
NOTES

*Revealed Comparative Advantage in Manufacturing, 1899-1950 **

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1. Introduction

Recent work in European economic history has emphasized that there was a considerable variety in patterns of economic development among the now advanced countries and that European experience does not easily fit the generalizations made famous by Rostow or even Gerschenkron (Crafts, 1985; O'Brien and Keyder, 1978). It is also clear that the development process from the mid-nineteenth century on involved a substantial volume of international trade and the work of Maizels especially has drawn our attention to the fact that advanced countries differed in their export specializations and that after 1899 shares in the total world market for manufactures changed considerably with the United States, Canada, Japan, and Sweden gaining and the United Kingdom and France losing (Maizels, 1970, pp. 189-192).

An economist would naturally wish to examine this experience in terms of comparative advantage which might be a useful concept both for the understanding of trade patterns and for the explanation of differences in structural change among the successful countries. In fact, relatively little has been written along these lines in the economic history literature. This paper is a first step towards filling this gap in the belief that study of international trade can shed light on some well-known hypotheses in European economic history. As Alfred Marshall put it many years ago "one of the best indicators of the nature and extent of a country's leadership is found in the character of goods which she exports and of those which she imports" (1919, p. 3).

* Earlier versions of parts of this paper were given to seminars at the Universities of Essex and Sussex and I am grateful to the participants for their helpful comments. My work has been greatly aided by discussions with Mark Thomas. I am solely to blame for all errors.

The second section of this paper provides evidence on "revealed comparative advantage" from the period of the "second industrial revolution" onwards and uses the results to discuss the varied revealed strengths of leader countries. Section 3 links the results to the historiography on British economic "failure" and "overcommitment" and considers the implications of the finding that prior to World War 2 the United Kingdom did not generally have a revealed comparative advantage in the new, technologically sophisticated industries.

2. Revealed comparative advantage in manufacturing generally

The idea of "revealed comparative advantage" has had wide currency in empirical studies of recent international trade and is especially associated with the work of Balassa (1965) (1977). The measure used here is the most commonly chosen one, i.e., a measure of normalized export share. For each country studied sectors are ranked in terms of their share of total world exports of that commodity; sectors which have a market share greater than the country's overall world market share are said to exhibit a "revealed comparative advantage." The approach is thus to identify industries in which an economy has a comparative advantage rather than to indicate the underlying source of the comparative advantage in terms of factor endowments, technology, demand or whatever.

The major obstacle to measuring revealed comparative advantage in economic history is the measurement of total world trade by sector in periods where the trade data for individual countries are not readily compatible. Eventually it is to be hoped that further research will allow a more detailed approach but for the moment a good start can be made based on the pioneering work of Tyszynski (1951) which was the backbone of much of Maizels's work. Tyszynski's monumental endeavours yielded trade data for sixteen sectors for the years 1899, 1913, 1929, 1937, and 1950 and for eleven countries which prior to World War 2 accounted for 80-85 per cent of total trade in these products (1951, pp. 272-3).

Calculations of revealed comparative advantage based on Tyszynski's figures are presented in Table 1. Sectors are ranked with 1 representing the sector in a given country with the highest world market share. Those sectors with a market share greater than the country's overall share (i.e., with a revealed comparative advantage) are circled.

As would be expected Table 1 reveals a substantial difference in revealed comparative advantage among countries. This is true even among the highest income countries alone and this immediately suggests that participation in trade may lead to differences in structure of manufacturing. Indeed, were the data to cover all trade this argument would surely extend to economic structure as a whole since we know that the composition of exports among rich

European countries varied enormously in the early twentieth century (Crafts, 1985, Table 8).

Table 2 reveals that there was also a strong tendency towards persistence of revealed comparative advantage rankings over time for most countries, especially in the period 1913-1937.

A number of economic historians have picked out sectors which they regard as key industries in the achievement of twentieth century technological progress and as at the heart of the "second industrial revolution." In terms of Tyszynski's sixteen sectors both Landes (1969) and Kennedy (1962) would select chemicals, industrial equipment, electricals, and cars and aircraft. Tables 1 and 2 indicate that the United States had a particularly strong performance in these areas. Of the Europeans, Germany stands out followed by Sweden and to a lesser extent France and Switzerland.

