I

FIBRES, TEXTILES AND ECONOMIC DEVELOPMENT
The changing role of fibres, textiles and clothing as economies grow

Kym Anderson

This chapter addresses the first of the questions posed above in the introduction, namely: how is the relative importance of fibre, textile and clothing production and trade in an economy likely to change as that economy and the rest of the world grow? It begins by drawing on trade and development theory to develop hypotheses about the changing patterns of trade specialization, and then examines global evidence to show the extent to which these hypotheses are supported. In fact the available evidence provides very strong support for the theory. This allows that theory to be drawn on with confidence in subsequent chapters which explore in more depth the recent and prospective experiences of the rapidly industrializing economies of East Asia.

Standard trade and development theory

Much of the production and employment of a low-income economy involves the provision of essentials, namely food and fibre. Agriculture's shares of GDP and employment thus start at high levels. However, as economic development and commercialization proceed, agriculture's relative importance typically falls. This phenomenon is commonly attributed to two facts: the slow rise in the direct demand for food and to a lesser extent fibre as compared with other goods and services as incomes rise, and the rapid development of new technologies for agriculture relative to other sectors which leads to expanding farm output per hectare and per worker (Schultz 1945: chs 3–5; Kuznets 1966: ch. 3; Johnson 1973: ch. 5). Together these two facts ensure that in a closed economy (including the world as a whole) both the quantity and the price of agricultural relative to other products will decline, as will the share of employment in agriculture. The
1. The changing role of fibres, textiles and clothing

... evidence certainly supports the declining relative importance of agriculture in world production and employment, and even appears to support the view that the long-run trend in agricultural prices relative to industrial product prices during this century has been downward.¹

But what about an open economy which has the opportunity to trade at the international terms of trade? Consider a small open agrarian economy which could trade all of its primary products at those declining international terms of trade. Its primary sectors would decline in relative importance unless its own productivity growth is biased toward agriculture and mining sufficiently for the relative output changes to more than offset the adverse change in the terms of trade that result from economic growth abroad. This bias in productivity growth would have to be even stronger in a large open economy because its own contribution to world exports of primary products would depress the terms of trade even further.

Moreover, in reality many goods and services are such that transaction costs make them prohibitively expensive to trade internationally. In so far as these nontradables as a group tend to have a high income elasticity of demand and/or to be produced in industries which have relatively low rates of labour and total factor productivity growth, the share of nontradables in output and employment will rise over time. There is strong evidence to suggest the income elasticity of demand for services is above unity,² so that may well be true for nontradables as a group too, given that the bulk of nontradables are services. Evidence on the productivity growth of nontradables in total is difficult to find, but it would not be surprising if it was below that for tradables simply because the cold-shower effect of international competition on the former is absent. For these two reasons the shares of tradables in GDP and employment are more likely to decline than to increase in a growing economy.

If there is a tendency for the primary sector's relative importance in the tradable part of an open growing economy to decline, and if the tradables part of the total economy is likely to decline, then the combined effects of these tendencies multiply the likelihood of the primary sector’s relative demise over time. For that not to happen, productivity growth in that sector has to be sufficiently greater than productivity growth in the other sectors so as to offset the effects of the decline in the relative price of primary products.³

¹ The latter conclusion, which can be generalized to include all primary products, is still somewhat controversial, however. See, for example, Spraos (1980), Sapsford (1985) and Grilli and Yang (1988).

² See, for example, Lluch, Powell and Williams (1977), Kravis, Heston and Summers (1983), and Theil and Clemens (1987).

³ For a more detailed treatment of the above argument, see Anderson (1987; 1990a: ch. 2).
One might also expect the share of primary products in a country’s exports to decline over time, though again this could be avoided by rapid productivity growth in the primary sector of the economy. The decline in the relative price of primary products in international markets due to the rest of the world’s economic growth would, *ceteris paribus*, discourage domestic primary production and encourage domestic consumption of primary products while doing the opposite in the domestic market for manufactured goods. Only by exceptionally rapid primary productivity growth in one’s own country could this be avoided. Even then for a large country its growth would have to be fast enough to offset the adverse effects its own expansion would have on further depressing the international terms of trade for primary products.

