Germany-China Trade:
An Empirical Assessment

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Differences in resource endowment ratios are generally viewed as the mainspring of international trade between countries. In addition, geographical, historical, cultural and political factors may influence trade between a pair of countries in a multi-country setting. This article adopts the comparative advantage theory to analyse Sino-German merchandise trade between 1975 and 1985. The focus is on the two countries' commodity composition of exports, because import patterns tend to be severely distorted by government trade policies.

Questions answered on the basis of empirical evidence[1] include the following: How intensive is the bilateral trade flow between the People's Republic of China (PRC) and Germany relative to the impact of the two countries in the international trade arena? Are their patterns of comparative advantage with the rest of the world[2] consistent with their economies' factor endowments? To what degree do their bilateral export structures differ from their comparative advantage established in world markets? Have these patterns of trade specialisation shifted over the ten-year sample period in terms of product sophistication? What are the effects of China's new foreign trade policy and practices, initiated in late 1978, both on her international competitiveness and in the German context? And most importantly, what is the potential for further expansion in Sino-German trade?

I. China's and Germany's Foreign Trade in Global Perspective

Before economic reform, like the other centrally planned economies (CPE) China tended to deemphasise the role of foreign trade in its economic growth. Imports merely served to make up for shortfalls in domestic production, and exports were considered a necessary evil to earn the foreign exchange to pay for imports. China has now abandoned her economic development strategy of import substitution based on self-reliance to conduct foreign trade in accordance with the comparative cost principle. This has been reflected in China's relative position in world trade. In terms of export value she came sixteenth in 1985, up from twenty-eighth in 1975.[3]

But despite the spectacular increase in the absolute volume of China's external trade since the launching of an open foreign trade policy in late 1978 it remained relatively small in world trade, accounting for only 1.68%[4] seven years later. Although its growth rate surpassed that of the world average, it only represented growth on a small base. In 1975, China's share in world exports exceeded that in world imports. By 1980, however, imports outstripped exports as a result of the policy shift from import substitution to comparative advantage. In 1985 China contributed 1.37% and 1.98% to the global export and import trades respectively.

The fact that foreign trade is vital for Germany has turned the country into one of the world's largest trading nations. Under increasing pressure from Japan and other newly industrialised countries her share in total world exports declined

marginally from 10.26% in 1975 to 9.46% in 1985. Nevertheless, with the exception of the year of 1984 she came second to the United States during the remainder of the period under consideration.[5] As exporters Germany and China ranked third and nineteenth respectively in that particular year.[6]

II. The Importance of the Bilateral Trading Relationship

China's major trading partners in 1985 were, by far, Japan, Hongkong, the European Economic Community (EEC) and the United States (US), in descending order of importance. Of all the Common Market countries Germany was China's biggest trading partner, contributing about two-fifths of the total.[7] Between 1975 and 1985, Germany's share of China's exports fell marginally from 3.51% to 3.29%. Similarly, her share of China's demand for imports slipped from 8.42% to 5.53%. Thus China has become slightly more independent of Germany in trade.

During the entire period under analysis, Germany's major trading partners, both in her export and import trades, were the original member states of the EEC: France, the Netherlands, Italy and Belgium-Luxembourg, with the latter being eventually surpassed by the UK.[8] A number of countries belonging to the European Free Trade Association (EFTA), including Switzerland, Austria, Sweden, Finland and Norway, were also important trading partners.[9] Given this firmly established intra-European trading pattern it is worth noting that by 1985 the US had become Germany's second most important export market.

The total volume of Sino-German trade in 1975 at some US$ 0.7 billion was statistically insignificant. Things improved slightly with China's share of Germany's exports rising from 0.58% to 1.22% between 1975 and 1985. In a similar vein, her share of Germany's demand for imports increased from 0.30% to 0.55% during the corresponding period. These two observations show that Germany has become marginally more dependent on China in trade. The Sino-German trading relationship may be described as symmetric, i.e. Germany's trade with China accounts for only a small proportion of her total foreign trade and vice versa.[10] By 1985 China ranked 15th and 31st among Germany's export markets and suppliers respectively.

The *relative* importance of the bilateral trading relationship between two countries can be gauged using the intensity of trade index.[11] For the purpose of this article it provides a measure of the extent to which China's (Germany's) exports to Germany (China) are larger or smaller relative to her exports to the whole world than Germany's (China's) imports are relative to world trade.

Table 1 puts the two countries' trade intensities in global perspective. The evidence suggests that China's export trade was extremely intensive with Hongkong. Given the special characteristics of the re-export trade of Hongkong, this finding is not surprising. But China also exported intensely to the member countries of the Association of South East Asian Nations (ASEAN) and Japan. By contrast, throughout the period under analysis, Germany was far less important as a market for China than the rest of the world.

Chinese imports from Hongkong became increasingly important over time. Again, if Hongkong's entrepot activities are taken into account, China can be said to have imported most intensely from Japan. She also had a consistently

intensive import trading relationship with Thailand, Australia and New Zealand. By comparison, Germany was only about half as important as a supplier to China than the rest of the world.