This suggests a tentative hypothesis for which Table 3 gives a scrap of evidence and which seems to deserve some serious research. The enrolment of 5-19 year olds in school is the variable which Chenery and Syrquin (1975) used to measure human capital formation in countries at different stages of development. On this basis it seems possible that relative success in the first half of the twentieth century's "hi-tech" industries among Europeans was related more to levels of human capital formation than to levels of income. The United States was, of course, both a high income country and one which had a high expenditure on education (Williamson, 1981, p. 26).

The trade evidence seems to be consistent with a number of well-known points from the literature, ranging from the trivial to the important. Thus Switzerland's dominance in watch and clock making and Belgium's in glass-making are reflected in their revealed comparative advantage in the sectors "metal manufactures" and "brick and glass" respectively. The trade data also agree with Sandberg's (1979) characterization of Sweden as an "impoverished sophisticate" in the nineteenth century and are supportive of Trebilcock's description of Germany's triumphant pre-World War 1 development of new high-technology industries (1981, p. 47).

The evidence for the United States is also of great note. An early strong record in "hi-tech" industries has already been mentioned. This can be further established by reference to evidence on wages and research and development. The rank correlations for United States revealed comparative advantage in 1937 and in 1913 with sectoral wage rates in 1929¹ are 0.78 and 0.61 respectively and the rank correlation of revealed comparative advantage in 1937

¹ Ranking of the sectors was based on the wage rate given in the Census of Manufactures (US, Bureau of the Census, 1933) for the most important employment; the ranking was (highest wage = 1): 1. iron and steel, 2. cars and aircraft, 3. industrial equipment, 4. rail and ship, 5. chemicals, 6. agricultural equipment, 7. non-ferrous metals, 8. electricals, 9. book and film, 10. brick and glass, 11. wood and leather, 12. fancy goods, 13. metal manufactures, 14. apparel, 15. alcohol and tobacco, 16. textiles.

