Data Base into 26 sectors based on their importance in China, India and the MENA region. The 93 countries and/or regions in this database included too much disaggregation of regions outside the region and insufficient disaggregation within the MENA region. We retained all of the low and middle income countries identified within the MENA region including Egypt, Iran, Tunisia and Morocco. We separated Algeria, Israel, Jordan Lebanon, and Syria out of the two GTAP regions representing the remainder of the MENA region – the rest of North Africa (XNF) and the rest of West Asia (XWS). The resulting database included eight MENA low and middle income countries—Algeria, Egypt, Iran, Jordan, Lebanon, Morocco, Syria, and Tunisia, and a composite energy-rich Other MENA region representing the Gulf Cooperation Council countries, Iraq, Libya and Yemen.

The separation procedure was based on (i) bilateral trade and tariffs data from MAcMaps; (ii) data on the three components of GDP – agriculture, industrial production and services – from the World Bank’s World Development Indicators (WDI) database; and (iii) data on imports and exports of services again from the WDI database. The actual process of separation began with a domestic input-output structure for an individual country that mirrored the input-output structure of the relevant GTAP region. The data most critical for our analysis—such as the trade and protection data—were filled in directly from the external sources. An optimization program filled in the remainder of the

data so that the structure of the GDP approximated the broad structure of the original economy while the total value of GDP and the value of trade in each commodity equaled the observed values. The structure of internal taxes in the original MENA region was imposed on the newly separated countries. At the end of this procedure, the data for each newly created country or region correctly reflected the size and the composition of its respective GDP, trade flows and applied tariff rates—all essential properties for any trade-related policy study.

To examine the implications of more rapid growth in China and India on the Middle East, we needed first to take account of some of the major reforms that are transforming India's trade structure, in particular liberalization of non-agricultural tariffs, improvements in infrastructure needed to support trade, and the introduction of duty drawbacks that have removed the burden of tariffs on intermediate inputs used in the production of exports. As in Dimaranan, Ianchovichina and Martin (2007), we find the correlation between China and India's exports of manufactures barely changed in response to these key liberalization reforms in India. This suggests that India and China are likely to remain exporters of very different sets of products, and hence less likely to be subject to mutually-adverse impacts from export expansion.

Then, we undertook a baseline projection to 2020, to allow for much higher expected rates of growth in many developing countries than in the mature industrial economies, and a consequent greater impact of future changes in outcomes in developing countries. For comparability with Dimaranan, Ianchovichina and Martin (2007), we considered a fifteen year baseline designed to replicate the widely-used GTAP baseline projections for labor force, human and physical capital growth in the period 2005-2020.<sup>7</sup> Economy-wide rates of technical change were determined endogenously in the model to ensure consistency between the exogenous variable forecasts and the GDP growth forecasts that follow closely the World Bank GDP projections

Finally, we examine the implications of higher-than-projected growth in India and China in order to assess the direct implications of growth in China and India on the MENA countries. We assumed that growth rates in each region were 2 percentage points per year higher than in the baseline. Over our 15 year baseline, this resulted in output levels 34.6 percent higher in each region than under the baseline scenario. Consistent with Kaldor's (1957) stylized facts of economic growth, we increased the stock of human and physical capital in line with overall output in these two growing economies. We allowed economy-wide productivity growth to adjust to maintain the targeted increase in the rate of economic growth.

A second scenario examines the impact of additional growth supplemented with an improvement in the quality and variety of exports, building on recent evidence which suggests that economic growth of the type considered in this paper increases both the quality and the variety of the goods exported by the growing economy. Using the quantity aggregator and empirical estimates from Hummels and Klenow (2005), we specify the reduction in effective prices associated with the combination of increases in

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<sup>7</sup> See Appendix Table 1 for the full set of macroeconomic projections by country.

variety and quality.<sup>8</sup> This specification is discussed in detail in Dimaranan, Ianchovichina and Martin (2009). Improvements in the quality of goods reduce the effective price of the goods at any given actual price, since a smaller amount of each good is required to bring about the same increase in welfare. Where, as in this study, consumers value variety in the products they consume, an increase in the range of varieties available also reduces the effective price of the good at any given set of actual prices for the goods.

