

The Age of Globalization and its Impact on Asia's Agricultural Trade: An Application of a "Chain" Comparative Advantage Index*

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Abstract

Due to timely process of WTO negotiations, unwillingness of advanced industrial countries to give concessions to developing economies regarding tariff and non-tariff barriers on agricultural commodity imports, the ongoing initiatives in Northern hemisphere to establish new and wider free trading areas which will divert trade out of the market from Asian countries, and ineffectiveness of deepening and widening existing regional trading blocs in Asia; the only promising avenue for Asian developing economies to expand agricultural trade and increase economic welfare of the majority of their population engaging in agricultural production is to resort to extensive regional integration and cooperation.

However, to be successful, all countries in the continent must adhere to the principle of comparative advantage as the engine of regional integration. Further, agricultural resources must be spatially allocated among local, national and regional geographic boundaries according to their natural resource endowments and comparative advantage in production and trade, so as to maximize the benefits of specialization. It is through this allocation arrangement that regional economic integration will be to the benefit of the people in Asia.

Keywords: sub-regional integration; extensive- integration; intensive- integration; comparative advantage index; intra-regional trade.

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I- Introduction

As WTO negotiations proceed, agricultural resource-base of many Asian countries is going under stiff pressure to compete in the world markets. Adding to the effect of globalization is the fact that the role of natural resources in agriculturally dominated Asian economies may be intensive and more technology-driven. Moreover, technological innovation has increased the possibility of material substitution, thus also increasing competition amongst producers of various raw materials and agricultural products in Asia. Moreover, the small size of many Asian farm economies may necessitate the development of considerable local, national and regional specialization if their agricultural products are to be competitive internationally.

One of the strategies and policies that Asian countries particularly the small ones could follow in order to combat the threats of globalization to Asian agriculture as well as to exploit the opportunities it renders to them, is 1) to focus on production and trade of those agricultural products in which they have a comparative advantage, 2) to aim at addressing the challenges arising from those forces and at exploiting the opportunities arising from the new regional and global environment, and 3) to properly design such policies as to strengthen cooperation among Asian countries.

The objective of this paper is twofold: **First**, to express the view that Asian countries must embark to put their collective efforts into regional cooperation through extensive regional integration and trade expansion. This is based on the following reasons:

- a) Industrialized countries are unlikely to give non-reciprocal trade concessions on imports of agricultural products to developing countries.
- b) Wider integration initiatives in the western hemisphere threatens agricultural exports from Asia.
- c) Intensifying regional integration in already existing regional trading blocs in Asia, are unlikely to result in the expansion of intra-bloc or intra-Asia trade.

Second, is to illustrate a "chain" index of comparative advantage, relating to local, national, and regional dimensions, and to demonstrate how it can be used to reveal advantages of different localities and regions of Asia in production and trade of agricultural commodities.

II- Importance of Agriculture in Asia's Economic Development

It has been well demonstrated in the literature that agriculture can contribute significantly to the transition of many less developed countries. This argument is a pertinent and insightful theme developed by many scholars (Johnston *et al.* 1961, 1975; Mellor 1966, 1995). However, given the fact that the

economies of many developing countries, particularly in Asia, are heavily agrarian, inappropriate economy-wide policies in many of these countries have thus far inhibited greater contribution by agriculture to sustained economic growth and rural development in Asia, and have given rise to what has been termed the "bias against agriculture". These policies tend to cause the small-scale rural enterprise sector, to be smaller and less internationally competitive than otherwise and accordingly causes exports of agricultural goods to be lower than they would be under more neutral and open policy regimes. The bias against agriculture also causes the purchasing power of rural populations to be lower than otherwise, adding to the demand-side constraint on less developed countries (Bautista *et al.* 1993, Krueger *et al.* 1988, 1992)

A- Agricultural Production, Employment and Trade Policy in Asia

Production and Employment : Agricultural performance in Asia has not been as successful as manufacture and services during the last thirty years. Notwithstanding seemingly rapid industrial growth in Asia, a large part of the region is still heavily agricultural, especially China, the Central Asian countries, and most countries in South Asia and Southeast Asia (Dutta, 1998). Figure (1) demonstrates the amount of production of different agricultural commodity groups in 3 sub-regions of Asia. Figure (2) also shows the relative importance of agriculture in the national economies of these sub-regions.

In Asia, the agricultural sector accounts from 0.10 to 0.20 percent in Singapore and Hong Kong to about 60 percent of GDP in Myanmar (WB Statistical Data) and provides employment to the range of 0 percent in Singapore to 94 percent in Nepal of total employment (WB, World Development Indicators 1998).

Agricultural Trade: It has become a well known fact that the big emerging markets in the years to come are all located in Asia (Sagafi-nejad 1998). In fact, nations are judged by the size of their markets and by their economic potential (Bravo *et al.* 1996) and not by their population.

Large markets allow countries to exploit their comparative advantage, reap the benefits of scale economies and ensure competition, greater variety and, potentially more stable markets and prices. Economists have put forward a number of arguments in favor of trade; some are rather obvious and common sense, others are less evident. In general, these arguments emphasize increase in consumption, diversification, stability and food security.

Some studies have examined empirically the significance of agricultural production, trade, and protection in developing countries (DeRosa 1999, 2000). The findings point to the continued significant contribution of agriculture to

output, exports, and especially employment in lower income developing countries.

1- Regional Trade: Although the relative importance of Asia's trade performance was very weak in the middle of 20th century (figure 3), its merchandise exports in 2000 came to about \$1325 billion. This graphical demonstration reveals several distinctive features of agricultural trade.

First, the performances of export trade in three separate parts of Asia have been the opposite. While Japan, China and six East Asian traders' share of world trade increased by fivefold, from 4.3 percent to more than 21 percent, Middle East and other Asia did poorly, losing their share by near half in 50 years period.

Second, the share of the Middle East and other parts of Asia in trade has been much less significant than the share of Japan, China and six East Asian nations. In the mid of twentieth century, the share of first has been larger than the share of the later, but by the end of the century, the situation has reversed tremendously.

Third, it seems that the significance of Asian trade has been leveling off during the second half of the 1990s. This has been mainly due to East Asia financial crisis during that period. The causes of Middle East and other parts of Asia's weak trade performance are many and rather complex. The lack of infrastructure, physical and human capital, low labor productivity, political internal instability, regional conflict, and inappropriate policies can be cited as the main reasons.

2- Intra-regional Trade: Asian economies are highly diverse in terms of population size, income levels, natural resources and agricultural potential and thus, trade opportunities in food and agriculture are enormous within the region (Lloyd 1999). Due to agricultural product differentiation among Asian economies and their growing complementarity as a result of such differentiation, trade among the countries of Asia can expand to a large extent. This increased complementarity is due to the existence of a large number of countries with significant climatic and geographic variation and increasing the heterogeneity of their economic structures (IMF 2001). It is also heartening to note that rapid growth in intraregional trade feeds into the domestic demand and higher incomes in the region (ADB, 2000)

As figure (4) demonstrates, the formation of two older RTBs in Asia, namely ASEAN and GCC have not effectively led to intra-regional trade. This is particularly the case for GCC. This statistical presentation supports the results of an analytical study which tested for the effectiveness of RTBs around the world (Foroutan 1998).