Table 1
REVEALED COMPARATIVE ADVANTAGE RANKINGS BY SECTOR

| | United Kingdom | | | | | United States | | | | |
|-----------------|----------------|------|------|------|------|---------------|------|------|------|------|
| | 1899 | 1913 | 1929 | 1937 | 1950 | 1899 | 1913 | 1929 | 1937 | 1950 |
| Iron & Steel | 2 | 3 | 4 | 9 | 15 | 9 | 9 | 8 | 5 | 9 |
| Non-F Metals | 13 | 16 | 13 | 15 | 14 | 2 | 1 | 3 | 6 | 15 |
| Chemicals | 9 | 11 | 10 | 12 | 13 | 10 | 12 | 9 | 8 | 4 |
| Brick & Glass | 15 | 14 | 12 | 10 | 9 | 14 | 11 | 12 | 10 | 11 |
| Wood & Leather | 16 | 15 | 15 | 14 | 16 | 6 | 7 | 10 | 11 | 13 |
| Indust. Equip. | 4 | 5 | 8 | 7 | 8 | 5 | 3 | 4 | 3 | 3 |
| Electricals | 6 | 8 | 7 | 5 | 4 | 3 | 5 | 5 | 4 | 5 |
| Agric Equip. | 5 | 10 | 16 | 16 | 12 | 1 | 2 | 1 | 1 | 1 |
| Rail & Ship | 1 | 1 | 1 | 3 | 5 | 8 | 8 | 11 | 12 | 7 |
| Cars & Aircraft | 7 | 12 | 14 | 11 | 3 | 4 | 4 | 2 | 2 | 2 |
| Alchl & Tobacco | 12 | 4 | 2 | 1 | 2 | 11 | 15 | 15 | 15 | 14 |
| Textiles | 3 | 2 | 3 | 2 | 7 | 16 | 16 | 16 | 16 | 16 |
| Apparel | 8 | 6 | 9 | 6 | 6 | 15 | 14 | 13 | 14 | 10 |
| Metal Manfs. | 10 | 7 | 11 | 13 | 11 | 7 | 6 | 7 | 9 | 8 |
| Books & Film | 14 | 13 | 6 | 8 | 10 | 13 | 10 | 6 | 7 | 6 |
| Fancy Goods | 11 | 9 | 5 | 4 | 1 | 12 | 13 | 14 | 13 | 12 |
| | Germany | | | | | France | | | | |
| | 1899 | 1913 | 1929 | 1937 | 1950 | 1899 | 1913 | 1929 | 1937 | 1950 |
| Iron & Steel | 11 | 8 | 10 | 9 | 2 | 13 | 12 | 4 | 4 | 2 |
| Non-F Metals | 12 | 13 | 12 | 14 | 8 | 10 | 10 | 15 | 14 | 15 |
| Chemicals | 4 | 5 | 5 | 3 | 4 | 9 | 8 | 5 | 2 | 8 |
| Brick & Glass | 7 | 9 | 9 | 5 | 6 | 6 | 9 | 6 | 7 | 5 |
| Wood & Leather | 5 | 3 | 7 | 11 | 13 | 5 | 6 | 8 | 5 | 9 |
| Indust. Equip. | 9 | 4 | 6 | 8 | 7 | 12 | 14 | 12 | 13 | 14 |
| Electricals | 10 | 1 | 4 | 7 | 10 | 15 | 13 | 14 | 15 | 13 |
| Agric Equip. | 16 | 14 | 13 | 12 | 9 | 16 | 16 | 16 | 16 | 16 |
| Rail & Ship | 15 | 11 | 11 | 6 | 12 | 14 | 15 | 11 | 11 | 11 |
| Cars & Aircraft | 8 | 12 | 16 | 13 | 11 | 4 | 2 | 9 | 9 | 12 |
| Alchl & Tobacco | 14 | 16 | 15 | 16 | 16 | 1 | 1 | 1 | 1 | 1 |
| Textiles | 13 | 15 | 14 | 15 | 14 | 8 | 7 | 3 | 6 | 4 |
| Apparel | 6 | 10 | 8 | 10 | 15 | 2 | 3 | 2 | 8 | 3 |
| Metal Manfs. | 3 | 6 | 1 | 1 | 1 | 11 | 11 | 13 | 12 | 10 |
| Books & Film | 1 | 2 | 3 | 4 | 3 | 3 | 4 | 10 | 3 | 6 |
| Fancy Goods | 2 | 7 | 2 | 2 | 5 | 7 | 5 | 7 | 10 | 7 |
| | Belgium | | | | | Sweden | | | | |
| | 1899 | 1913 | 1929 | 1937 | 1950 | 1899 | 1913 | 1929 | 1937 | 1950 |
| Iron & Steel | 5 | 4 | 2 | 3 | 2 | 1 | 1 | 5 | 3 | 5 |
| Non-F Metals | 2 | 2 | 3 | 1 | 1 | 11 | 10 | 10 | 9 | 10 |
| Chemicals | 4 | 5 | 5 | 5 | 4 | 5 | 7 | 8 | 10 | 8 |
| Brick & Glass | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 4 | 7 | 7 |
| Wood & Leather | 7 | 6 | 7 | 8 | 13 | 3 | 3 | 1 | 1 | 1 |
| Indust. Equip. | 9 | 10 | 13 | 14 | 11 | 4 | 5 | 3 | 4 | 3 |
| Electricals | 15 | 15 | 12 | 9 | 9 | 12 | 6 | 2 | 5 | 4 |
| Agric Equip. | 15 | 15 | 16 | 16 | 16 | 7 | 4 | 7 | 6 | 9 |
| Rail & Ship | 3 | 3 | 4 | 4 | 7 | 9 | 13 | 6 | 2 | 2 |
| Cars & Aircraft | 8 | 9 | 10 | 12 | 15 | 13 | 15 | 14 | 11 | 14 |
| Alchl & Tobacco | 14 | 14 | 15 | 15 | 14 | 15 | 14 | 16 | 16 | 16 |
| Textiles | 10 | 7 | 8 | 6 | 5 | 14 | 15 | 15 | 15 | 15 |
| Apparel | 12 | 12 | 6 | 7 | 6 | 16 | 12 | 11 | 12 | 12 |
| Metal Manfs. | 6 | 8 | 11 | 11 | 10 | 6 | 9 | 9 | 8 | 6 |
| Books & Film | 13 | 13 | 14 | 10 | 8 | 10 | 11 | 12 | 13 | 13 |
| Fancy Goods | 11 | 11 | 9 | 13 | 12 | 8 | 8 | 13 | 14 | 11 |

