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REVEALING COMPARATIVE ADVANTAGE: CHAOTIC OR COHERENT PATTERNS ACROSS TIME AND SECTOR AND U.S. TRADING PARTNER?

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ABSTRACT

We map United States comparative advantage between 1980 and 1995, by trading partner and region, using Balassa's export-based index of Revealed Comparative Advantage (RCA).

We find: temporally stable and ubiquitous US comparative advantage in differentiated producer goods (except disadvantage in Japan); somewhat less stable and less sweeping US disadvantage in standardized producer goods; chaotic and diverse patterns of US RCA in consumer goods (especially in the Chinese market).

Our most significant findings are surprisingly sharp geographical differences in patterns of US RCA and surprisingly small differences across sub-sectors of 1, 2, and 3-digit SITC classifications - regional, but not sectoral, "niche" specialization.

The high overall variability across regions in RCA indexes seems unrelated to obvious explanations such as proximity or lingual/historical ties to the US. In producer goods, RCA variability across regions correlates somewhat better with accounts of trade diversion and of regional preferences for and discrimination against US exports.

We find only scant evidence of high or increasing variability across disaggregated commodity sub-groups in US RCA indexes. Such variability is often the prediction of theories of comparative advantage that are based on vertical specialization, product differentiation, or scale and agglomeration economies.

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Revealing Comparative Advantage: Chaotic or Coherent Patterns Across Time and Sector and U.S. Trading Partner?

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A paper in honor of Robert E. Lipsey[1]

Introduction, Motivation, Novelty, Overview

In this paper we attempt to honor, by mimicry, Bob Lipsey's ongoing life work of innovative and painstaking measurement and analysis.[2]

We do so by mapping and interpreting United States comparative advantage across time, trading partners, and sectors at an increasing level of commodity detail. We use Bela Balassa's index of Revealed Comparative Advantage (RCA) measured from US export data. Bela, like Bob, was a master of measurement and analysis (and the early mentor of one of us).

To our knowledge, we are among the first to do these mappings simultaneously across time, sectors, and regional markets (groups of trading partners).[3] To coin a term that emphasizes

[1]Earlier drafts of this paper have been presented at the November 1998 Conference in Empirical Investigations in International Trade Conference at Purdue University and at Koc University, Istanbul, as well as at the December 1998 Conference in honor of Robert E. Lipsey at the New York Federal Reserve Bank. The authors are indebted to the active comments of all the participants there.

[2]For example, Bob's early work with Irving Kravis to see how closely the available price indexes of internationally traded goods come to measures that were built up carefully from surveys of actual transactions prices (Kravis and Lipsey (1971)), continuing in regular contributions to measures of relative prices through the International Comparisons Project (ICP, (Heston and Lipsey (1998)) most recently, with many references within). Or, for example Bob's many attempts (with Kravis) to measure the relative "importance" of multinational-firm production in world trade and production (Kravis and Lipsey (1992), most recently, which features the measures of revealed comparative advantage that we use below). We are, for one final example, particular fans of Bob's painstaking efforts to measure what economists really <u>mean</u> by "capital formation" (Kirova and Lipsey (1998) most recently, with earlier references within).

this, we call some of our indexes RRCA indexes -- they measure Regional Revealed Comparative Advantage by market groups of US trading partners.

We are interested in several patterns of variation. The most novel is the variation in US comparative advantage from region to region. It turns out to be quite diverse; US patterns of comparative advantage seem to be different in different parts of the world. And the differences seem to have changed during the period from 1980 to 1995 from which our data comes. And the differences look different at different levels of aggregation.

Aggregation defines our second pattern of interest. US comparative advantage is naturally quite diverse from sector to sector (by definition), but the differences differ in interesting ways as sectors are more finely defined. Sectors in which US exports are typically strong often include disaggregated sub-products in which they are not ... and conversely. And these patterns, too, change between 1980 and 1995.

What accounts for these changes in differences? Why are they important? Our results yield several answers.

Obvious variables such as proximity underlie some of our findings, such as the quantitatively sharper (larger) US comparative advantage in exports to the Western Hemisphere and disadvantage in exports to Asia. Less obvious is the apparent influence of per capita income, especially on manufactures; US comparative advantage and disadvantage are quantitatively sharper (larger) in countries that are poorer than they are in richer trading partners.[4] We find this suggestive for evaluating "natural" regional trading blocs, and for detecting trade diversion, for which there seems to be some evidence with respect to NAFTA.