As Table 1 shows, Germany had intensive bilateral trading relationships with the EFTA and EEC countries. Moreover, without exception, her export intensity with them increased during the decade under discussion. The opposite trend would have prevailed, had she moved away from Europe into worldwide markets. Germany also traded intensely with Lybia, next to the UK the largest supplier of her crude oil requirements. Both for exports and imports China registered negative trade intensity indexes with Germany.

III. Overview of Sino-German Trade

In value terms, two-way trade between Germany and China increased more than four-fold during the 1975-1985 period which was substantially above the growth rate observed in total world trade.[12] Bilateral trade expanded more rapidly between 1975 and 1980, but it represented only growth on a relatively small base. Sino-German trade as a proportion of total world trade rose from 0.04% to 0.08% in the decade under investigation.[13] This negligible contribution is hardly surprising given both the small volume of the two countries' bilateral trade and the negative intensity of trade indexes.

The conclusion of the first trade agreement between the EEC countries and the PRC on 2 May 1978, which accorded China mostfavoured-nation status, and of the textile agreement on 20 December 1979 gave a substantial boost to PRC sales to Germany.[14] The spectacular growth of Chinese exports to Germany during the 1975-1980 period (Table 2) is, to some extent, attributable to these trade agreements. In addition, flexible trade practices were adopted by China's trade organisations to promote exports and imports.[15]

In 1980 the EEC started to include China in the generalised system of preferences (GSP) on a limited range of products.[16] But since the PRC does not rank among the ten most important supplier countries in total GSP exports to the EEC,[17] the impact of this preferential treatment on her sales to Germany would have been marginal. Imports play a strategic role in China's development process and largely depend on the country's economic policy objectives with demand being very sensitive to priority. During the PRC's Sixth Five-Year Plan (1981-1985), foreign trade was earmarked for rapid expansion and imports were expected to grow at a faster rate than exports. In the event, these expectations materialised in the German context since industrially advanced Germany could provide China with the technology-intensive goods needed for her industrialisation.[18] The fact that China's preferential access to the EEC market was limited by quotas in seven and seventeen cases in 1981 and 1983 respectively[19] added to her worsening export/import ratio. The effects of these protectionist policies are clearly reflected in what virtually amounts to a stagnation of China's export trade with Germany between 1980 and 1985.

Table 2 summarises the Sino-German bilateral trade position over the period under analysis. China suffered a continual trade deficit. With exports expanding faster than imports in 1975-1980, her trade deficit/export ratio declined accordingly. In the 1980s, however, export growth became negligible lifting the 1985 deficit to the unprecedented level of close to US$ 1.4 billion.[20]

IV. The Case of China

1. China's Factor Endowments

Countries will export commodities making relatively intensive use of the factor of production that is relatively cheap before trade. This section reviews some crude indicators of the Chinese economy's factor endowments: land, labour and capital. They provide us with certain expectations with respect to the PRC's export specialisation. The following discussion adopts the approach taken by Garnaut and Anderson.[21] Firstly, taking income as a proxy for physical capital, in terms of capital to labour ratio (GNP per capita) China belongs to the low-income countries. Secondly, the proportion of the PRC's population participating in tertiary education, taken as a proxy for human capital, is very low. These two economic indicators suggest a low endowment of both physical and human capital relative to labour. This implies that China will tend to specialise in unskilled labour-intensive goods rather than in technology-intensive or human capital-intensive products.

Thirdly, China's ratio of population to 'total land area',[22] a crude proxy for the ration of labour to natural resources, takes an intermediate value between resource-rich countries, such as Canada and Australia, and resource-poor countries, such as Japan and Germany. Hence one can only speculate as to wether China has a slight comparative advantage or comparative disadvantage in agricultural and mineral resources. The hypotheses advanced above will be tested in the next section. All we can say with confidence at this stage is that China is abundant in labour relative to both capital and natural resources, compared with a global average.

2. China's Global and Bilateral Comparative Advantages[23]

The concept of global comparative advantage derives from the commodity composition of a country's total exports, showing its pattern of comparative advantage with the rest of the world. The 'revealed' comparative advantage index[24] permits us to measure a country's export specialisation on a global scale. This section examines the extent to which the pattern of China's comparative advantage established in world markets has been duplicated in Germany.

Although most goods require inputs of all factors of production, they can be classified according to their dominant factor, that which determines the location of production and that used most intensively.[25] For the purpose of this article, the commodities of the SITC three-digit-level[26] have been divided into five categories of factor characteristics: agricultural resources, mineral resources, unskilled labour, technology, and human capital.

The upper section of Table 3 reveals the strongest global comparative advantage for China in goods intensive in unskilled labour such as textiles, clothing and footwear. Given the country's abundance of labour relative to land and capital, international competitiveness in this factor category was to be expected. What is more, the importance of unskilled labour-intensive manufactures in China's world exports increased over time, highlighted by the switch in emphasis from heavy industry to light industry as an integral part of economic reform. In fact, from 1980 onwards these goods contributed the largest share to China's total exports.