Revealed Comparative Advantage in Manufacturing, 1899-1950

(Continuation Table 1)

| | Italy | | | | | Switzerland | | | | |
|-----------------|--------|------|------|------|------|-------------|------|------|------|------|
| | 1899 | 1913 | 1929 | 1937 | 1950 | 1899 | 1913 | 1929 | 1937 | 1950 |
| Iron & Steel | 14 | 16 | 15 | 15 | 13 | 14 | 13 | 12 | 14 | 14 |
| Non-F Metals | 11 | 14 | 14 | 14 | 15 | 9 | 9 | 8 | 4 | 4 |
| Chemicals | 7 | 7 | 6 | 8 | 12 | 6 | 6 | 3 | 2 | 2 |
| Brick & Glass | 5 | 8 | 7 | 5 | 8 | 11 | 11 | 11 | 10 | 11 |
| Wood & Leather | 8 | 9 | 12 | 10 | 16 | 12 | 14 | 10 | 13 | 12 |
| Indust. Equip. | 12 | 13 | 11 | 9 | 7 | 4 | 4 | 2 | 9 | 3 |
| Electricals | 9 | 11 | 10 | 13 | 9 | 2 | 3 | 4 | 6 | 6 |
| Agric Equip. | 15 | 15 | 16 | 16 | 14 | 13 | 16 | 16 | 16 | 16 |
| Rail & Ship | 10 | 12 | 9 | 11 | 5 | 15 | 15 | 15 | 15 | 13 |
| Cars & Aircraft | 16 | 2 | 4 | 4 | 10 | 16 | 8 | 13 | 11 | 15 |
| Alchl & Tobacco | 1 | 1 | 3 | 1 | 3 | 10 | 12 | 13 | 12 | 9 |
| Textiles | 2 | 3 | 1 | 2 | 1 | 3 | 2 | 5 | 3 | 10 |
| Apparel | 4 | 4 | 2 | 3 | 2 | 7 | 7 | 6 | 5 | 7 |
| Metal Manfs. | 13 | 10 | 13 | 12 | 11 | 1 | 1 | 1 | 1 | 1 |
| Books & Film | 6 | 6 | 8 | 7 | 6 | 8 | 10 | 9 | 8 | 8 |
| Fancy Goods | 3 | 5 | 5 | 6 | 4 | 5 | 5 | 7 | 7 | 5 |
| | Canada | | | | | Japan | | | | |
| | 1899 | 1913 | 1929 | 1937 | 1950 | 1899 | 1913 | 1929 | 1937 | 1950 |
| Iron & Steel | 11 | 14 | 12 | 11 | 8 | 13 | 14 | 15 | 10 | 5 |
| Non-F Metals | 15 | 5 | 2 | 1 | 2 | 1 | 3 | 12 | 15 | 4 |
| Chemicals | 10 | 4 | 6 | 7 | 7 | 4 | 5 | 8 | 10 | 11 |
| Brick & Glass | 13 | 11 | 15 | 15 | 5 | 9 | 7 | 4 | 5 | 8 |
| Wood & Leather | 3 | 2 | 1 | 2 | 1 | 6 | 8 | 6 | 8 | 13 |
| Indust. Equip. | 7 | 13 | 14 | 12 | 14 | 12 | 13 | 13 | 12 | 12 |
| Electricals | 16 | 15 | 10 | 9 | 12 | 13 | 12 | 10 | 9 | 10 |
| Agric Equip. | 1 | 1 | 4 | 4 | 3 | 13 | 15 | 16 | 16 | 16 |
| Rail & Ship | 8 | 7 | 13 | 14 | 6 | 11 | 11 | 9 | 6 | 7 |
| Cars & Aircraft | 2 | 3 | 5 | 6 | 9 | 13 | 15 | 14 | 14 | 14 |
| Alchl & Tobacco | 6 | 6 | 3 | 3 | 4 | 7 | 6 | 11 | 13 | 15 |
| Textiles | 14 | 16 | 16 | 16 | 16 | 3 | 2 | 1 | 2 | 1 |
| Apparel | 12 | 12 | 7 | 5 | 10 | 5 | 4 | 3 | 1 | 3 |
| Metal Manfs. | 9 | 9 | 9 | 10 | 13 | 8 | 10 | 7 | 7 | 9 |
| Books & Film | 4 | 8 | 8 | 8 | 11 | 10 | 8 | 5 | 4 | 6 |
| Fancy Goods | 5 | 10 | 11 | 13 | 15 | 2 | 1 | 2 | 3 | 2 |
| | India | | | | | | | | | |
| | 1899 | 1913 | 1929 | 1937 | 1950 | | | | | |
| Iron & Steel | 12 | 5 | 4 | 4 | 11 | | | | | |
| Non-F Metals | 11 | 11 | 3 | 3 | 10 | | | | | |
| Chemicals | 3 | 3 | 6 | 7 | 7 | | | | | |
| Brick & Glass | 9 | 9 | 10 | 8 | 8 | | | | | |
| Wood & Leather | 1 | 2 | 2 | 2 | 2 | | | | | |
| Indust. Equip. | 13 | 13 | 13 | 12 | 13 | | | | | |
| Electricals | 13 | 13 | 14 | 14 | 15 | | | | | |
| Agric Equip. | 13 | 13 | 14 | 14 | 15 | | | | | |
| Rail & Ship | 10 | 12 | 12 | 13 | 14 | | | | | |
| Cars & Aircraft | 13 | 13 | 14 | 14 | 12 | | | | | |
| Alchl & Tobacco | 5 | 4 | 9 | 11 | 4 | | | | | |
| Textiles | 2 | 1 | 1 | 1 | 1 | | | | | |
| Apparel | 4 | 6 | 7 | 5 | 3 | | | | | |
| Metal Manfs. | 8 | 8 | 5 | 9 | 9 | | | | | |
| Books & Film | 6 | 7 | 8 | 6 | 6 | | | | | |
| Fancy Goods | 7 | 10 | 11 | 10 | 5 | | | | | |