Qualitatively, the US has comparative advantage in all regions in differentiated producer goods (e.g., capital equipment) – though it is less marked in Japan -- and comparative disadvantage (except for chemicals) in standardized producer goods (e.g., metals) and consumer goods of all sorts. The producer-goods patterns are very stable over time, and appear in both aggregated and disaggregated data. The consumer goods patterns are, however, both highly volatile and remarkably uneven across groups of trading partners and at different levels of aggregation.

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[3]Both Kreinin and Plummer (1994a,b) and Hoekman and Djankov (1997) examine the difference between RCA indexes defined for one particular region (East Asia and the European Union, respectively) and normal "global-market" RCA indexes. Balassa and Bauwens (1988), Ch. 3, examine the determinants of regional/bilateral net exports, but that is a very different measure of comparative advantage than Balassa's pure export-based measure.

[4]Both traditional and modern trade theories allow for this, of course, explaining it by environmental factors that range from cones of diversification (Schott (1998)), to global vertical specialization ((Hummels et al. (1998), Yeats (1998)), to two-way trade within a differentiated-products sector. In some variants of two-way trade, however (e.g., reciprocal dumping), the very conception of comparative advantage loses relevance, to say nothing of its measurement.

We were far less successful in detecting sectoral "niche" comparative advantage than geographical "niche" comparative advantage. We expected higher and higher specialization as we deepened sectoral disaggregation, rising over time with the advent of vertical specialization ("outsourcing," "fragmentation")., as described in Hummels et al. (1998) and Yeats (1998). There was only limited evidence for this among machinery and equipment exports, and not for manufactures in general.

Background

Indexes of Revealed Comparative Advantage (RCA) have a checkered history since Bela Balassa developed them decades ago.[5] They are arguably useful as one of the few formal ways of measuring the sector identity and intensity of a country's comparative advantage and disadvantage. Yet their consistency with the most familiar theories of trade patterns has not always been clear, despite Balassa's efforts (see also Hillman (1980)). Like gravity equations and Grubel-Llyod indexes RCA indexes are employed frequently but "don't get no respect"!

Even empirical properties of RCA indexes remain unexplored. For example, few researchers have attempted to see if RCA indexes using a country's import data alone suggest similar patterns of disadvantage and advantage as RCA indexes using the same country's export data alone.[6] Likewise, trade-based RCA indexes could be compared to production-based RCA indexes[7] to see if a consistent story emerges.

Finally, only a few researchers have calculated RCA indexes by regional groupings of a country's trading partners, in order to examine similarities and differences in the cross-regional pattern. That is the chief purpose of our paper (and then see how these patterns vary with aggregation).

What Do RCA Indexes Measure Anyway?

RCA indexes measure a country's comparative advantage, and do so in as fairly natural way.

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[5]Balassa (1965, 1977, 1979, 1989), Balassa and Associates (1964), Balassa and Bauwens (1988), Balassa and Noland (1988, 1989).

[6]We treat the issue of export-based vs. import-based concepts very briefly toward the end of the paper. Balassa (1965), Balassa and Bauwens (1988), and Balassa and Noland (1988, 1989) all use imports to adjust exports either linearly ("net exports") or in ratio form. But imports alone give a uniquely different measure of comparative advantage, as we show below.

[7]In a world of similar preferences, production-based or value-added-based RCA indexes would be very reasonable measures of comparative advantage. In practice, the requisite data are hard to compile. For recent examples, however, relying on Organization for Economic Cooperation and Development data, see Wolff (1998), using manufacturing production, or Leamer (1997), using value-added. For an example using 1963 US data on inter-state merchandise shipments, see Greytak, Richardson, and Smith, in process.

A simple account is that an RCA index is a ratio of ratios -- specifically it is relative relative trade shares. The two modifiers "relative" both belong in the sentence because the index is attempting to evaluate comparative advantage, which is itself a relative relative concept -- the relative competitiveness of one country's industry to its other industries relative to global norms.

To be more exact, a generic, export-based RCA index is the following (multiplied by 100), using the US as a focus:

$$\frac{\text{US exports in sector i}}{\text{US exports in } \mathbf{all} \text{ sectors}} \Big/ \frac{\mathbf{World} \text{ exports in sector i}}{\mathbf{World} \text{ exports in } \mathbf{all} \text{ sectors}}$$

... in either a designated importer's **market**,
or in a region,
or for the whole world.

As written, the measure corresponds naturally to colloquial and classroom challenges to "tell me what the US has comparative advantage in ...!" The answer is sectors in which the index is high. The index itself is the US share of i exports in US total exports relative to the world counterpart. Equivalently[8] it is the US share in world exports of i relative to the US share in world exports of everything else (non-i). When it is greater than 1 (or 100), the US is a relatively[9] heavy exporter of i, and is said to have revealed comparative advantage in sector i; when it is less than 1, it is considered to have revealed comparative disadvantage.