As shown in the lower section of Table 3, the increase in China's unskilled labour-intensive exports to Germany stands out as a conspicuous feature of the countries' two-way trade. While the trend clearly accorded with China's world trade pattern, the disproportionately high growth rate was presumably largely due to Germany's gradual decline in competitiveness in this factor category of goods, as observed below.

Clothing is found to have been the most dynamic element in China's global export pattern, increasing its contribution to total exports from 5.1% to 13.1% during the sample period. Specialisation within the same factor category towards products of higher-value forms implies a shift from intermediate to final manufactures. This development was duplicated in the German context, where the shares of textiles and clothing roughly doubled and trebled respectively.

China's extent of comparative advantage in agricultural commodities relative to the rest of the world, in particular in the 1970s, is obviously a distortion resulting from government trade policies. A value marginally above or below unity would have more closely accorded with her factor endowments observed above. As shown in the middle section of Table 3, in 1975 agricultural commodities accounted for more than two-thirds of China's total exports. This disproportionately high share reflects the PRC's economic development strategy before economic reform, when agricultural exports were promoted to finance imports of producer goods for the heavy industry sector. The shift in investment priorities towards light industry, initiated after 1978, is borne out by a substiantially reduced international export specialisation in agricultural goods in the 1980s.

China's shift from import substitution industrialisation to comparative advantage reduced domestic demand for raw materials, creating an exportable surplus of mineral resources. Thus, as shown in the upper section of Table 3, by 1985 China's initial comparative disadvantage in this factor category had turned into a comparative advantage. But in spite of Germany's scarcity of mineral resources - as analysed below - these imports from China shrank over time.

The poor penetration of world markets by Chinese technology-intensive and human capital-intensive goods was to be expected. Moreover, the slight decline in their values shows that China's research and development expenditures as a share of value added in production and the proportion of scientists, engineers and skilled workers in total employment has remained extremely low. The negligible contribution to Sino-German export trade of goods embodying a large component of human capital was entirely consistent with China's lack of competitiveness in world markets. By contrast, one would not have expected the relatively large share of manufactures intensive in technology, as shown in the lower section of Table 3, largely consisting of chemicals and pharmaceuticals.

The PRC's export specialisation, both on a global scale and in the German context, was essentially confined to higher levels of value added per worker. In fact, in 1985 unskilled labour-intensive goods accounted for nearly half of Germany's imports from China. This was the area in which the PRC enjoyed a significant comparative advantage due to low labour costs.

3. Commodity Composition[27] of China's Exports to Germany

Initially Chinese sales to Germany focused on crude minerals except fuels (SITC 2), followed by food and live animals (SITC 0), reflecting the PRC's global export pattern before economic reform. Crude animal materials and preserved and prepared vegetables remained the key export commodities in the above two sectors, albeit with increasingly smaller shares. Emphasis is shown to have gradually shifted to miscellaneous manufactured articles (SITC 8), dominated by products of the clothing industry, followed by basic manufactures (SITC 6), mainly textiles.

China's export structure clearly underwent a fundamental change to the effect that agricultural commodities were replaced by manufactured goods. The share of primary products - SITC sections 0 to 4 including non-ferrous metals (SITC division 68) - dropped from 61.8% in 1975 to 30.6% in 1985, while that of manufactures - SITC sections 5 to 8 excluding non-ferrous metals - increased from 38.2% to 69.4%. In other words, with the bulk of her sales being light industrial products, the commodity composition of China's export trade with Germany typifies that of a newly industrialising country.

The Case of Germany

1. Germany's Factor Endowments

This section discusses some indicators, albeit imperfect, of the German economy's factor endowments: land, labour and capital. They provide a sound basis for anticipating Germany's export specialisation. Firstly, Germany's per capita income ranks among the highest in the world.[28] Secondly, the proportion of her population in tertiary education is high. But more importantly, her universities are regarded as the 'foundations of research'. The fact that approximately half of the domestic research and development expenditure of the public sector is directed towards universities[29] enhances the quality of the graduates. Thirdly, taking population density as a crude proxy for the availability of natural resources per head, Germany's endowment of agricultural and mineral resources per unit of labour is extremely low. In fact, Germany is a resource-poor country, comparable to Japan.

It follows that Germany is abundant in capital, both physical and human, relative to labour. Nonetheless, given the country's fairly large population, the labour content of her exports may not be low either. By contrast, she cannot be expected to specialise in agricultural produce or minerals. The extent to which actual trade specialisation matches above *a priori* expectations both in the global and Chinese contexts will be examined below.