Source and Definition: derived from Tyszyński (1951) and based on his 16 sectors. In most cases the sectoral definition is reasonably obvious and anyone wishing for full details of coverage can consult Tyszyński. The following sectors are defined thus: *brick and glass*: manufactured stones and abrasives, glass and glassware, bricks, tiles and other crude pottery, cement, plaster, mortar, manufactures of asbestos, mica and asphalt, prepared chalk; *wood and leather*: leather including tanned hides and skins, rubber sheets, thread hose and tubing, ebony rods, all types of wood except furniture, paper, cardboard, celloid, celluloid and other plastic materials; *metal manufactures*: springs, chains, anchors, metal gauze and wire manufactures, nails, bolts and nuts, screws and all types of hardware, tanks, vats and other containers, kitchen utensils and cutlery, stoves, radiators, clocks and watches, instruments other than electrical, optical and musical, meters, sewing machines, needles, pins; *books and film*: books, periodicals and all printed matter, agendas, notebooks and boxed stationery, pens, pencils, toys, games and sports goods, gramophones, musical instruments, cameras, optical instruments, films and photographic paper, paintings and works of art; *fancy goods*: travelling requisites, furniture, picture frames, rubber manufactures, china, fine pottery, plastics, manufactures of straw, esparto, rush, cane, brooms and brushes, jewellery, goldsmith's and silversmith's wares, small wares, oil-cloth, linoleum.