Figure (5) clearly shows the relative significance of both intra-regional and inter-regional trade in East and South East Asia. This sub-region accounts for more than 95 percent of intra -regional trade among the three. As far as inter-regional trade is concerned, still this sub-region has the highest share, with almost 80 and 20 percent of inter-regional trade with West and South Asia respectively. South Asia, in contrast, has the lowest trade, .1 percent in intra-regional trade and 20.6 percent in inter-regional trade.

Contribution of Agriculture to the Overall Economy: Due to the policy-bias toward agriculture, particularly with respect to price policies (Krueger *et al.* 1988), the contribution of agriculture to total employment has been said to be frequently a more reliable indicator of the economic importance of agriculture in the national economy of developing countries (Derosa, 1997).

We introduce the following formula to show the relative significance of agriculture in the overall Asian economies, giving more weight to employment and export:

$$RII = \sum(w_l * L + w_q * Q + w_x X) \quad (1)$$

Where, w_l , w_q , and w_x , are the relative shares of labor, output and export of agricultural sector in the economic structure of a developing economy respectively. These weights (w_s), are given the following values: $w_l=3$; $w_x =2$ and $w_q=1$.

Figure (6) demonstrates the importance of agriculture sector in the economy of 3 sub-regions of Asia. The agricultural sector of the East and Southeast Asia bears more weight in the overall economy of this region. This has to do more with trade liberalization and more labor force contribution to this sector in this part of Asia. In the contrary, due to the significance of oil production and export in West Asia, the overall role of agriculture in this sub-region is less than that of other sub-regions.

Although the trend of the share of agricultural production in GDP and of agricultural trade in total trade in many developing countries have been falling during the last decades, we should be remindful of the fact that this evolution can be explained in part by the increasing proportion of products originating from agriculture that are being processed to produce food, the later being increasingly traded (Yon *et al.* 2000). Therefore, agro-processing in Asia, which has been characterized by the predominance of thousands of small-scale traditional units (Hicks 1997), maintains a high potential for boosting economies of this region. This helps ensure growth with stability, and increasing rural incomes.

B- Trade Liberalization, Regional Integration and Agriculture

Regional Integration: There are two important questions related to regional integration, globalization, and agriculture in Asia: **First**, what is the impact of globalization on the agricultural economy in Asia? Is there a future role for Asian agriculture in the globalize economy? **Second**, how will regional economic integration benefit Asian agriculture in the future? **Third**, What potential does integration hold for macroeconomic stability and economic growth throughout the region?

The reasons for the rise of regionalism have been greatly discussed in the literature (Baldwin 1997; Bhagwati 1994; Either 1998; Krueger 1999). Generally, the present resurgence of interest in regional schemes to expand trade has its origins in the dissatisfaction with multilateral efforts under the GATT to achieve continued and timelier progress in liberalizing global trade relations. Moreover, regional trading arrangements among developing countries have come to be viewed as providing an economic defense against shifting patterns of trade and investment likely to follow in the wake of the initiatives in North America and Western Europe to establish new and wider free trading areas (DeRosa 1995).

One of the greatest challenges facing Asian countries in the 21st Century is how to strengthen their participation in the global economy. Their national incomes in just over 20 years. There are some evidence to suggest that much of the improvement in macro economic indicators in East Asian economies is a result of globalization (Court 1998). Countries such as the Republic of Korea, Malaysia and Thailand, by pursuing macroeconomic stability, further liberalization of their trade regimes, and a strategic regional integration, have doubled their national incomes in just over 20 years. We now point to four important issues that provide the case for a wider regional integration in Asia for the expansion of intra-regional trade and economic cooperation.

Agricultural Trade Policy: Regarding trade policy, there are evidence that point to the broad decline in protection in developing countries for agriculture during the last decade (DeRosa 2000). In many Asian economies too, protection particularly that enforced through non-tariff barriers, has declined remarkably during the last decade (IMF 2001). India and Vietnam in Asia that have opened their economies in recent years have experienced faster growth and more poverty reduction (Dollar, 2001). But protection in regions such as South and West Asia still remains high by international standards.

Figure (7) shows the evolution of the degree of openness over time in Asian developing countries, measured as total imports plus exports as a percentage of their GDP. To the extent that the growth in the openness of a

country respond to trade liberalization, its more rapid increase indirectly bears witness to the breath and scope of a country's trade liberalization effort.

The data demonstrate that the degree of openness have gradually increased over time during the entire period of 1990s in all three sub-regions of Asia, although the speed of openness has been higher in the East and Southeast Asia. East Asia show highly significant openness with respect to the rest of the world. These results are similar to those obtained by others (Frankel et. al. 1995; Dhar et. al. 1995).

But, as far as agriculture is concerned, the capabilities, particularly in agriculture, to take advantage of liberalization have been somewhat inadequate in all of Asia, because of the unwillingness to reduce agricultural trade barriers and inability to achieve economies of scale in agricultural production.

Agricultural Protection in DCs: Is there any hope for agricultural trade liberalization in advanced industrial economies in the foreseeable future? Industrial countries maintain high protection in agriculture through an array of very high tariffs, including tariff peaks, tariff escalation, and restrictive tariff quotas. Average tariff protection in agriculture is about nine times higher than in manufacturing. In addition, agricultural subsidies in industrial countries undermine developing countries' agricultural sectors and exports by depressing world prices and pre-empting markets (IMF 2001).

Also, as the last decade has shown, new forms of barriers to trade are emerging. For example, sanitary and phytosanitary measures, rules of origin and other importing country regulations, have been increasingly taking center stage in recent years. The diverse standards and technical regulations among developed countries, along with the corresponding testing procedures for compliance, limits market access and raises production and testing costs for the country, particularly for agricultural products (Austria 2001). In contrast, RTBs advance liberalization in these areas much more rapidly than in the WTO.

Wider integration in the Western Hemisphere: There are few studies that have estimated the impact of the initiatives in North America and Western Europe to establish new and wider free trading areas on Asian countries and trading blocks. Some studies have estimated that, through elimination of tariffs, NAFTA diverts trade out of the market from Asian countries (Noland, 1994; Hufbauer et al. 1993; Kreinen 1992; Kreinen et al. 1992; Safadi et al. 1993).

It is been shown also that East and South Asia suffer significantly as the result of trade diversion due to the effects of a hemisphere-wide FTA (Hufbauer et al. 1994). In other studies, authors have demonstrated that the total net effects of EC on ASEAN, the Asian NIEs, and South Asia and China export to EC is negative (Davenport 1991; Page 1992; Kreinen et al. 1992).

One can conclude from all these studies that, the potential exist for competitive regionalization where the formation of one regional grouping puts

pressure on other countries to form a bloc of their own, rather than to liberalize unilaterally or multilaterally.

The Effectiveness of RTBs in Asia: The question has been raised whether regional integration arrangements or trading blocks which have been formed in Asia thus far, have been effective to expand intra-regional trade and promote economic cooperation. One study tried to test for effectiveness of regional grouping of principal RTBs involving developing countries (Foroutan 1998). It found that in Asia, neither ASEAN nor GCC have thus far proved effective. In the case of GCC, the member countries' similarity of production and trade structures, as well as their relatively open trade regimes vis-à-vis the rest of the world has been cited for their RTA ineffectiveness. But, their cultural proximity as well as small size of its market can be cited as another reason.