2. Germany's Global and Bilateral Comparative Advantages

This section seeks to establish the degree of discrepancy obtaining between the factor composition of Germany's world exports and that of her sales to China. Table 5 reveals a global comparative advantage in technology-intensive and human capital-intensive goods during the entire period of analysis. A combination of factors appear to be responsible for the slight downward trend in 1980-1985. Firstly, the OPEC oil price rise of 1979 substantially increased the costs of energy-intensive manufactures,[30] such as chemicals and iron and steel products.[31]

Secondly, Germany's industrial structure was becoming obsolete, and re-orientation towards new areas progressed too slowly.[32] Thirdly, revaluations of the DM were associated with a decline in international competitiveness.[33]

Unlike in Japan, Germany's strongest comparative advantage lay in technology-intensive rather than human capital-intensive manufactures. Nonetheless, the shares of both these factor categories of goods remained virtually constant over time, as shown in the middle section of Table 5. However, since readjustment policy in the PRC had the effect of curbing demand in certain sectors, Germany's bilateral export trade with China was at variance with her globally established pattern. Between 1975 and 1980, the human capital component of her sales to China was more than halved, mainly as a result of a steep fall in the area of iron and steel products. This was approximately matched by a rise in the technology component, largely due to machinery and chemicals. By 1985 these trends had been reversed, thus narrowing the gap between the two factor categories' shares.

Germany's initial global comparative advantage in unskilled labour-intensive goods turned into a comparative disadvantage over time, reflecting increasing competition from new suppliers who penetrated traditional German markets. Even so, the share of these light manufactures in total exports to the world remained fairly constant at around 10%. Sales to China, however, were much lower which had to be expected given that country's extremely strong comparative advantage in this area established in world markets. The 1985 figure in the lower section of Table 5 is misleading, because the bulk of it happens to represent ships and boats (SITC 793),[34] entailed a single shipment rather than a flow of product.

Table 5 enforces our previous observations concerning Germany's endowment of agricultural and mineral resources in both of which she has a comparative disadvantage, in particular in the latter. In fact, Germany is a net importer of farm products.[35] In a similar vein, she imports most of her energy supplies and the major proportion of her raw materials. Thus Germany's exports of agricultural produce and minerals are of a low magnitude, the more so in the Chinese context. As discussed above, the PRC herself has a comparative advantage in these commodities which account for more than half of her world export trade.

3. Commodity Composition of Germany's Exports to China

Germany's export trade with China was preponderantly focused on machinery and transport equipment (SITC 7) and basic manufactures (SITC 6), increasingly on the former and decreasingly on the latter. The emergence of textile and leather machinery as Germany's most important export commodity reflected the rise of China's textile industry.[36] Chemicals (SITC 5) also made up a significant proportion in 1980. But by 1985 the trend away from energy-intensive industries became apparent in the marked decline in exports of chemicals. As Table 6 shows, the contribution of the other sections was negligible. Apart from the shifts mentioned above, the commodity composition remained basically unchanged during the period under analysis.

Germany's export trade with China depended almost exclusively on the manufacturing sector, with the share of manufactures - SITC sections 5 to 8 excluding non-ferrous metals (SITC division 68) - increasing from 95.6% in 1975 to 97.0% in 1985. By comparison, the proportion of primary products - SITC

sections 0 to 4 including non-ferrous metals - dropped from 4.4% to 3.0% during the corresponding period. This commodity structure accords entirely with the fact that investment goods have been the traditional backbone of Germany's export trade.

VI. Bilateral Trade Prospects

The analysis here presented revealed the highest possible degree of complementarity in bilateral trade. As a comparison between the resource endowments of the two countries shows, complementarity existed in all the five factor categories of traded commodities.[37] On this basis, one would expect a steady trade flow of agricultural produce, minerals and unskilled labour-intensive manufactures from China to Germany and one of goods intensive in technology and human capital in the opposite direction. With the exception of minerals, this was actually the case in other four factor categories of goods.

According to Keesing and Sherk,[38] developing countries have their most severe comparative disadvantage in the production of machinery and transport equipment (SITC 7). Indeed, China's 'revealed' comparative advantage for this particular section stood at 0.17 in 1975 and at 0.14 in 1985, compared with Germany's indexes of 1.68 and 1.42 respectively. However, even though industrially advanced Germany and developing China are endowed with such markedly different resources, the degree of trade intensity is low and the bilateral trade shares, both in absolute terms and relative to the two partners' world trade shares, are small. What is more, the importance of the bilateral trading relationship between the two countries relative to the rest of the world declined over time (Table 1).

As alluded to at the beginning of this paper, differences in resource endowment ratios are but one variable in the foreign trade equation, albeit generally the most important one. Drysdale has shown that the intensity of trade between two trading partners is jointly determined by the degree of complementarity and the degree of special country bias.[39] Based on the foregoing empirical analysis commodity mix complementarity can be ruled out as the determining factor in the Sino-German context. Germany is found to have been preoccupied with her European neighbours, with whom she traded intensively, and increasingly so in her export trade (Table 1).