Must self-sufficiency in primary products such as natural fibres also decline as an economy grows? According to the standard Heckscher–Ohlin–Samuelson model of international trade, each country would export commodities which require relatively intensive use of the country’s relatively abundant factors of production, and import commodities which would demand much of the country’s relatively scarce factors. Empirical tests in the early postwar years failed to support this model of comparative advantage in its simplest form, giving rise to numerous attempts in modifying the theory to make it more applicable to the real world. Many of the earlier modifications were synthesized by Harry Johnson in his 1968 Wiksell Lectures. He suggested that the two-sector, two-factor, Heckscher–Ohlin–Samuelson model is more applicable, at least for manufactured goods, if capital is defined broadly to include not only physical capital equipment but also human skills, social capital, technological and organizational knowledge, and natural resources, while labour is defined in the narrow sense of human labour time availability. The relative capital intensity of different activities is then reflected in flow terms by relative value added per unit of labour time input.4

Anne Krueger has further modified the model to allow it to explain trade in primary products as well.5 This modification separates out natural resources from Johnson’s broad definition of capital, and integrates the model with the specific-factors model that has become popular again. It then becomes a model of an economy with two tradable sectors, producing primary products and manufactures, and three factors of production: natural resources which are specific to the primary sector, capital which is specific to the manufacturing

---

4 The use of value added per worker as a measure of the overall capital intensity of production was first used to discuss US imports of manufactured goods from developing countries by Lary (1968).

1. The changing role of fibres, textiles and clothing

sector, and labour which is used in both sectors, is intersectorally mobile and exhibits diminishing marginal product in each sector. In this model, at a given set of international prices, the real wage rate is determined by the overall per worker endowment of natural resources and capital, as in the Johnson synthesis, while the pattern of comparative advantage between manufactures and primary products is influenced largely by the relative endowments of capital and natural resources in this country as compared with the rest of the world.

An underdeveloped country with little capital will produce mostly primary products and export them (in raw or lightly processed form) in exchange for manufactures. As the stock of industrial capital per worker expands in this as compared with other countries, relative wages increase and labour is attracted to the manufacturing sector. The country gradually switches from being predominantly a primary producer to being predominantly an exporter of (non-resource-based) manufactured goods, with the capital intensity of manufacturing activities increasing over time. Labour begins to be attracted to manufacturing at an earlier stage of economic development, and the non-resource-based manufactured goods initially exported use unskilled labour relatively more intensively, the lower the country’s natural resources per worker and hence initial relative wage rate. This is because the relatively low wage will give the resource-poor country an international comparative advantage initially in labour-intensive, standard-technology manufactures.

Allowing for the fact that capital is required in addition to natural resources and labour in primary production strengthens the above conclusion. At a particular level of capital per worker, a country would tend to employ a greater share of its available capital in primary production rather than in manufacturing, the greater its agricultural land and mineral resource endowment per worker. This is because an abundance of natural resources per worker keeps down the price of those resources relative to labour and hence boosts the return from investing capital in the primary sector. This is a further reason for expecting that natural-resource-poor, densely populated countries will begin manufacturing at an earlier stage of capital availability per worker than will resource-rich countries. These changes in comparative advantage can proceed even more rapidly when barriers to foreign capital inflow are lowered.

The demand for food increases with population and per capita income while the demand for industrial raw materials increases with industrial production. Thus, relatively rapid increases in a country’s national income and manufacturing output raise domestic relative to overseas demand for primary products and hasten the country’s switch from being a net exporter to being a net importer of primary products, including natural fibres in the case of resource-poor economies whose
industrialization begins with labour-intensive products such as textiles and clothing.

To summarize, this theory suggests that a poor country opening up to international trade will tend to specialize in the production and export of primary products, though less so the more densely populated the country. If its domestic incomes grow more rapidly than the rest of the world’s, its export specialization will gradually move away from primary products (in raw or lightly processed form) to manufactures. The manufactured goods initially exported will be more labour intensive the more resource-poor or densely populated the country. Since many processes in textile and clothing production tend to be intensive in the use of unskilled labour, they would be among the items initially exported by a newly industrializing, densely populated country. And as the demands for textile raw materials by that country’s expanding textile industry grow, so the country’s net exports of natural fibre would diminish, or net imports of natural fibre would increase, ceteris paribus. On the other hand, since synthetic fibre production is an extremely capital-intensive activity, it will tend to be imported by the newly industrializing country from relatively more capital-abundant countries. If this newly industrializing country is growing more rapidly than other countries, it will initially increase its shares of world production and exports of textiles and clothing and of world imports of fibres at the expense of more mature industrial economies. In time, another generation of newly industrializing countries would duplicate this process, so gradually displacing the former in those world markets but providing a growing export market for capital-intensive synthetic fibres. Meanwhile, slower-growing, land-abundant economies – even rich ones – may retain an export specialization in natural fibres or other primary products and import textiles, clothing and other labour-intensive manufactures from densely populated lower-wage economies.