Table 2
PERSISTENCE OF REVEALED COMPARATIVE
ADVANTAGE OVER TIME

| | rank r; RCA 1899 & RCA 1937. | rank r; RCA 1913 & RCA 1950. | rank r; RCA 1913 & RCA 1937. |
|----------------|------------------------------------|------------------------------------|------------------------------------|
| United Kingdom | 0.32 | 0.38 | 0.70 |
| United States | 0.75 | 0.50 | 0.83 |
| Germany | 0.68 | 0.49 | 0.64 |
| France | 0.66 | 0.58 | 0.64 |
| Belgium | 0.76 | 0.68 | 0.83 |
| Sweden | 0.66 | 0.66 | 0.66 |
| Italy | 0.71 | 0.63 | 0.93 |
| Switzerland | 0.81 | 0.73 | 0.85 |
| Canada | 0.28 | 0.71 | 0.67 |
| Japan | 0.38 | 0.63 | 0.51 |
| India | 0.69 | 0.86 | 0.79 |

number of sectors through 1913-1937 with RCA^a

| | always | never | sometimes |
|----------------|--------|--------|-----------|
| United Kingdom | 3 (0) | 9 (3) | 4 (1) |
| United States | 6 (3) | 6 (1) | 4 (0) |
| Germany | 7 (3) | 5 (1) | 4 (0) |
| France | 3 (1) | 6 (2) | 7 (1) |
| Belgium | 4 (0) | 11 (3) | 1 (1) |
| Sweden | 5 (2) | 6 (1) | 5 (1) |
| Italy | 3 (0) | 10 (3) | 3 (1) |
| Switzerland | 2 (0) | 8 (1) | 6 (3) |
| Canada | 4 (0) | 10 (2) | 2 (2) |
| Japan | 3 (0) | 11 (3) | 2 (1) |
| India | 2 (0) | 14 (4) | 0 (0) |

a. Figure in parentheses refer only to the "high-technology" sectors, chemicals, industrial equipment, electricals, and cars and aircraft.

Source: derived from Table 1.

with research and development intensity for the 1950's is 0.72.² These results appear to be consistent with the literature. Kravis (1956) found United States exporting to be persistently concentrated in high wage sectors, Sanderson (1972) indicates a particularly high level of research and development

² Ranking of the sectors was based on the data in Gruber et al. (1967, p. 23); the ranking was (highest R & D intensity = 1): 1. cars and aircraft, 2. electricals, 3. chemicals, 4. metal manufactures, 5. agricultural equipment and industrial equipment, 7. rail and ship, 8. brick and glass, 9. non-ferrous metals, 10. iron and steel, 11. book and film, 12. alcohols and tobacco, 13. textiles, 14. fancy goods, 15. wood and leather, 16. apparel.

Table 3
SCHOOL ENROLLMENT AND NATIONAL INCOME PER HEAD
IN CERTAIN EUROPEAN COUNTRIES IN 1890

| | Proportion of 5-19 year olds in primary & secondary schools | National Income per head in 1970 US dollars |
|----------------|----------------------------------------------------------------------|---------------------------------------------------|
| United Kingdom | 0.385 | 1130 |
| Germany | 0.539 | 729 |
| France | 0.567 | 668 |
| Belgium | 0.342 | 932 |
| Sweden | 0.488 | 469 |
| Italy | 0.281 ^a | 466 |
| Switzerland | 0.575 | 750 |

a. This figure is for 1900.

Source: school enrollment data derived from Mitchell (1975) and income levels taken from Crafts (1983).

spending in the United States and Abramovitz and David (1973) note the very large increase in total factor productivity growth, or returns to "unconventional" capital formation in the United States from the turn of the century.

Indeed the United States appears already to have from the early twentieth century on the characteristics which later researchers have emphasized for its recent trade (for example, Stern and Maskus, 1981; Balassa, 1977), namely a comparative advantage in high wage, technologically sophisticated, human capital intensive activities. Balassa (1981) in presenting his work on the "stages of comparative advantage" sees this as to be expected of the richest and most developed countries.

3. Implications of the United Kingdom's revealed comparative advantage

The evidence for the UK is most interesting in the context of the historiography on British economic "failure" in the early twentieth century. Traditionally many historians had been critical of the British economy between c. 1880 and 1914, alleging that there was misallocation of capital, neglect of new techniques and a failure to exploit opportunities in new industries (for example, Landes, 1969; Levine, 1967). A strong reply came from neoclassical economic historians in the late 1960's and 1970's which argued that entrepreneurs generally made profit-maximizing choices of technique (McCloskey and Sandberg, 1971), that the capital market allocated funds efficiently as far as it is possible to quantify matters (Edelstein, 1976) and that growth was slow because of exogeneously given supply constraints (McCloskey, 1970).