Therefore, without actually having calculated the degree of special country bias, it is safe to conclude that China's exports had less favorable access to Germany's import markets and vice versa than might have been expected from both countries' shares of world trade. Due to a combination of elements, such as geographical proximity and historical and cultural ties, Germany's trading relationship with the EEC and EFTA member states was overwhelming. In fact, the highest export trade intensity indexes she registered with her immediate neighbours Austria, Switzerland, the Netherlands, Belgium-Luxembourg, Denmark and France (Table 1). Significantly, this group of countries was led by Austria, where German is the official language, followed by Switzerland, in parts of which German serves als the official language.

The long shipping route between Germany and China is bound to divert rather than create trade. To name but one commodity, it is undoubtedly cheaper and faster for Germany to obtain her crude oil supplies from the UK and Nor-

way, or even from the Persian Gulf, than from China. In other words, the low levels of trade intensity between Germany and China are the result of special country bias rather than lack of commodity mix complementarity. They are explained by high resistances to trade in the two partners' bilateral relationship, such as high transportation, communication and other costs associated with trade, relative to their trading relationships with the rest of the world.

Moreover, given Germany's perennial trade surplus with China, the issue of what and how much to buy from the PRC has presumably hampered two-way trade. China still lacks the necessary capital equipment and expertise to produce a diverse mix of high-quality goods. However, with her low level of development and large population, she is likely to enjoy a strong comparative advantage in labour-intensive goods of the lowest level of value-added per worker, such as textiles and clothing, for a long time to come. By 1985 these light manufactures already accounted for nearly 50% of Chinese exports to Germany.

The question arises as to the prospects of further expansion in Sino-German trade. Having examined a decade of trade performance in 1975-1985, the picture that emerges does not appear to be a favourable one. On the one hand, the dynamic factor in Sino-German trade was the PRC's demand for precisely the kinds of sophisticated products that Germany had available for export. On the other hand, the limited market in Germany for China's manufactured consumer goods must be expected to reduce the degree to which the two economies can be complementary. But most importantly, even though trade complementarity between the two countries in 1975-1985 could not have been stronger, it clearly has not been and is unlikely to become the decisive factor in their bilateral trading relationship. Past performance suggests the degree of special country bias will continue to determine the direction of trade for both countries. Thus the conclusion is inescapable that the potential for further expansion in Germany-China trade will be limited.

Notes

1) Since the detailed statistics necessary for this analysis are not available from Chinese government sources, they were extracted from the United Nations, **Commodity Trade Statistics** (selected years), New York and **Yearbook of International Trade Statistics** (selected years), New York, which are based on the Standard International Trade Classification (SITC). The raw data consist of official trade statistics published by China's trading partners, in this case by Germany. For the purpose of this article, "Germany" refers to "West Germany" excluding the then "German Democratic Republic".

2) "World" refers to only market economies, because detailed foreign trade statistics for the centrally planned economies (CPE) are unavailable. The trade of countries reporting according to the United Nations' SITC covers about 90% of world trade. Given the relatively small volume of CPE trade, its omission is unlikely to bias the data used in this article.

3) **Almanac of China's Foreign Economic Relations and Trade**, Hongkong: China Resources Advertising Co., 1988, p.446.

4) Unless otherwise indicated all figures given in the text of the article were computed from raw data provided in the two sources listed in note 1.

5) As exporters Japan ranked second after the United States in 1984. Her share in total world exports soared from 6.36% in 1975 to 9.07% in 1985.

6) **Almanac of China's Foreign Economic Relations and Trade**, Hongkong: China Resources Advertising Co., 1986, pp.951,952.

7) In 1985, 39.8% of trade between the EEC and the PRC was accounted for by Germany, followed at a considerable distance by Italy (17.8%), France (16.4%) and the United Kingdom (UK) (11.7%). The remaining member states together (The Netherlands, Belgium, Denmark, Greece, Luxembourg and Ireland - in descending order of importance) made up only 14.3%.

8) The UK joined the Common Market in 1973.

9) Germany's exports to the EEC and EFTA countries combined increased from 59.2% in 1975 to 63.4% in 1985, while imports rose from 59.0% to 62.0% during the corresponding period.

10) By comparison, the Sino-Japanese trading relationship is asymmetric. While China's exports to and imports from Japan account for a substantial proportion of her total trade, her share of Japan's total trade is comparatively small.

11) The 'intensity of trade' concept was first used in Brown (A.J.Brown, **Applied Economics: Aspects of the World Economy in War and Peace**, London: George Allen & Unwin Ltd., 1948). It was popularised by Kojima, Drysdale, Drysdale and Garnaut, and Anderson: Kiyoshi Kojima, "The Pattern of International Trade among Advanced Countries", **Hitotsubashi Journal of Economics**, 5(1964)1, pp.16-36; Peter Drysdale, "Japan, Australia, New Zealand: The Prospect for Western Pacific Economic Integration", **Economic Record**, 45(1969)111, pp.321-342; Peter Drysdale and Ross Garnaut, "Trade Intensities and the Analysis of Bilateral Trade Flows in a Many-Country World: A Survey", **Hitotsubashi Journal of Economics**, 22(1982)2, pp.62-84; Kym Anderson, "Intensity of Trade between Pacific Basin Countries", **Economic Papers**, 2(1983)1, pp.58-67.