## **Results**

The effects on key variables of higher growth in China and India, and higher growth with increased variety and quality of exports, are presented in Table 1. These impacts are presented for real incomes (welfare); for export volumes; and for terms-of-trade effects using the standard estimate of the welfare impacts of terms of trade changes that does not take into account second-best welfare effects<sup>9</sup>. For each variable, the effect depends upon whether the income increases in China and India result in intensive-margin growth of the same exports (“Growth”), or whether export growth is accompanied by expansion in the range of products exported, and improvements in their quality (“Growth, Variety and Quality”). Increases in real income presented are percentage changes in equivalent variation measured in 2004 US dollars. Export expansion is presented using percentage changes in the volume of exports. The terms-of-trade effects are presented in 2004 US dollar terms.

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<sup>8</sup> The model results in an effective price,  $P^*$ , given by  $P^* = \left[ N \cdot (P / \lambda)^{(1-\sigma)} \right]^{1/(1-\sigma)}$ , where  $P$  is the actual price of individual commodity exports,  $N$  is the number of varieties,  $\lambda$  is product quality and  $\sigma$ , which is assumed to equal 7.5 – the mid-range value in Hummels and Klenow (2005), is the elasticity of substitution between varieties.

<sup>9</sup> Second-best welfare impacts arise when a change in an exogenous variable leads to a change in the quantity of a good passing over a distortion. If, for instance, an increase in exports from China and India raises the volume of imports passing over an import duty, it may generate a second-best welfare gain through increases in tariff revenue collections, as well as a direct terms-of-trade gain.

**Table 1. Impacts of China and India's extra growth (relative to baseline, 2020)**

	Growth		G&Q*		Exports %		Terms of trade \$m	
	EV \$m	EV %	EV \$m	EV %	Growth	G&Q	Growth	G&Q
Australia/New Zealand	5127	0.5	8317	0.8	1.2	2.6	5092	7762
China	1033330	28.9	1111113	31.1	33.3	60.9	-55960	22879
Japan	-1177	0.0	6653	0.1	3.1	5.5	2116	6321
Republic of Korea	4750	0.4	11586	1.0	3.5	5.7	-112	4310
Hong Kong/Taiwan	2553	0.4	9350	1.3	1.4	3.2	2959	9578
Indonesia	1178	0.3	2007	0.4	0.2	0.6	1125	1622
Malaysia	2669	1.2	5323	2.4	-0.7	-0.6	2118	3399
The Philippines	-472	-0.3	-191	-0.1	0.6	1.0	-415	-186
Singapore	-247	-0.1	1878	1.0	1.8	3.2	476	2361
Thailand	409	0.1	2050	0.4	1.2	2.4	121	1268
Vietnam	565	0.7	928	1.1	-0.5	-0.9	615	1157
Rest of Southeast Asia	450	1.9	599	2.5	-1.4	-1.9	442	583
India	393012	30.5	413951	32.2	41.4	68.8	-14628	6270
Rest of South Asia	-757	-0.2	71	0.0	1.0	2.1	-536	493
Canada	3068	0.3	4670	0.4	-0.7	-0.9	3252	4144
USA	-595	0.0	17531	0.1	1.4	3.2	4605	21171
Mexico	1802	0.2	5231	0.5	0.9	2.7	94	724
Argentina and Brazil	2043	0.2	3804	0.3	0.8	1.4	2149	3186
Rest of Latin America	3414	0.5	5102	0.7	-0.1	0.4	3248	4374
EU 25 plus EFTA	-6186	0.0	12990	0.1	0.2	0.2	6771	21523
Former Soviet Union	8385	0.8	10970	1.0	0.4	1.2	7889	9878
Other M E & N Africa	16347	3.0	20013	3.7	-1.6	-1.0	15343	18733
Sub-Saharan Africa	5996	0.8	8891	1.2	0.0	0.7	4932	7619
Israel	3397	1.1	3846	1.2	-1.8	-2.0	2610	3114
Rest of World	-1094	-0.1	-315	0.0	1.0	1.2	-502	1174