In turn, the most vociferous proponent of failure has argued that the British economy of the late nineteenth century could have had much faster growth if its structure had been more similar to that of the United States and based more heavily on the new, "hi-tech" industries (Kennedy, 1982), an argument reminiscent of Richardson's (1965) claim that the economy was overcommitted. The neoclassical response to this argument is that Britain was right to exploit its comparative advantage which lay in the old staple industries and that Kennedy's calculations are merely wishful thinking (McCloskey, 1982).

A very clear interpretation of Britain's international position seeking to refute arguments such as those of Kennedy is given by Harley and McCloskey: "when British industries were compared with their German and American counterparts it was clear that Britain's competitive position was strongest in certain old industries—textiles, shipbuilding, heavy engineering, and even some branches of ferrous metal production. This advantage appears to have been based on the skills that the labour force had developed over a century of industrial experience... In newer branches of industry Britain did not enjoy the advantage of existing skills... In short, because it industrialized first Britain's comparative advantage lay in the old industries while its rivals' comparative advantage lay in the newer industries... Britain's international specialization conformed to her comparative advantage: there were gains from trade that would have been lost by some alternative structure" (1981, pp. 68-69).

Prima facie a look at the evidence on revealed comparative advantage in Table 1 seems consistent with Harley and McCloskey's position. In particular, the UK retains a strong showing in "rail and ship" and "textiles" throughout the period to 1950, at no stage has a revealed comparative advantage in chemicals, and in 1913-29 does not have revealed comparative advantage in cars and aircraft, industrial equipment or electricals.

Yet the evidence has another side also. The United Kingdom's showing in "hi-tech" industries is evidently a weak one. In 1937 the rank correlations of UK revealed comparative advantage with sectoral wage rates and research and development intensity as measured for the United States were *minus* 0.34 and *minus* 0.33 respectively. The former result is consistent with cross-section regressions to explain net exports performed by Crafts and Thomas (1983, Table 1) which regularly find a negative association between human capital employed in an industry and net exports for all Censuses of Production between 1907 and 1935. It appears then that the United Kingdom prior to World War 2 does not fit Balassa's general view of the pattern of comparative advantage expected to be found in "leader" countries.

In turn, the United Kingdom's revealed comparative advantage does appear to be understandable in the context of the available evidence on accumulation of capital and performance of research and development. Thus Sanderson (1972a, p. 122) demonstrates that R & D spending was only a small

fraction of UK national income even in the 1930's and was well below that of the United States and he concludes his review of scientific education with the observation that "Britain's quantitative lag in producing scientists for industry was plain compared with the capability of our competitors" (1972b, p. 39). Similarly NEDO (1983) chronicle a long list of Royal Commissions from the 1880's to the 1930's who each find that technical education in Britain is seriously deficient and Williamson (1981) finds that accumulation of skills per worker were higher in the United States than Britain. At the moment when United States total factor productivity growth leaps markedly in the early twentieth century Britain's reaches a climacteric (Feinstein et al., 1983).

So, whilst Harley and McCloskey are basically right in their view of Britain's comparative advantage this should not be taken as completing the neoclassical exoneration of British economic performance. On the contrary, the trade evidence suggests that there are important aspects of the British economy in the late nineteenth century and after which are as yet virtually untouched by neoclassical analysis and which deserve some careful research. It must be remembered that comparative advantage at a point in time is the outcome of prior strategies of accumulation of factors of production and that total factor productivity growth as conventionally measured depends on the accumulation of "unconventional" capital. The evidence of the pattern of trade suggests that consideration should be given to the optimality or otherwise of Britain's strategies in the accumulation of human capital and in research and development. Until there are convincing demonstrations that the relatively low inputs Britain made in these areas were justified by low rates of return the overcommitment arguments are not fully refuted. Revealed comparative advantage in new industries was generally achieved in 1950 - should it have been sooner?

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