The intensity of trade index is defined as the share of one country's export (import) trade with another country, divided by the other country's share in imports from (exports to) the rest of the world. A value of unity indicates that the bilateral relationship between two countries is as important as their trade with the rest of the world. A value greater (smaller) than on suggests a more (less) intense bilateral trading relationship. The index takes the form

$$I_{ij} = \frac{X_{ij}}{X_i} \bigg/ \frac{M_j}{M_w - M_i}$$

where
X_{ij} is country i's exports to country j,
X_i is country i's total exports,
M_j is country j's total imports,
M_w is total world imports, and
M_i is country i's total imports.

12) During the 1975-1985 period, total world trade grew by 123.2%.

13) By comparison, by 1985 Sino-Japanese trade accounted for 4.8% of total world trade.

14) L.Jensen, **EC-China: A Statistical Analysis of Foreign Trade, 1970-1979**, Luxembourg: Statistical Office of the European Communities, 1981, p.23.

15) **China Foreign Trade**, (1979)2, p.2.

16) Sieglinde Reichenbach, **Protectionism in the EEC and its Implications to Developing Countries**, Vienna: United Nations Industrial Development Organisation, 1984, p.4.

17) **Ibid.**, p.13.

18) In a similar vein, Japan increased her exports to China by 145.7% in 1980-1985. By comparison, Australia and Canada registered growth rates of only 8.1% and 16.0% respectively during the corresponding period.

19) Reichenbach, p.7.

20) By comparison, among her trade deficits, China's adverse balance of trade with Japan was the largest (**Beijing Review**, 4.11.1985, p.4), at close to US$ 6 billion.

21) Ross Garnaut and Kym Anderson, "ASEAN Export Specialisation and the Evolution of Comparative Advantage in the Western Pacific Region", in Ross Garnaut (ed.), **ASEAN in a Changing Pacific and World Economy**, Canberra u.a.: ANU Press, 1980, pp.374-420.

22) The concept of 'total land area' has been adopted from **FAO Production Yearbook**, Vol.39, Rome: Food and Agriculture Organisation of the United Nations, 1986, p.3. It refers to the total area of the country, including area under inland water bodies. 'Population density' is used as a proxy for the availability of natural resources per head, as in Keesing and Sherk (Donald B. Keesing and Donald R. Sherk, "Population Density in Patterns of Trade and Development", **The American Economic Review**, 61(1971)5, p.956.

23) Although it basically depends on it, a country's pattern of bilateral comparative advantage generally differs substantially from that of its global comparative advantage.

24) The 'revealed' comparative advantage index, an export specialisation index introduced by Balassa (Bela Balassa, "Trade Liberalisation and 'Revealed' Comparative Advantage", **The Manchester School of Economic and Social Studies**, 33(1965)2, pp.99-123), is defined as the share of a commodity group in an economy's total exports divided by that commodity group's share of world exports. Provided the country's export specialisation has not been distorted by government policies, an index value above (below) unity indicates a comparative advantage (disadvantage) relative to the rest of the world. The index takes the form

$$I_{ic} = \frac{X_{ic}}{X_i} \Big/ \frac{X_{wc}}{X_w} \qquad \text{where} \quad \begin{array}{l} X_{ic} \text{ is country i's exports of commodity group c,} \\ X_i \text{ is country i's total exports,} \\ X_{wc} \text{ is world exports of commodity group c, and} \\ X_w \text{ is total world exports.} \end{array}$$

25) The following analysis adopts the method developed by Krause (Lawrence B. Krause, **U.S. Economic Policy toward the Association of Southeast Asian Nations: Meeting the Japanese Challenge**, Washington, D.C.: The Brookings Institution, 1982, pp.39-55), who considers commodities to result from five factor inputs: natural resources, unskilled labour, physical capital, human capital (skilled labour) and technology. However, physical capital is not used as a factor for classification purposes, because it is relatively mobile internationally.

Based on the work of Findlay, Phillips and Tyers (Christopher Findlay, Prue Phillips and Rodney Tyers, **China's Merchandise Trade: Composition and Export Growth in the 1980s**, Kuala Lumpur and Canberra: ASEAN-Australia Joint Research Project, 1985 [ASEAN-Australia Economic Papers; 19]) this article further disaggregates natural resources into agricultural and mineral resources. This permits a more detailed analysis of the structure of China's exports, which are partly natural-resource-based.

26) For the purpose of measuring comparative advantage, commodities are disaggregated to the SITC three-digit level, also referred to as commodity groups, because they most closely correspond to the concept of an 'industry' used conventionally in economic analysis. For a list of commodity categories at the SITC three-digit level, see Findlay, Phillips and Tyers, p.45.