	Growth		G&Q*		Exports %		Terms of trade \$m	
	EV \$m	EV %	EV \$m	EV %	Growth	G&Q	Growth	G&Q
Iran	2460	0.9	3239	1.2	0.2	1.7	2119	2856
Egypt	363	0.3	596	0.5	0.2	0.6	297	543
Morocco	50	0.1	196	0.3	1.7	1.6	-18	144
Tunisia	-57	-0.1	-58	-0.1	-0.5	-1.5	-31	33
Algeria	2871	1.3	3206	1.5	-0.5	-0.6	2435	2695
Jordan	864	1.2	1067	1.5	-12.4	-14.6	261	454
Lebanon	206	0.3	258	0.3	10.3	11.2	277	390
Syria	493	0.5	651	0.6	2.2	2.8	241	461
<b>MENA</b>	23593	1.5	29168	1.9	-0.9	-0.4	20923	26309
<b>World</b>	1485215	2.7	1675523	3.0	4.7	8.8	0	171033

Source: Authors' simulations with the modified GTAP model (Ianchovichina, 2004). \*G&Q denotes growth accompanied by improvements in export quality and variety.

The welfare changes are expected to be largest for China and India, which will benefit directly from their own growth. The gains for other countries will be generally relatively small in the absence of quality and variety improvements on exports from China and India. High-income countries gain, except for the European Union and Japan, which may lose in the growth-only scenario despite terms-of-trade gains because of interactions between existing distortions and changes in energy prices (see Martin, Ianchovichina and Dimaranan 2008). Many countries are expected to benefit from improved terms-of-trade for their products as China increases its imports from the rest of the world by 28.5 percent and India by 35.2 percent. Some middle- and low-income countries such as Korea, the Philippines, and other countries in South Asia, are projected to lose as competition with China and India in third markets negatively affects their terms-of-trade.

The improvement in the welfare of the MENA region as a whole, and in all MENA countries except Tunisia, is not associated with increases in export volumes, except in specific cases such as Lebanon. Oil exporting countries in the MENA region, represented by the Other MENA region, will experience large increases in welfare associated with strong expected gains in terms of trade. They thus will be able to increase their consumption at any given volume of exports, reducing their need to export. Exporters of manufactures, such as Lebanon and other developing countries, are expected to suffer from increased competition and lower prices for their exports of manufactures (Table 2).

Given its sizable exports of energy products and the larger increase in energy prices than in prices of other goods (Table 2), it is perhaps not surprising that the MENA region as a whole is projected to benefit from the strongest terms-of-trade gains under both simulations (in money terms) (Table 1). In this set of simulations the welfare gain of the MENA region is exceeded only by the welfare gains of the Former Soviet Union and the two Giants (Table 1).

**Table 2. Implications of China and India’s extra growth for world commodity prices (relative to baseline, 2020)**

	Growth	Growth, Variety & Quality
	%	%.
Rice	1.05	1.71
Wheat	3.16	3.4
Grains	2.58	2.85
Vegetables and fruits	2.08	2.25
Oils and fats	-0.21	-0.7
Sugar	-0.67	-1.29
Plant-based fibers	3.41	3.55
Others crops	1.24	1.15
Livestock and meat	-0.27	-0.8
Dairy	-0.78	-1.44
Other processed foods	-0.82	-1.4
Energy	5.52	4.89
Textiles	-1.15	-1.1
Wearing Apparel	-1.9	-0.97
Leather	-1.36	-1.11
Wood Products	-1.54	-2.03
Minerals	-1.42	-1.31
Chemicals	-1.17	-1.59

	Growth	Growth, Variety & Quality
	%	%.
Metals	-1.89	-1.87
Vehicles	-1.76	-2.46
Machinery and Equipment	-2.28	-2.22
Electronics	-2.66	-2.71
Other manufactures	-3.63	-1.12
Trade and transport	-1.37	-1.7
Communications	-2.13	-2.42
Other services	-1.66	-2.24
All	-1.24	-1.45

Source: Results drawn from the simulations discussed in Dimaranan, Ianchovichina, Martin (2007).

The increase in world prices of a number of key agricultural products appears to be a consequence of a transfer of resources out of labor-intensive agriculture associated with the rise in the endowment of physical and human capital in China and India. This result is not pre-ordained. In the baseline simulations used to project the model to 2020, the prices of agricultural goods rise, rather than fall, but in the growth simulation reported in (Dimaranan, Ianchovichina and Martin 2007) the prices of agricultural products fall because the stocks of physical and human capital remain unchanged. The capital deepening in our simulation is expected to draw resources out of labor-intensive agriculture in these countries through Rybczynski effects, contributing to the increase in world prices of agricultural products.<sup>10</sup> While many MENA countries are net food importers, and hence potentially adversely affected by increases in food prices, these disadvantages are expected to be strongly outweighed for the energy exporters by the projected increase in the prices of energy products and the declines in the prices of imported manufactures.