In the case of ASEAN, the lack of effectiveness has been referred to the very limited trade concessions given to partners. But, it could well be argued that their relative natural and human resource homogeneity as well as relative similarity of their economic and social structures could have caused their group ineffectiveness.

In another research, by adjusting intra-bloc trade shares, conclusion was reached that the rate of increase of trade within ASEAN or within East Asia could be entirely explained by the rapid growth of the countries (Frankel *et al.* 1996). There was nothing left over to attribute to an intensifying bloc.

Other researchers used CGE models (Lewis *et al.* 1995) and reached similar conclusions: They argued that the countries are too similar to reap very large gains from trade among themselves. There are others who argue that the members of ASEAN are too similar to form a successful FTA, but that expansion to include Indochina, or to include the NIEs and Japan, might give the group the necessary economic complementarity (Kwan 1994; Plummer 1994). It is unquestionably true that trade relations with countries outside ASEAN are more important to the determination of growth and economic welfare of this region than are intra-ASEAN trade relations. The problem with purely intra-regional liberalization in Southeast Asia is that the countries mostly produce the same commodities.

There are also other evidences that show coordinated liberalization of countries within an Asian region on an unconditional MFN basis is probably preferable to the formation of a discriminatory FTA within that region (Panagariya, 1994; DeRosa 1993a, 1993b, 1995; Srinivasan *et al.* 1995).

III- Regional Integration, Comparative Advantage and Agriculture

Countries which are able to strengthen their national and regional comparative advantage, by upgrading factor conditions, are likely to benefit

from regional integration. Increased competitiveness, export promotion and integration of Asian economies by strengthening the national and regional comparative advantage in agricultural sector, require the development of indigenous technology. These countries stand to benefit from existing and emerging sub-regional and regional cooperation, which facilitates the sharing of technologies across borders through joint agricultural research and development (R&D) effort.

By fostering domestic efficiency where resources are allocated according to a country's comparative advantage, liberalization policies enable industries to adjust and prepare for global competition. But as industries become competitive, bigger markets are required for them to realize economies of scale. Regional integration and cooperation then becomes important as they provide region members the opportunity to penetrate larger markets as the process of globalization speeds up (Onguglo *et al.* 2000).

Strategies from the Viewpoint of Asian Countries: What is the appropriate degree of integration within Asia? The strategic question, from the viewpoint of an individual Asian country, is whether to pursue unilateral, sub-regional, pan-regional, or multilateral routes to enhanced trade.

By considering a sequence of nested country groupings in Asia, one study carried out a full examination of possible blocs in Asia Pacific to evaluate the potential degree to which Asia and its sub-regions can be trade-integrated (Frankel *et al.* 1995). The results confirmed the presence of implicit or de facto trade blocs in Asia. It showed that the right place to "*draw the line*" seems to include all of Asia. A Pan-Asia bloc was shown to exhibit a strong inward trade bias. In a related study, a CGE model was used to demonstrate that all countries in the region gain from a full-fledged Asia or Pacific trading bloc (Lewis *et al.* 1994, Martin *et al.* 1994, 1995).

One of the main prerequisites for the Asian countries to form a regional trading bloc (with emphasis on agriculture) is to have product diversification together with comparative advantages in different lines of agricultural production. Each group of Asian countries has common factors, e.g. religion, language, customs, traditions, etc. At the same time they have heterogeneous factors of production as well as economic structure. This helps each Asian sub-continent to integrate in order to create a balance in the globalization era. In general, there will be more room for specialization, based on comparative advantage, and advantages will be bigger the more potentially the concerned national economies are complementary.

An important question can be asked as to whether an "***intensive regional integration***", or an "***extensive regional integration***" results in more trade and economic welfare in the participating countries. I define intensive regional integration as the one which deepens trade liberalization in an already existing

RTB (i.e. ASEAN, AFTA) and extensive regional integration as the one which expands an existing regional trading bloc to encompass more countries in the region. Usually, the later kind of integration results in more trade and economic welfare in the participating economies.

In an empirical investigation, the question has been raised that whether free trade areas might be counted upon to reduce the frequent bias against agriculture in less developed countries. To analyze this question, a research used a computable general equilibrium model with reference to AFTA (Arndt *et al.* 1996). The quantitative results indicate that AFTA holds little promise of substantial economic gains for agriculture and national welfare in general. Trade liberalization in Asia, based on larger market expansion and regional integration generally yields significant gains for both agriculture and national welfare, because it substantially expands ASEAN trade with other Asian countries whose natural and accumulated resources are complementary to that of ASEAN.

Other studies, using simulation method, have also reached similar conclusion. The AFTA benefits are less than the advantages from opening up ASEAN economies to more countries (Derosa 1995). Thus, ASEAN would be better-off, if it concentrates on greater liberalization with a larger number of economies, particularly those located in Asia. In addition, the plan would reduce the current bias against agriculture and other natural resource-based sectors.

One of the important prerequisites for the successful implementation of any regional integration plan is that each country adheres to the principle of comparative advantage (at regional, national or world level) in its struggle to expand output and promote trade. We now turn our attention to the comparative advantage issue, particularly in regard to crop production in agriculture. We first examine the conceptual and methodological measurement issues of local comparative advantage within a country. Then an attempt will be made to link "local", "national" and "world" comparative advantage indices in order to provide some rules for the evaluation of agricultural commodity trade potentials in a region. Our examination is accompanied with a case study, comprising Asia, Iran and Isfahan, as a region in this country.

Local Comparative Advantage in Crop Production: A country's regional pattern of trade is a reflection of its comparative advantage which is determined by its resource endowments. In a free market economy, a region's comparative advantage in agricultural crops is usually evident in its trade with other regions. However, a test of this framework is difficult, if intra-regional trade flows within a country is not available.

However, the actual output or the composition of regional trade flows may not be the appropriate measures of specialization. Due to fluctuations in weather and other uncertain factors, actual output differs from the expected or

anticipated, and it is the latter that actually reflect the observed comparative advantage (Carter *et.al.* 1991). The expected output is proportional to actual sown area; in fact, the expected output is product of the actual sown area and the expected yield. Therefore, the sown area ratio, rather than output or trade composition, may best indicate the degree of specialization and trade. According to the theory, the sown-area ratio of different crops can be explained by the expected yield ratio. If output prices change over time or vary among regions, the sown-area ratio will be determined by the return ratio, which is the product of the yield ratio and the price ratio (Carter *et.al.* 1991).

Therefore, if one is considering only crop production in agriculture, the land productivity differential in terms of yield ratios among crops can be taken as the appropriate measure of comparative advantage. This is consistent with the H-O theory. As the matter of fact, unlike capital, land is a non-neutral input in crop growing. Differences in climate, topography, and soils result in deviations in the relative productivity of land in growing different crops. These differences may be viewed as different resource endowments in crop production.

There are relatively few studies available on comparative advantage in agricultural trade. One study have used the domestic resource cost (DRC) approach and estimated the relative comparative advantage of African coffee growers (Pearson *et. al.* 1974). There are other related studies. A World Bank (1985) report on China, addressed the issue of provincial comparative advantage in industrial crops. This report measured the ratio of industrial crop yields to cereal grain yields in each province. The ratio was normalized by dividing it through by the same ratio of yields for the entire country. The resulting comparative advantage index was calculated using one year data and it was computed for seven different crops.