27) The one-digit code (sections) of the SITC is as follows:

    0   Food and Live Animals
    1   Beverages and Tobacco
    2   Crude Minerals except Fuels
    3   Mineral Fuels
    4   Animal and Vegetable Oils and Fats
    5   Chemicals
    6   Basic Manufactures
    7   Machinery and Transport Equipment
    8   Miscellaneous Manufactured Articles
    9   Commodities not Classified by Kind

28) At US$ 11,040 in 1985, Germany ranked sixteenth.

29) Bureau of Industry Economics, **Studies in Industrial Development and Innovation Policy: No. 1 Federal Republic of Germany**, Canberra: Australian Government Publ. Service, 1988, p.38.

30) Ibid., p.VII.

31) Iron and steel products are classified as human capital-intensive goods, while the bulk of chemicals are technology-intensive.

32) Target industries selected for research and development aid included the familiar choices of aerospace, aeronautics, nuclear energy and data processing (Bureau of Industry Economics, p.26). In the case of the latter, this policy approach had a favourable impact on Germany's foreign trade by lifting the share of automatic data processing machines in total exports from 0.8% to 1.4% between 1980 and 1985.

33) Bureau of Industry Economics, pp.4-5.

34) Shipbuilding is one of the sectors that have been favoured by Germany's industrial policy in order to prevent or slow down their decline (Bureau of Industry Economics, pp.17,18).

35) OECD, **OECD Economic Surveys, Germany**. Paris, May 1976 & June 1981, inside cover.

36) In the early 1980s, China became a major purchaser of polyamide, polyester and acrylic fibres (**Beijing Review**, 27.5.1985, p.31), and she is reported to have become the world's largest exporter of polyester-cotton mixed fabrics in 1981 (Chia Siow-Yue and Cheng Bifan (eds), **ASEAN-China Economic Relations: Trends and Patterns**, Singapore: Institute of Southeast Asian Studies, 1987, p.107).

37) Interestingly enough, the degree of complementarity was lower between China and Japan than between China and Germany. Firstly, during the 1975-1985 period, Japan lost her comparative advantage in technology-intensive goods; and secondly, although Japan's competitiveness in unskilled labour-intensive manufactures was progressively eroded over time, in 1985 she still had a comparative advantage in this factor category.

38) Keesing and Sherk, p.960.

39) If two countries trade more or less intensively with each other than they do with the rest of the world because of their geographical proximity and special institutional and historical ties, this is referred to as degree of special country bias (Drysdale, p.323).

Table 1: Trade Intensities

Trading Partner	China's Exports			China's Imports		
	1975	1980	1985	1975	1980	1985
Hongkong	28.63	22.10	19.23	0.80	6.63	13.02
Singapore	5.00	2.84	6.52	1.12	1.66	0.73
Philippines	1.88	2.95	4.07	1.59	0.81	0.82
Japan	3.72	3.45	3.86	5.55	3.84	3.36
Indonesia	6.00	2.04	1.84	0.00	0.00	0.23
Thailand	0.72	4.96	1.83	1.26	1.98	1.92
Malaysia	5.92	2.62	1.54	2.00	1.74	0.53
Australia	1.23	1.34	0.93	4.03	3.77	1.89
United States	0.00	0.51	0.88	0.36	1.56	0.75
New Zealand	0.60	0.89	0.67	1.07	3.07	1.22
Germany	0.43	0.48	0.42	0.77	0.57	0.57
Canada	0.23	0.25	0.29	1.62	1.16	0.48

Trading Partner	Germany's Exports			Germany's Imports		
	1975	1980	1985	1975	1980	1985
Austria	3.69	3.97	4.23	2.64	3.36	3.87
Switzerland	2.58	2.70	3.17	1.76	2.14	2.52
Netherlands	2.43	2.32	2.49	3.59	3.21	3.76
Belg.-Luxemb.	2.10	2.06	2.32	2.75	2.28	2.35
Denmark	1.82	1.80	2.17	1.59	2.05	1.98
France	1.82	1.86	2.08	1.92	1.66	1.84
Sweden	1.77	1.63	1.84	1.20	1.32	1.46
Italy	1.60	1.63	1.65	2.18	1.93	2.00
Norway	1.44	1.34	1.65	1.19	1.83	2.01
Libya	1.12	1.31	*	2.37	1.39	*
Finland	1.32	1.23	1.54	0.97	1.16	1.16
United Kingdom	0.71	1.02	1.48	0.74	1.08	1.40
China	0.77	0.57	0.57	0.43	0.48	0.42
United States	0.51	0.46	0.54	0.53	0.48	0.45
USSR	0.71	0.62	0.40	0.46	0.56	0.58
Japan	0.15	0.15	0.18	0.34	0.46	0.48

Note: * At the time of writing, the 1985 raw data for Libya were not available.
Source: Indexes were computed from data in United Nations trade statistics (various issues of **Commodity Trade Statistics** and **Yearbook of International Trade Statistics**).