Adding improvements in the variety and quality of exports from China and India to the high growth scenario will likely increase the welfare gains to the world economy from US\$1485 billion to US\$ 1675 billion relative to baseline by 2020 (Table 1). Over the same time period, the volumes of exports from China and India are expected to grow by 61 and 69 percent, respectively, relative to baseline, with positive terms-of-trade effects in all regions other than the Philippines.<sup>11</sup> Most countries are expected to benefit

<sup>10</sup> See Martin and Warr (1993) and Gehlhar, Hertel and Martin (1994) for a discussion of this channel.

<sup>11</sup> In the model with product-quality-augmenting technical change, since the price of relevance to the importer is the effective price which may fall when quality and variety increase, and the price relevant to

since they can import higher volumes from China and India at lower effective prices while exporting higher volumes to these two countries as demand for imports in China and India grows. The biggest beneficiaries are, of course, China and India, whose estimated welfare gains increase by 31 percent and 32 percent, respectively. The volume of trade between China and India will likely increase more than does either's trade with the rest of the world, deepening the trade links between the two Asian giants.

MENA is likely to play a smaller role in exporting manufactured goods and services as a result of higher growth in China and India (Figure 1). Projected losses in terms of export volumes for many MENA countries, including Tunisia, Algeria, Jordan and countries in other MENA (Table 1), suggest that the effect from increased opportunities to export to China and India is likely dominated by the effects from increases in third-market export competition from these two countries and increased domestic demand resulting from the terms-of-trade improvement. But the boost to China's and India's manufacturing industries is expected to create positive spillover effects via increased demand for intermediate inputs including minerals, energy, and farm-based natural resources. Indeed, exports of energy products will increase the most, followed by increases in exports of farm products, and minerals (Figure 1).

The aggregate results however hide differences at the country level. The rise in MENA's mineral exports is due to strong export growth of minerals and energy from Egypt, Iran and other MENA countries (Figure 2). Strong export growth of metal products from countries in the rest of MENA region will likely be offset by a decline in exports of metal products from the individually-identified countries in figure 2. Morocco and Tunisia may expand exports of minerals and chemicals (Figure 2).

Exports of manufactures are projected to be hit hard in all countries, and for industries in some countries these effects could be substantial (Figure 3), but the declines are expected to be much smaller for industry outputs (Appendix table 3). Higher growth of exports from China implies an expansion of its textile industry and a contraction of the textile industries in all MENA countries except Tunisia (Figure 3). The projected growth of China's apparel industry entails sharp contraction of apparel production elsewhere including in all MENA countries (Figure 3). Similarly, large declines are expected for machinery and equipment, electronics and other manufactures. Algeria is expected to suffer the most significant contractions in the largest number of manufacturing sectors.

Policy makers are likely to be tempted to protect some sectors against increased competition from imports. This, however, would exacerbate the problems of exporters, by raising export costs and reducing the variety of goods and services exported—and hence the competitiveness of exports. Venables (2004) shows that a reduction in the number of products facing import competition is likely to be associated with a similar reduction in the number of products exported. By contrast, policies that focus on improving productivity can improve competitiveness and increase the range and quality of products exported.

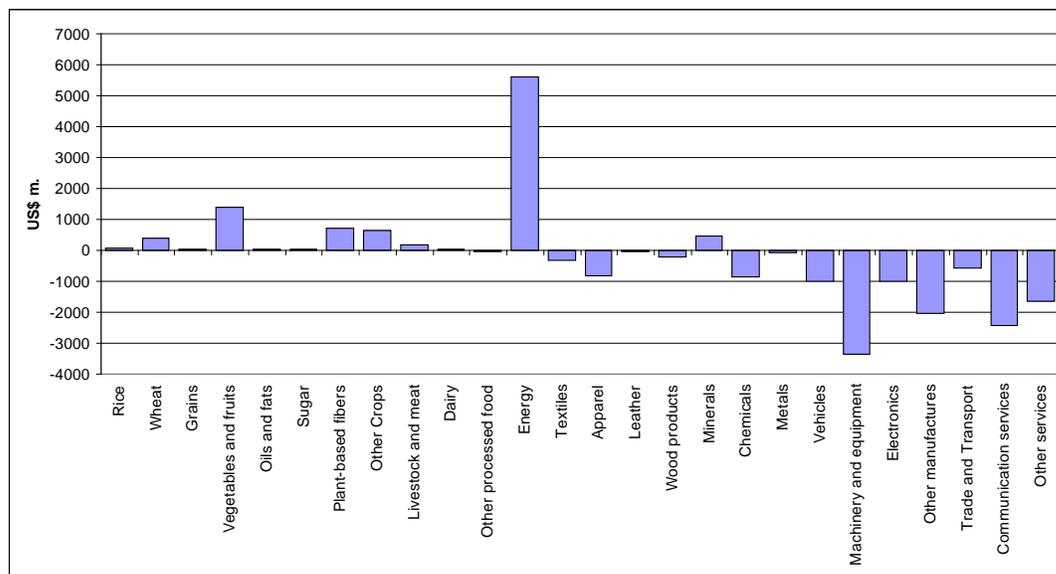
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the producer is the actual price which rises when quality and variety increase, it is possible for the terms-of-trade to improve for both importer and exporter.