In another empirical work, a series of direct production indicators, instead of the trade flow data were used to access regional comparative advantage in grain production in China (Zhong, 2000). Two sets of indicators were used. The first set included Net Social Profitability (NSP), and DRC, whereas the second set was comprised of three indices, namely Efficiency Advantage Index (EAI), Scale Advantage Index (SAI), and Aggregate Advantage Index (AAI) as measures of regional comparative advantage (Li, 1997).

EAI is an indicator of the relative yield of one crop in relation to the average yield of all crops in the region, and to the national average. Assuming no significant differences in techniques of crop production and or no significant barriers to technology diffusion and adoption among regions, the $EAI > 1$ can be taken as an indicator of relative efficiency in crop production due to natural resource endowments, and therefore as an indicator of comparative advantage.

The SAI shows the extent of concentration of one crop in a region relative to that at the national average. It is usually measured by the relative grain sown

area. If $SAI > 1$, then the degree of concentration of that crop in the region is higher than that in the whole country. If the concentration level is determined by economic factors, then the SAI reveals regional comparative advantage in that crop.

The AAI is simply the geometric average of the EAI and SAI. In case $AAI > 1$, then that crop in the region is said to have a comparative advantage over the national average. In sum, EAI indicates relative yield differential, SAI indicates relative production differentials and AAI could be taken as an aggregate indicator of regional comparative advantage in crop production. It is clear that the comparative advantage at the regional level in crop production, not only varies across provinces but also across crops.

In an empirical investigation of the above three indices (EAI, SAI, AAI), the Isfahan region in Iran was selected. In order to reduce the impact of weather calamities and other random disturbances, it is recommended that an average of several years of yields and sown area be used in the estimation of those indices. Therefore, a data set for a period of 8 years regarding crop production in this region as well as the nation is utilized.

IV- Measuring Comparative Advantage in Agriculture

Local Comparative Advantage in Iran : We express the comparative advantage of Iranian farmers in terms of land productivity-the yield ratio of different crops (EAI), relative land usage (SAI), and the average of the two (AAI). The published data for the Isfahan province limits the data to 14 crops. Due to the heterogeneous nature of agricultural crop products and in order to rationalize our computation of RCAs, we divided these agricultural crops in 4 different categories, namely, cereals, legumes, industrial crops and vegetables. Moreover, in order to neutralize the impact of weather calamities on RCAs, the average of 8 years period (1989/1990-1997/98) was taken. The resulting statistics are reported in Table (1).

National Comparative Advantage in Iran: To compute the national comparative advantage, a simple Balassa index of comparative advantage is applied to the international agricultural trade data of Iran, incorporating only the above 14 crops for which data was reported for the Isfahan province. The trade data included exports of those agricultural crops to the Asia continent.

Regional Comparative Advantage in Asia: In order to evaluate the Asia's comparative advantage in trade of the above related agricultural crops, the same Balassa index was used and applied to the flow of Asia's export to outside Asia. Due to data limitation, the average of 5 years data (1994-1998) was calculated.

The “Chain” Comparative Advantage Index

The relations between regional, national and continental (or world) comparative advantage indices and their interpretations are one of those interesting issues and seems that have not been touched upon either in regional or international economic theories of trade. The importance of these relations and their interpretations stems from the following reasons:

a) The structure of the above RCA indices at all levels of regional, national, and the world are very similar (all have the same structure as the Location Quotient coefficient). This makes their comparisons more convenient.

b) The relation between comparative advantage indices at the local, national and international scale, completes the “chain” connection between “spatial” characters of production and trade, and in fact, draws and expands the roots of a country's production comparative advantage for exports from national localities way beyond the political and geographical boundaries of that country. This is of particular importance, since in a dynamic evaluation of a country's comparative advantage in the world trade, where globalization is increasingly putting pressure on efficient allocation of resources, it reveals which regions of a country is capable of showing more flexibility and adjustability to changes in world market conditions.

A “chain” comparative advantage index, comparing RCA indices at local (RLCA), national (RNCA) and the world (RWCA) level, reveals several interpretive relations. We make several propositions, regarding the interpretation of some of these relationships as follows:

$$RLCA_{ir} > RNCA_{in} \geq 1 \geq RWCA_i \quad (2)$$

The region (r) of country (n), as well as country (n) itself, has a revealed comparative advantage in production and export of commodity (i) to the grand region (i.e. Asia).

$$RNCA_{in} > 1 > RWCA_i > RLCA_{ir} \quad (3)$$

The country (n) has a revealed comparative advantage in production and export of commodity (i) to the grand region, but not the local region(r).

$$RLCA_{ir} > 1 > RWCA_i > RNCA_{in} \quad (4)$$

The region (r) of country (n) has a revealed comparative advantage in production and export of commodity (i) to the grand region, although country (n) as a whole, has no comparative advantage.

$$RNCA_{in} > 1 > RWCA_i > RLCA_{ir} \quad (5)$$

The country (n) has a revealed comparative advantage in production and export of commodity (i) to the grand region, but not the region(r) in country (n). Some other regions of the country surely have comparative advantage in production and export to the grand region.

$$RRCA_i > 1 > RNCA_{in} > RLCA_{ir} \quad (6)$$

Neither the country (n) nor its region (r) have a revealed comparative advantage in production and export of commodity (i) to the grand region.

In order to evaluate the comparative advantage position of 14 different crops production in Isfahan region, the three indices, namely EAI, SAI and AAI were constructed, together with the construction of national and world RCA indices, using commodity export data. The statistical results computed for the province of Isfahan, Iran and Asia, as a whole, revealed the following (Table 1):

The Isfahan region has a good comparative advantage in production of lentil, sunflower seed, and potato, whereas Iran and Asia continent, both, do not show to have such a privilege in world trade (chain index 4).

Iran has a strong comparative advantage in production and export of wheat, onion, melon and pea to Asia, whereas the province of Isfahan does not show to have comparative advantage in such products, except onion, but its comparative advantage is less than the national average (chain index 4).

Although Asia did not reveal to have any significant comparative advantage to export such products whether to Iran, any other country within Asia, or to the world, but it is certain that individual Asian countries, like Iran, do have strong local and national comparative advantages in export of many different types of agricultural crops (not evaluated in this study) to the world, but even more so to other Asian countries as well. The investigation of this proposition requires extensive data, time and effort which are beyond the scope of this study.