Table 2: Sino-German Bilateral Trade Performance

	1975 (US$1000)	1980 (US$1000)	Change (%)	1985 (US$1000)	Change (%)
PRC Exports	224,341	802,888	257.9	871,646	8.6
PRC Imports	522,861	1,145,192	119.0	2,229,699	94.7
Total Trade	747,202	1,948,080	160.7	3,101,345	59.2
Balance of Trade	-298,520	-342,304		-1,358,053	
Exp./Imp. Ratio	1:2.3	1:1.4		1:2.6	

Source: Figures were compiled from data in various issues of UN, **Commodity Trade Statistics**.

Table 3: **China's 'Revealed' Comparative Advantage and Exports by Factor Intensity**

	1975	1980	1985
'Revealed' comparative advantage index - goods intensive in:			
Agricultural resources	2.26	1.66	1.54
Mineral resources	0.73	0.88	1.20
Unskilled labour	2.78	3.56	3.58
Technology	0.27	0.34	0.24
Human capital	0.32	0.37	0.29
Factor category shares of exports to the world (%):			
Agricultural resources	40.7	26.8	22.9
Mineral resources	19.3	27.4	27.9
Unskilled labour	26.5	30.2	35.5
Technology	6.5	8.2	6.9
Human capital	7.0	7.4	6.8
Factor category shares of exports to Germany (%):			
Agricultural resources	54.0	37.3	25.6
Mineral resources	10.1	9.7	6.1
Unskilled labour	21.9	38.3	49.4
Technology	12.4	11.1	13.8
Human capital	1.7	3.5	5.1

Sources: The 'revealed' comparative advantage index was computed from data in Central Intelligence Agency, **China: International Trade Annual Statistical Supplement**, A Reference Aid, Washington, D.C.: US Government, Febr. 1989. The factor category shares of China's exports were computed from data in various issues of UN, **Commodity Trade Statistics**.

Table 4: **Commodity Composition of China's Exports to Germany by one-digit SITC Sections**

SITC	1975 (US$1000)	(%)	1980 (US$1000)	(%)	1985 (US$1000)	(%)
0	49,264	22.8	163,871	20.9	101,563	12.1
1	105	0.1	–	–	1,667	0.2
2	70,645	32.6	162,222	20.7	141,751	16.9
3	593	0.3	21,502	2.7	1,413	0.2
4	5,897	2.7	–	–	3,804	0.5
5	28,150	13.0	92,427	11.8	111,053	13.2
6	29,270	13.5	145,483	18.5	168,589	20.1
7	–	–	–	–	23,935	2.9
8	32,542	15.0	199,139	25.4	285,077	34.0
9	–	–	–	–	618	0.0

Note: SITC sections 0 to 9 do not add up to the total PRC-German export values shown in Table 2, because the UNs' commodity trade statistics occasionally lump China's trade in with that of other "Asian Planned Economies". However, the discrepancies are negligible.

Source: Figures were compiled from data in various issues of UN, **Commodity Trade Statistics**.

Table 5: Germany's 'Revealed' Comparative Advantage and Exports by Factor Intensity

	1975	1980	1985
'Revealed' comparative advantage index - goods intensive in:			
Agricultural resources	0.38	0.47	0.50
Mineral resources	0.26	0.28	0.29
Unskilled labour	1.09	1.13	0.97
Technology	1.72	1.70	1.47
Human capital	1.58	1.65	1.47
Factor category shares of exports to the world (%):			
Agricultural resources	6.8	7.5	7.4
Mineral resources	7.0	8.7	6.6
Unskilled labour	10.3	9.6	9.6
Technology	41.8	40.9	42.3
Human capital	34.1	33.3	34.0
Factor category shares of exports to China (%):			
Agricultural resources	0.6	2.3	2.0
Mineral resources	4.0	0.5	1.1
Unskilled labour	2.3	1.8	8.5
Technology	38.7	72.4	57.5
Human capital	54.4	23.1	30.9

Sources: The 'revealed' comparative advantage index was computed from data in various issues of UN, **Yearbook of International Trade Statistics**. The factor category shares of Germany's exports were computed from data in various issues of UN, **Commodity Trade Statistics**.

Table 6: Commodity Composition of German Exports to China by one-digit SITC Sections

SITC	1975 (US$1000)	(%)	1980 (US$1000)	(%)	1985 (US$1000)	(%)
0	-	-	514	0.1	7,960	0.4
1	-	-	-	-	-	-
2	3,280	0.6	19,846	2.2	30,903	1.6
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	66,808	12.9	261,577	28.6	258,170	13.0
6	290,297	56.1	161,288	17.6	483,445	24.3
7	151,446	29.2	442,165	48.3	1,092,658	54.9
8	5,938	1.1	30,673	3.3	117,240	5.9
9	-	-	-	-	-	-

Note: SITC sections 0 to 9 do not add up to the total German-PRC export values shown in Table 2, because the UNs' commodity trade statistics occasionally lump China's trade in with that of other "Asian Planned Economies". However, the discrepancies are negligible.

Source: Figures were compiled from data in various issues of UN, **Commodity Trade Statistics**.