The expansion of the energy sector and the contraction of manufacturing and services is a sign of a Dutch disease effect. All MENA countries may be facing increasing pressures to adjust their domestic and trade policies in order to increase competitiveness and cushion the effects on their non-energy sectors.<sup>12</sup> The challenges will be great especially in terms of creating conditions for employment growth in order to absorb the large number of young people expected to join the labor force in the next 2 decades.

When improvements in product quality and variety are taken into account, the reductions in the effective prices of imports from China and India are expected to reduce MENA’s estimated export losses, and the larger reduction in the effective price of imports from China and India turns the expected trade losses into gains, amplifies the terms of trade effects, and respectively, the welfare gains to countries in the MENA region (Table 1). The trade gains stem from new opportunities to increase exports of certain crops, vegetables and fruits, minerals, metals and trade and services (Figure 4).<sup>13</sup>

**Figure 1. Change in MENA’s volume of exports due to China and India’s extra growth (relative to baseline, 2020)**

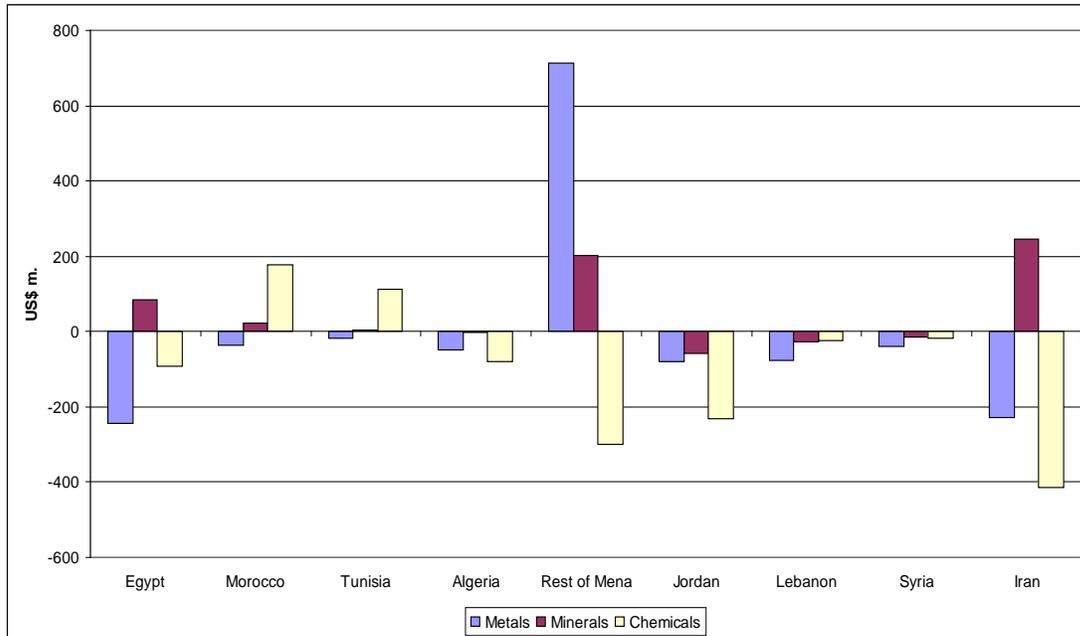


Source: Authors’ simulations with the modified GTAP model (Ianchovichina, 2004).