Conclusion

From what have been discussed in this paper, several conclusions can be reached as follows:

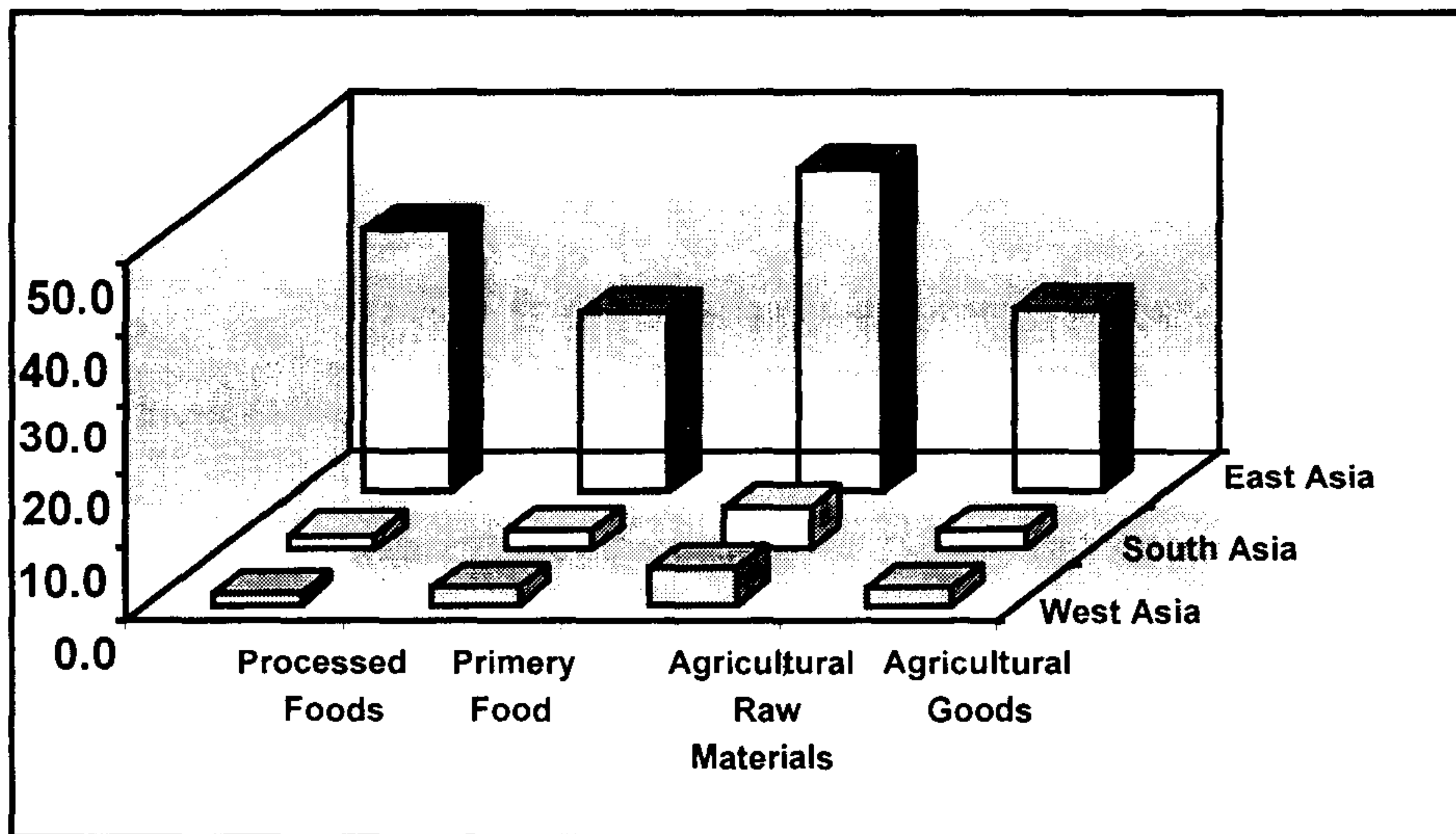
- Due to the: 1) ongoing process of globalization, with increasing pressure on the agricultural sector of Asian developing countries for efficient allocation and use of their economic resources, 2) unlikely non-reciprocal agricultural trade concessions by western countries, 3) the trade diversion impact of wider regional integration initiatives in the western hemisphere on the agricultural exports of Asian countries, and 4) the insignificant consequences of deepening integration in the already existing regional trading blocs in Asia for intra-regional trade, particularly in the agricultural sector, it is incumbent on Asian countries not only to act collectively within Asia or Asia sub-regions, but also to achieve their competitive advantage through proper coherence in their agricultural trade policies.
- Since Asian countries today are an increasingly heterogeneous group with diverse economic interests, by opening their economies to greater intra-regional trade and investment, allowing the forces of comparative advantage

and open markets to guide their economy, they can speed up the process of their development and ease the necessary adjustments for further participation in world trade.

Table 1: Comparative Advantage Indices of Agricultural Crop Production at Local, National and Regional Levels

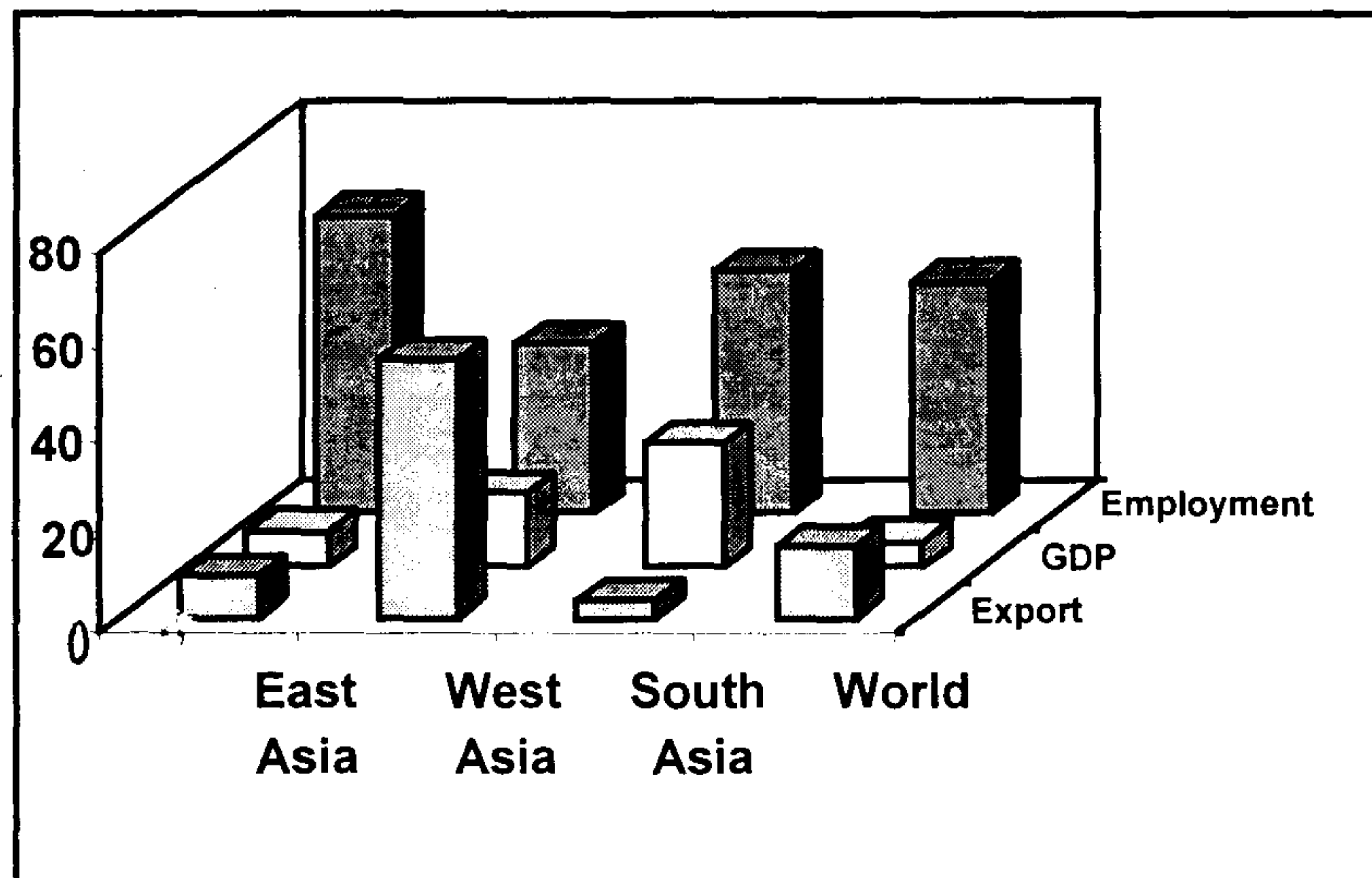
Product	Isfahan Region (1989/90-1997/98)			Iran (1994-98)	Asia (1994-98)
	(RLCA)			(RNCA)	(RwCA)
	EAI	SAI	AAI		
Wheat	1.08	0.89	0.98	13.39	0.20
Barely	1.03	1.40	1.20	---	0.22
Maize	0.61	0.75	0.68	---	0.09
Pea	0.93	0.16	0.39	65.39	0.01
Lentil	0.56	4.07	1.51	0.10	1.43
Sunflower	1.15	4.79	2.34	---	0.91
Cotton	2.21	0.39	0.93	1.15	0.70
Suger beet	0.98	1.68	1.28	---	1.17
Melon	0.61	0.16	0.32	7.37	0.93
Cucumber	1.16	0.46	0.73	---	0.38
Potato	0.84	2.76	1.52	---	0.27
Onion	1.42	1.42	1.42	3.26	0.44
Tomato	0.89	0.16	0.38	0.08	1.10
Bean	0.51	1.33	0.83	0.65	0.87