* Perhaps the best single indicator of (physical and human) capital intensity of production is value added per worker (Johnson 1968; Lary 1968). According to 1980 data for industry value added, from the Japanese input-output table published by the Bank of Japan in its Economic Statistics Yearbook (Tokyo, 1984), and for number of employees, published by the Ministry of International Trade and Industry in its Textile Statistics Yearbook (Tokyo, 1981), the value added per worker in 1980 in Japan’s clothing industries averaged 4 million yen, while in the natural-fibre spinning and weaving industries it averaged 4.8 million yen, and in the synthetic fibre and spinning industries it was 24.1 million yen. Similar data for Korea from the Bank of Korea’s 1985 Input-Output Table (Seoul, 1986) also show value added per worker to be highest in synthetic fibre production (12.8 million won), intermediate for yarns and fabrics (4.6 million won) and lowest for finished textiles (3.9 million won) and clothing (2.4 million won).

* For more on these changes in comparative advantage that accompany economic growth and their effects on global patterns of production and trade, see Akimatsu (1961), Balassa (1979), Leamer (1984), and Balassa and Bauwens (1988).
1. The changing role of fibres, textiles and clothing

Empirical support for the theory

This theory has strong empirical support from both cross-sectional and time-series evidence. For example, the theory suggests the share of primary products in total exports (PRI) would be negatively related to both per capita income (Y, a crude index of the endowment of capital per worker) and population density (PD, a crude index of the endowment of natural resources per capita), and this is what is obtained in estimating ordinary-least-squares regression equations from cross-sectional data. For example, using the data available for the year 1983 from the World Bank (1985a, 1986) for 69 countries with populations exceeding one million, one obtains the following regression result (t-values in parentheses):

\[ PRI = 180.4 - 9.75\ln Y - 11.52\ln PD, \quad R^2 = .54 \]
\[ (5.68) \quad (7.15) \]

The theory suggests also that the share of labour-intensive goods such as textiles and clothing in total exports of manufactures would be very high at first as per capita income and industrialization increase from a low base and then would fall, and would tend to be higher the greater the population density of the country. Recent data from the World Bank (1988) provide 1986 shares of textiles and clothing in manufactured exports (TEX) as well as Y and PD data for 63 countries, from which the following regression equation is obtained:

\[ TEX = 25.6 + 7.77\ln Y - 0.523(\ln Y)^2 + 0.00136PD, \quad R^2 = 0.52 \]
\[ (5.6) \quad (5.7) \quad (6.3) \]

These regression equations are clearly consistent with the theory of changing comparative advantage presented above, with the latter equation suggesting the share of textiles and clothing in manufacturing exports declines at an increasing rate as income per capita rises.

The four key conclusions that can be drawn from these statistical relationships are confirmed also in the first two columns of Table 1.1. They are (a) that the shares of primary products in total exports and of textiles and clothing in manufactured exports will be higher in developing economies than in advanced industrial economies, (b) that these shares will tend to decline over time in all economies, (c) that the declines will be faster in economies that are growing relatively

* Since many empirical studies are available with such evidence, only a small sample is presented here. For more detailed evidence, see, for example, Kuznets (1971), Chenery and Syrquin (1975) and Chenery, Robinson and Syrquin (1986).

* On the usefulness and limitations of population density as a proxy for primary resources per worker, see Keesing and Sherk (1971) and Bowen (1983).
<table>
<thead>
<tr>
<th>Year</th>
<th>Export specialization and net exports as a share of world trade in primary products, fibres, textiles and clothing,(^a) industrial and developing economies, 1965 to 1987</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary products(^b) share (%) of total exports</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All advanced industrial economies</strong></td>
<td></td>
</tr>
<tr>
<td>1965–69</td>
<td>29</td>
</tr>
<tr>
<td>1970–79</td>
<td>27</td>
</tr>
<tr>
<td>1980–87</td>
<td>25</td>
</tr>
<tr>
<td><strong>All developing economies</strong></td>
<td></td>
</tr>
<tr>
<td>1965–69</td>
<td>84</td>
</tr>
<tr>
<td>1970–79</td>
<td>80</td>
</tr>
<tr>
<td>1980–87</td>
<td>68</td>
</tr>
<tr>
<td><strong>Japan</strong></td>
<td></td>
</tr>
<tr>
<td>1965–69</td>
<td>7</td>
</tr>
<tr>
<td>1970–79</td>
<td>5</td>
</tr>
<tr>
<td>1980–87</td>
<td>4</td>
</tr>
<tr>
<td><strong>Northeast Asian NIEs(^c)</strong></td>
<td></td>
</tr>
<tr>
<td>1965–69</td>
<td>20</td>
</tr>
<tr>
<td>1970–79</td>
<td>11</td>
</tr>
<tr>
<td>1980–87</td>
<td>8</td>
</tr>
</tbody>
</table>

\(^a\) All primary products are SITC 0 to 4 plus 68 less 266; natural fibres are SITC 26 less 266; textiles are SITC 65; clothing is SITC 84; and synthetic fibres are SITC 266.

\(^b\) The index of export specialization is the share of a commodity group in an economy’s exports as a ratio of that commodity group’s share of world exports, following Balassa (1965).

\(^c\) Hong Kong, Korea and Taiwan.