<sup>12</sup> Detailed results by commodity and country for exports and output changes due to high growth in China and India are available in Appendix tables 2 and 3.

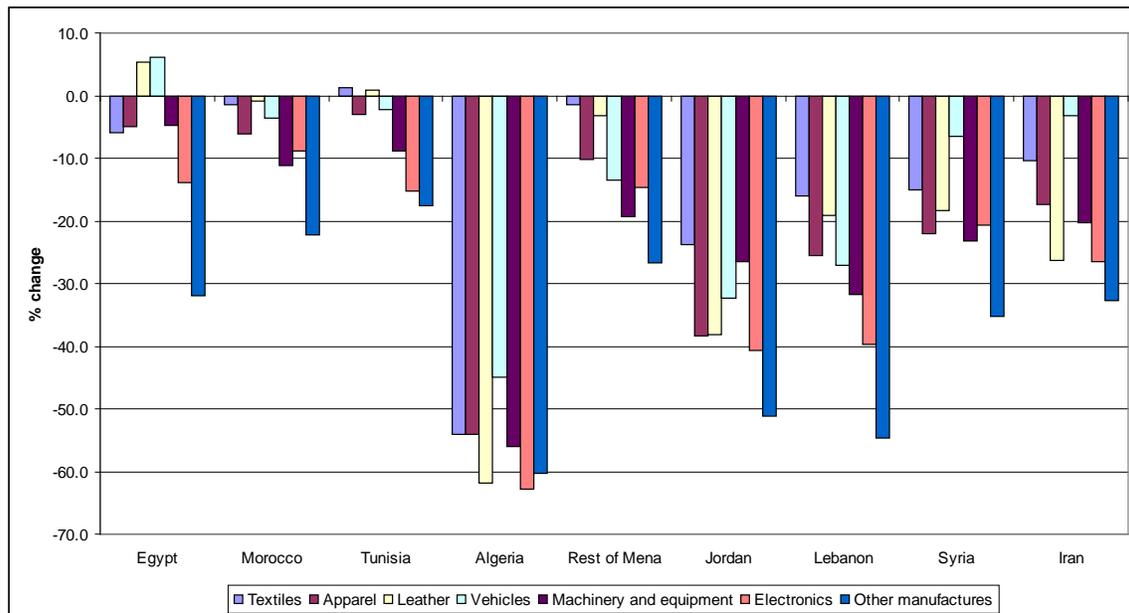
<sup>13</sup> Detailed results by commodity and country for exports and output changes due to high growth, variety and quality in China and India are available in Appendix tables 4 and 5.

**Figure 2. Changes in volume of resource-based manufactured exports due to China and India's extra growth (relative to baseline, 2020)**



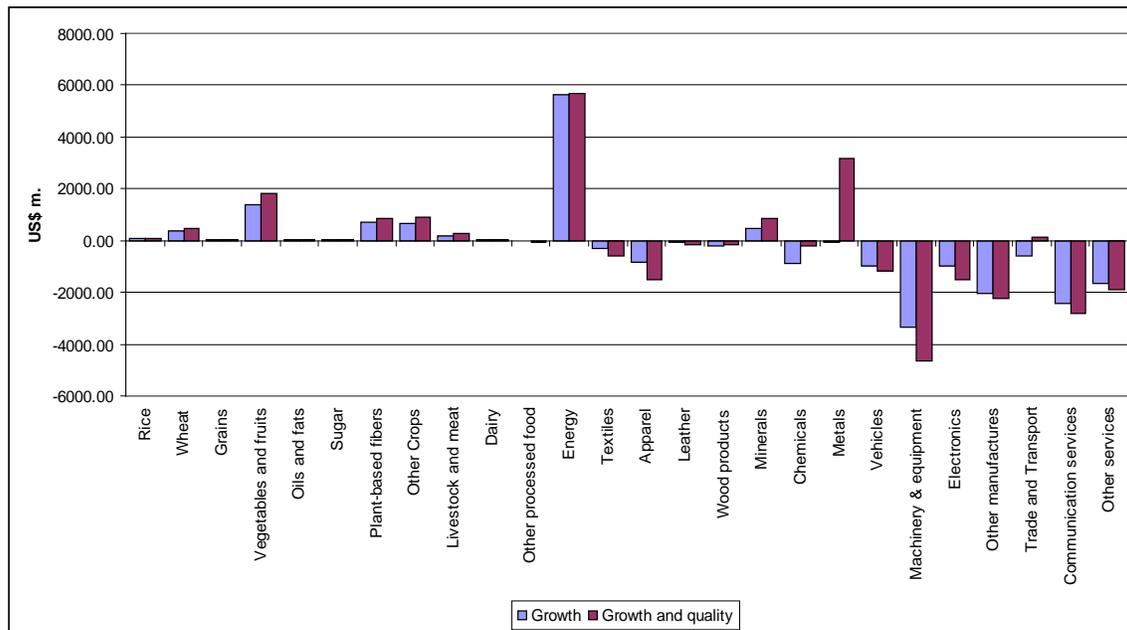
Source: Authors' simulations with the modified GTAP model (Ianchovichina, 2004).