Figure 1: The Share of Asia's Sub-region Agricultural Commodity Group Production in World Agricultural Output (2000)



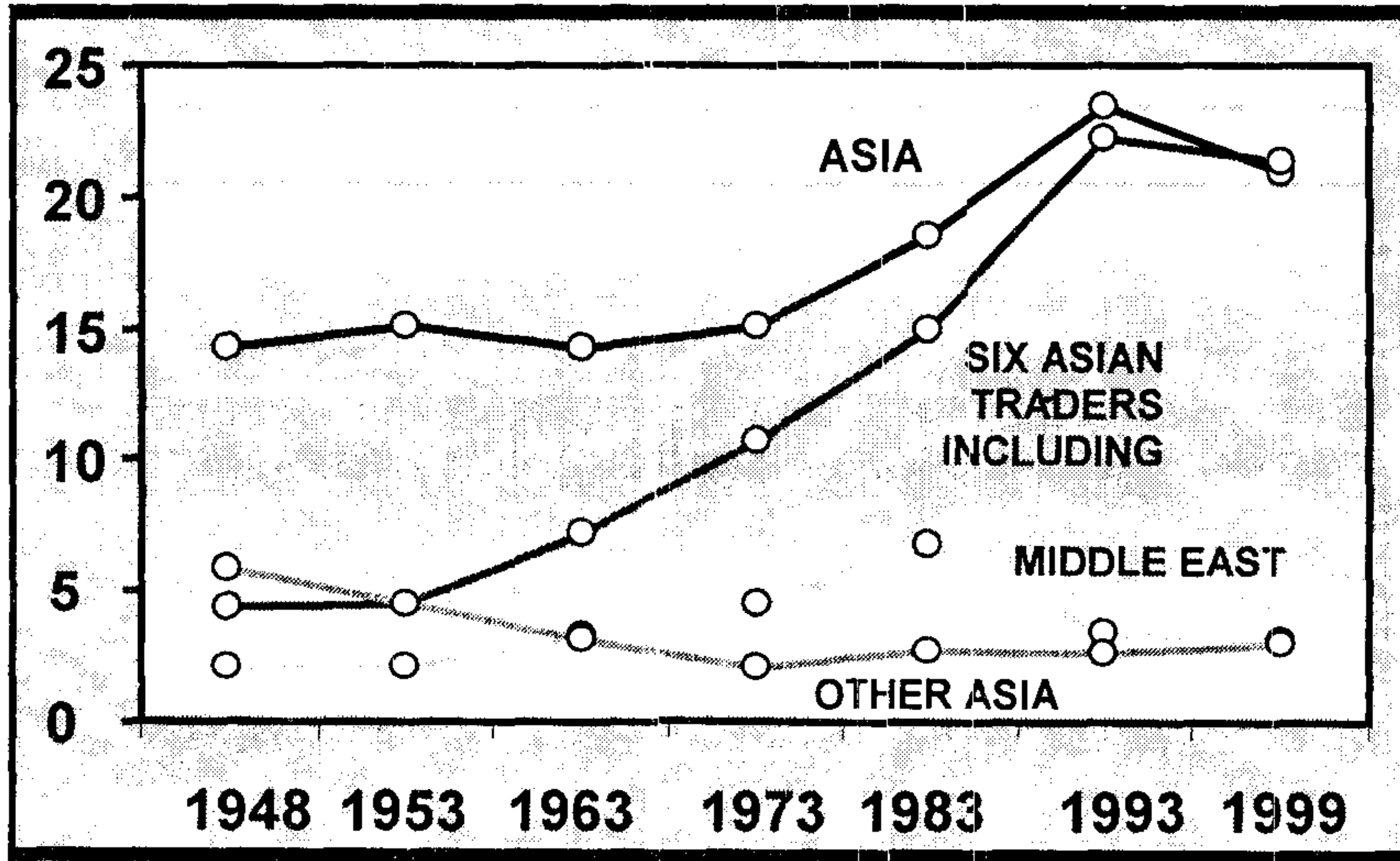
Source: FAO

Figure 2: Relative importance of Agriculture in the National Economies of Asia Sub-regions (1998)