Source: International Economic Data Bank, Trade Data Tapes, Australian National University, Canberra, 1990.
1. The changing role of fibres, textiles and clothing

rapidly, and (d) that within each of these two groups, relatively densely populated economies will tend to have lower shares of exports due to primary products and higher shares due to textiles and clothing. The experiences of Japan and Northeast Asia’s newly industrializing economies (NIEs) illustrate the latter two points since they are very densely populated and have been the world’s fastest-growing economies.

There are two other indicators of changes in comparative advantage which are useful for present purposes. One is an index of export specialization, or what Balassa (1965) called an index of ‘revealed’ comparative advantage, defined as the share of a product group in an economy’s exports as a ratio of that commodity group’s share of world exports. Table 1.1 shows this index over time for all primary products, natural fibres, textiles, clothing and synthetic fibres. Clearly, developing economies as a group have a much stronger comparative advantage in primary products in general and in natural fibres in particular than do industrial economies as a group, by a factor of two or three. For both groups this index has been declining for all primary products and especially for natural fibres in the case of developing economies. Comparative advantage in textiles and clothing as measured by this index has been declining for industrial economies and increasing for developing economies, with the trend much stronger for clothing. And industrial economies have a much stronger comparative advantage in capital-intensive synthetic fibres than do developing economies, although the Northeast Asian NIEs have rapidly strengthened their competitiveness in that product group.

Japan, being very densely populated, has a much stronger comparative disadvantage (advantage) in primary products (manufactures) than the average industrial country. Hence its export specialization index in the 1960s was much lower for primary products including natural fibres and much higher for textiles and clothing than other industrial countries. And since Japan’s economy has grown faster than other industrial economies its comparative advantage in these products has declined faster too, according to Table 1.1.

The NIEs of Northeast Asia (Hong Kong, Korea and Taiwan) also are endowed with few natural resources per worker and so their rapid economic growth has resulted in a much lower level of and sharper decline in their index of export specialization in primary products compared with other developing economies, while their indexes of export specialization in textiles and clothing are very high. Note, however, that the latter indexes have been declining since the 1960s for labour-intensive clothing, had begun to decline in the 1970s for textiles, and have been rising rapidly for capital-intensive synthetic fibres. These changes reflect the fact that the comparative advantage of these NIEs is gradually moving away from unskilled labour-intensive manufacturing towards more capital-intensive processing.

Notice also from Table 1.1 that in industrial countries textiles have
Kym Anderson

a higher and a less rapidly decreasing index of export specialization than clothing, and conversely in developing economies, reflecting the fact (see footnote 6 above) that clothing production is more intensive in the use of unskilled labour than textile production on average.

This export specialization index is less than ideal as an indicator of comparative advantage because it ignores what is happening to a country’s import pattern. An indicator which better captures both trade patterns is shown on the right-hand side of Table 1.1, namely, net exports as a percentage of world trade. The story is much the same, however. Industrial (developing) economies as a group are net importers (exporters) of natural fibres and net exporters (importers) of clothing, while textiles are in between: they switched in the mid-1980s from being a net export group to a net import group for industrial countries, and conversely for developing economies.

It should be kept in mind that textiles and clothing comprise a heterogeneous set of commodities which not only use a wide range of production techniques in terms of their labour or capital intensity but also face widely varying elasticities of demand. Thus France until the 1980s had remained a net exporter of clothes in terms of value by exporting high-priced fashion clothing, and Italy is still a net clothes exporter. Moreover, as real ocean transport costs and international communication costs continue to diminish, countries are becoming more specialized in producing intermediate goods. This is reflected in the changes that are taking place in the extent of intra-industry trade, that is, in the extent to which imports fail to dominate exports or vice versa.

Advanced industrial economies are gradually reducing the degree of their intra-industry trade in clothes, but some are increasing their intra-industry trade in intermediate textile products as their textile firms specialize more heavily in modern capital-intensive processes and leave the more labour-intensive processes (including the final assembly of clothing) to lower-wage countries (Table 1.2). This point, which is taken up again in Chapter 9 by Peter Lloyd, can also be seen from the data in Table 1.3 on shares of different country groups in gross imports and gross exports of the world as a whole. All groups are participants in both imports and exports of natural fibres, textiles, clothing and synthetic fibres, but textiles stand out as having the highest degree of intra-industry trade among these four commodity groups. For industrial countries as a whole, imports as a share of consumption and exports as a share of production have been increasing at about the same rate for textiles while the former has increased much faster than the latter for clothing (Table 1.4).

As is evident from Table 1.3, developing countries now supply more than half the world’s exports of clothing and a third of global textile exports, double their shares of the late 1960s. This is reflected in the dramatic increase in the penetration of imports into industrial country markets for these products. The self-sufficiency of industrial countries