**Figure 3. Changes in manufactured exports due to China and India's extra growth (relative to baseline, 2020)**



Source: Authors' simulations with the modified GTAP model (Ianchovichina, 2004).

**Figure 4. Changes in export volumes under different scenarios for China and India's extra growth (relative to baseline, 2020)**



Source: Authors' simulations with the modified GTAP model (Ianchovichina, 2004).

## **Concluding comments**

The key objective of our analysis is to study the trade-related implications of higher-than-expected rates of growth in China and India for the countries in the MENA region. We identified four broad channels through which the growth of China and India might be expected to affect the MENA region:

- i. Increases in opportunities for MENA to export to China and India
- ii. Increases in opportunities for MENA to import from China and India
- iii. Increases in third-market export competition, and
- iv. Indirect trade impacts.

The first two of these effects are unambiguously favorable for the MENA countries, the third one is unambiguously negative, and the fourth one is ambiguous in sign. Thus, the overall impact of high growth in China and India is in general ambiguous in sign. We used a special version of the GTAP global general equilibrium model to investigate the sign and magnitude of these effects. To do this, we began with a representation of the world in 2004. We took into account liberalization and reductions in trading costs that increased India's interaction with the world economy. We then projected it forward by 15 years, to take into account the rapidly-increasing importance of China and India in the world economy. In addition to examining the consequences of high export growth from China and India, we considered a scenario under which the quality and variety of exports from these countries improve as they grow. The extra growth of China and India was assumed to be associated with increases in physical and human capital as a result of higher savings and investment in China and India.

We found that the MENA region would likely benefit substantially from this extra growth of the two Asian Giants, with real incomes in the region rising on average by \$24 billion at 2004 prices. With improvements in the quality of exports from China and India, the gains to the MENA region would rise on average by \$29 billion. This increase in growth rates triggered increased exports of goods and services from, and imports to, the MENA countries from China and India.

As was the case in our earlier study focused on Russia (Ianchovichina, Ivanic and Martin 2009), we found that gains from improvements in the terms of trade were particularly important. The overwhelming majority of the gains (\$21 billion and \$26 billion under the two scenarios) accrued through improvements in the MENA region's terms of trade. These terms-of-trade gains were associated with increases in world prices of energy products and of some agricultural products. The prices of most agricultural goods increased, partly because of increased demand fueled by increasing incomes in China and India, and partly by labor moving out of agriculture in China and India into more capital and skill-intensive activities.

Overall exports from the MENA region declined slightly in volume terms. Exports of energy products and of a few agricultural products increased, while exports of most manufactures and services declined. These effects were the result of increased competition in third markets and increased domestic demand resulting from the terms-of-trade improvements associated with the growth of China and India. Some countries, such as Algeria and Jordan saw relatively large reductions in their manufactured exports, while others, such as the other MENA grouping, saw increases in their exports of resource-based exports such as metals and minerals.

The results of this study are clearly mixed for the MENA region. The improvements in the region's terms of trade provide worthwhile income gains. These gains are larger when the likely improvements in the quality and variety of exports from China and India are factored in. Against that, increased competition in third markets reduces the opportunities for MENA countries to expand exports of manufactures, and suggests that exports of manufactures might decline in some cases. Finally, the expansion of the energy sector and the contraction of manufacturing and services is a sign of a Dutch disease effect. All MENA countries will face increasing pressures to adjust their domestic and trade policies in order to increase competitiveness, cushion the effects on their non-energy sectors, and accommodate the large number of young people expected to join the labor force in these countries in the next 2 decades.

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