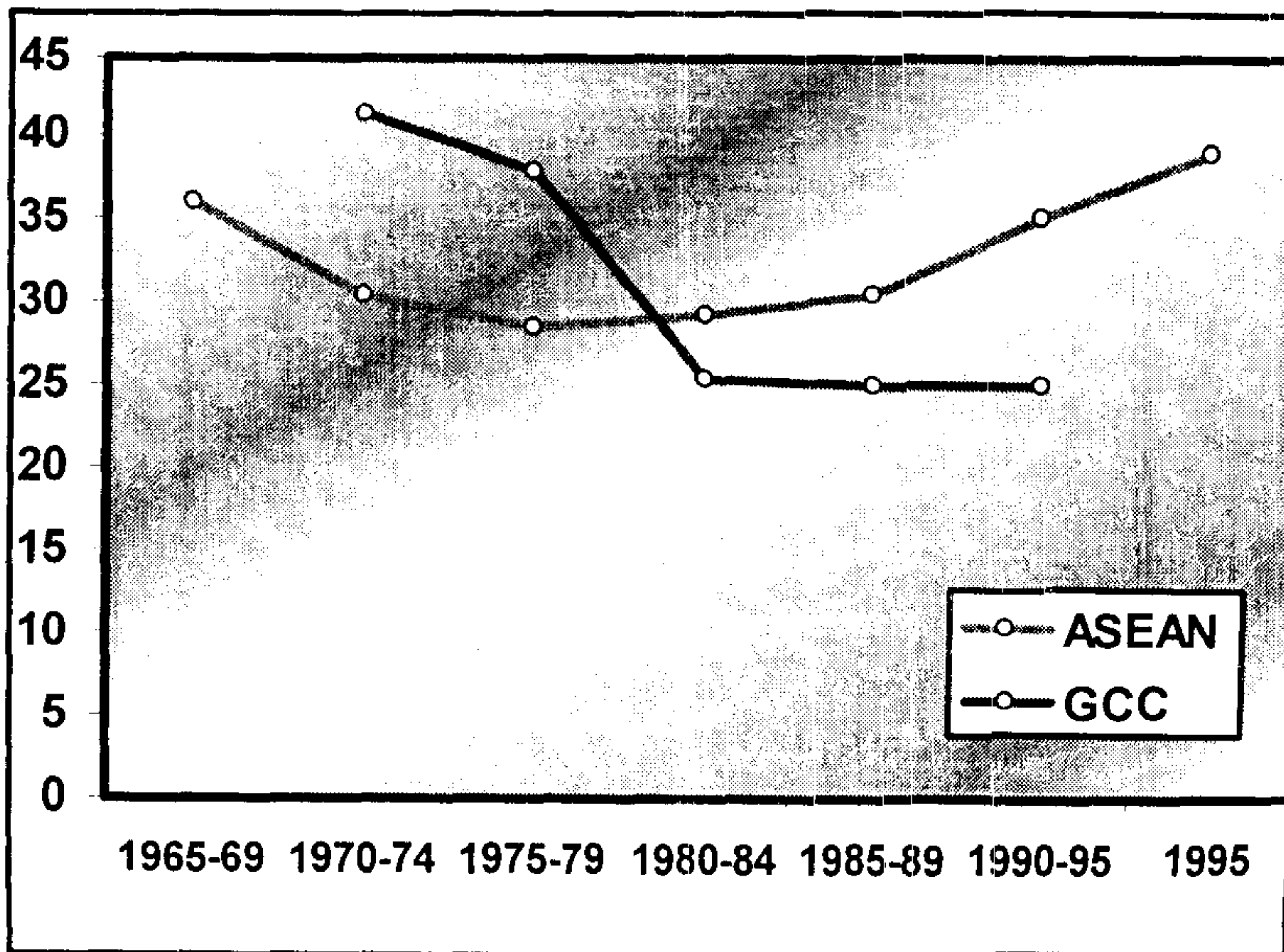
Source: PC-TAS (CD_ROM); IFS (CD_ROM); ILO, STATDBASE
 *employment data is for 1990.

Figure 3: Asia's Share of World Exports (1948-1999)



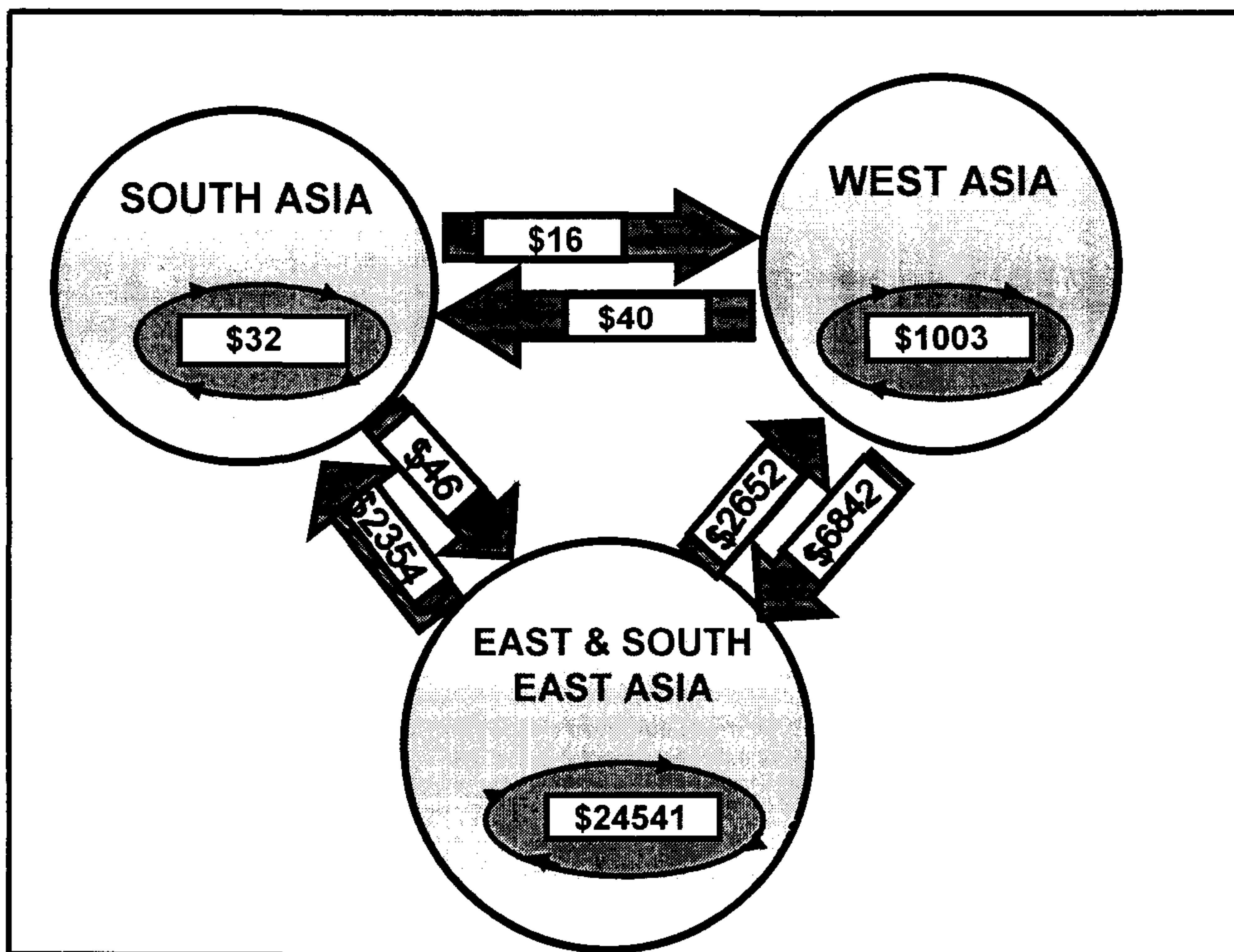
Source: WTO-International Trade Statistics 2000

Figure 4: Intra-regional Trade as Percentage of Total Trade: Sub-regions of Asia-Non-fuel (1965-1995)



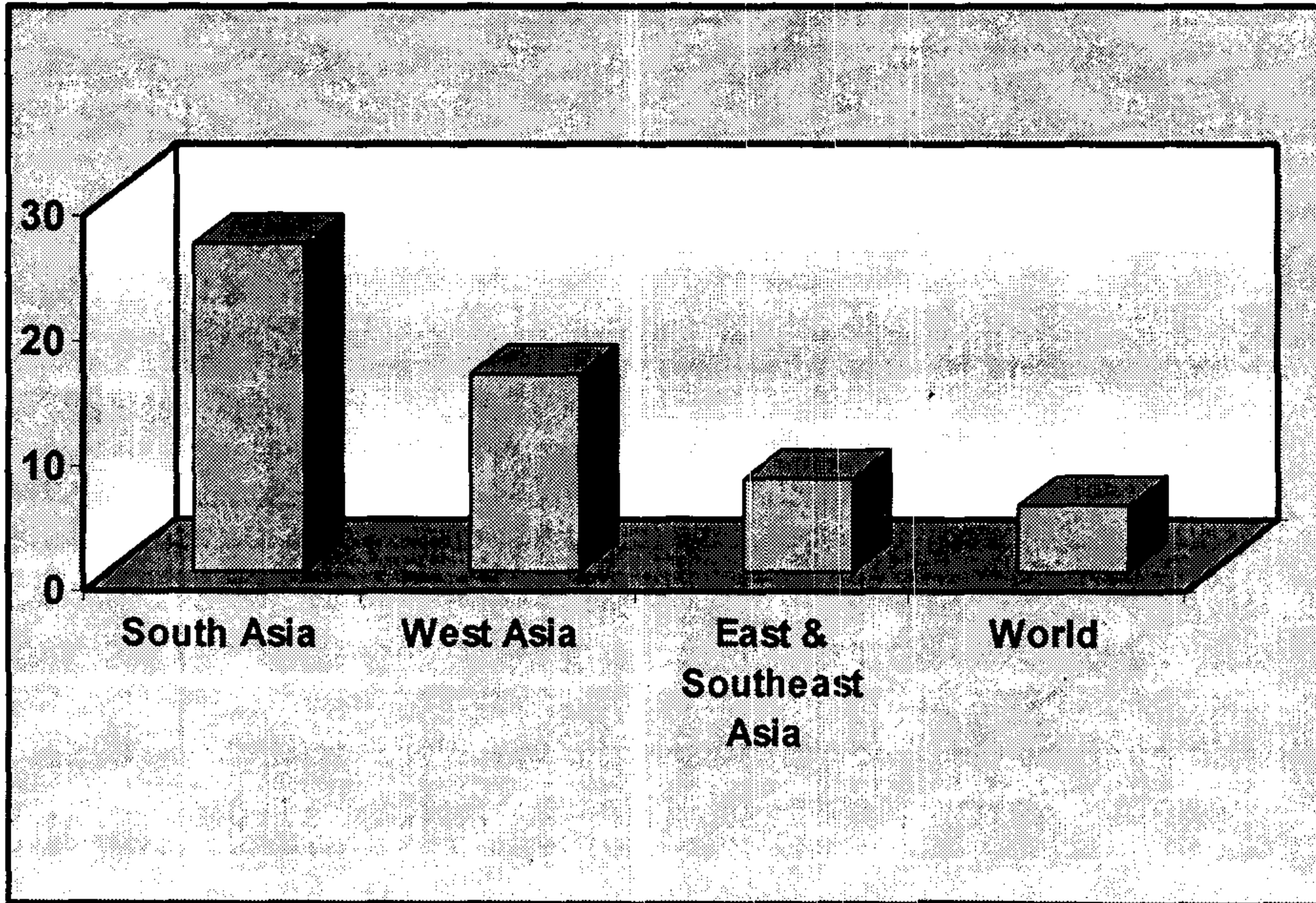
Source: IMF (2001)

Figure 5: The Significance of Intra-regional and Inter-regional Trade: The case of Asia Sub-regions (2000)



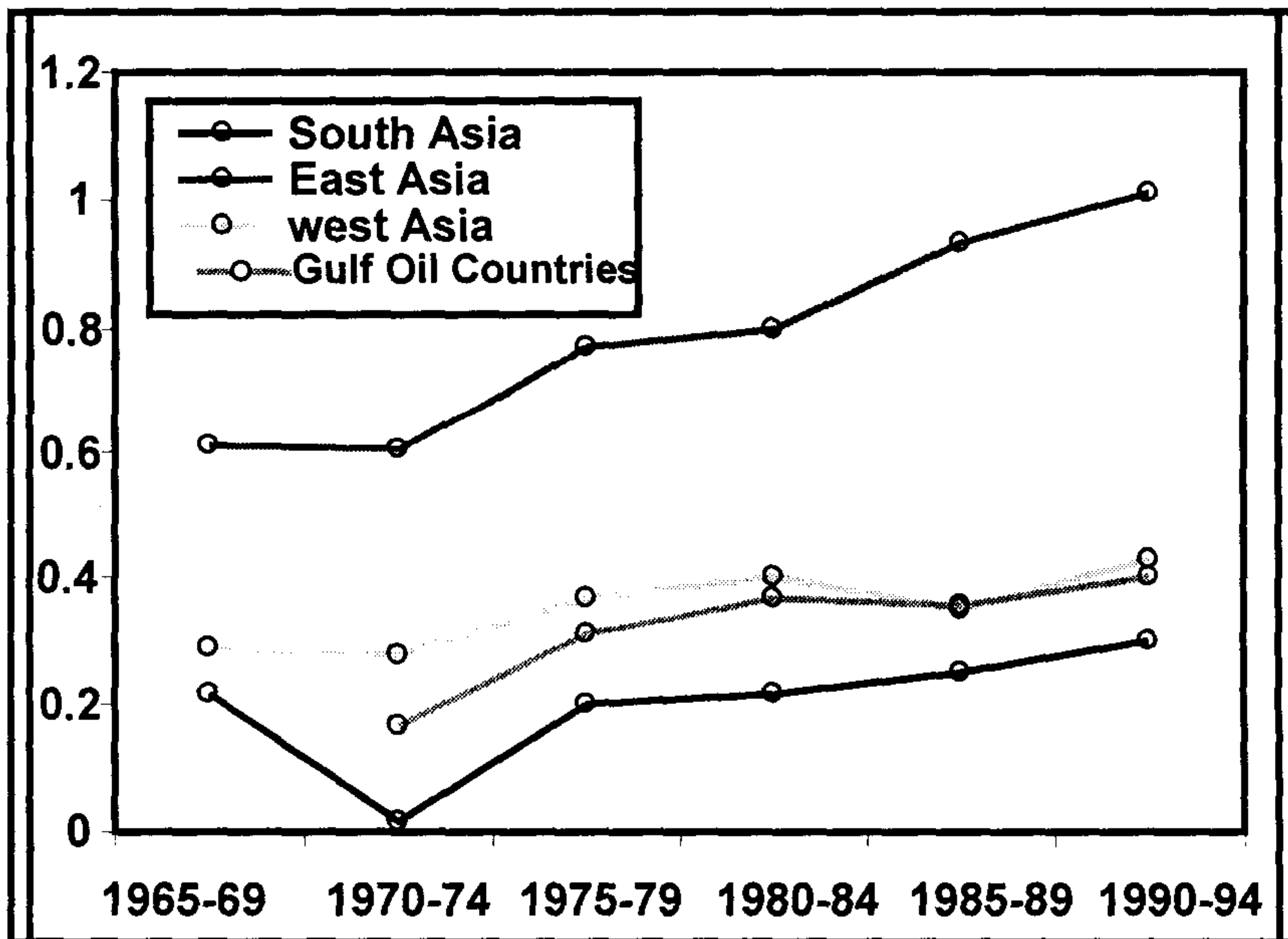
Source: WTO-International Trade Statistics-2000

Figure 6: The relative importance of Agricultural Sector in the Economy of Asia's Sub-regions (1998)



Source: see text

Figure 7: The Evolution of Openness in Various Sub-regions of Asia



Source: Foroutan (1998)

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