The index is not unique, however. Each **bolded** word in the definition signals an important choice. Researchers must first define the sectoral boundaries captured by the word **all**. Is it all exports of goods and services, a usually troublesome data series to collect? Or is it all merchandise exports, a more available series? Or all manufactured exports?[10] Next researchers must decide how exhaustively to define the world of "peer" exporters captured by the word **world**. Is it all exporters everywhere in the world, or only a group of close rivals, or perhaps even a particular country against whom a researcher wants to assess US comparative advantage. Finally researchers must be precise about the customer **market**. Is it US comparative advantage in a single market that interests them? Or in a region? Or in the entire world? If regions are the focus, for example, Europe and Asia, then researchers must be clear that the group of "peer" exporters will be different for each region; peer exporters into a unified European market do not

[8]By rearranging the elements of the measure.

[9]Relatively relatively.

[10]The trouble with these narrower but more widely available measures of **all** exports is that they would fail to record comparative advantage accurately for a country that in reality had its exports principally in unrepresented industries, for example in various services or raw materials, and had net imports of all sorts of goods, especially manufactures

include European exporters; peer exporters into a unified Asian market do not include Asian exporters.[11]

The index is, however, quite robust. Export-based RCA and RRCA measures are not very sensitive to growth and business-cycle differences across trading partners, which tend to affect both numerator and denominator in the definition similarly. Nor, for the same reason, are they sensitive to the height of trade barriers -- as long as it is across-the-board, nondiscriminatory protection against all exporters into the market of that trading partner. They are sensitive to discriminatory barriers against US exports, and may vary also to the degree that US exports vary with US and foreign multinational-firm investment, outsourcing, etc. Likewise, export-based RCA and RRCA measures are not very sensitive to across-the-board exchange-rate strength or weakness of trading-partner currencies, but they are sensitive to unusual strength or weakness against the dollar alone.

Data and Terminological Conventions

In this paper we compare US export performance in 1980 and 1995 to that of 38 of its largest trading partners and rivals. These 38 also form both the world of US peer exporters and the markets (regional groups) in which US and peer exporters compete.[12] We draw our export data from Statistics Canada's World Trade Data Base, which provides annual trade flow data between countries as reported to the United Nations.

We adopt several conventions in the terms we use. We will refer to cases of large distance from 100 in our RCA measures as "sharp" or "strong" comparative advantage and disadvantage. We will refer to variability over time in our RCA measures as "volatile" comparative advantage and disadvantage, and variability over trading partners and closely related commodity groups as "geographically diverse" and "sectorally diverse" comparative advantage and disadvantage, respectively.

We will describe the broad commodity classifications of the SITC (Standard International Trade Classification) by nicknames, as follows:[13]

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[11]The same difference exists when single-country markets are the focus. Peer exporters into the Japanese market include everyone but Japanese exporters! Production-based RCA indexes, such as those in Leamer (1997) and Wolff (1998), would not be subject to these differences, but neither could they be used to assess the comparative advantage of US production relative to Europen rivals, for example, in Japan.

[12]Our selection of 38 large partners only was partly dictated by the cumbersomeness of dealing with the universe of US trading partners. But it occasionally causes anomalies, such as a measured US comparative advantage in fuels in Japanese markets -- the really big exporters of fuels to Japan (oil-producing countries) are not among our 38 country sample. We picked the countries according to several criteria: geographic location, size and importance in US trade; spectrum of traded merchandise; and change over time. The 38 sample countries represent over 75 per cent of the 1995 US trade. Areas that are not represented are most of Africa, Middle East oil exporting countries, Eastern Europe and the former Soviet Union, South Asia and Central America.

[13]A more careful description of what belongs in each is:

SITC 1-4: raw materials (fibers, wood, paper), agricultural and mining products

SITC 1-4: primary products
SITC 5-8: manufactures
  SITC 5: chemicals
  SITC 6: manufactured materials
  SITC 7: machinery & equipment
  SITC 8: finished manufactures

We will often find it helpful to describe SITC 5 and 6 as "standardized manufactures" and SITC 7 and 8 as "differentiated manufactures," although both caricatures do some violence to the diversity of the sub-products therein. We will also find it helpful to describe sub-aggregates of these broad 1-digit classifications as sub-products or sub-categories, and to further identify these as consumer goods or producer goods, depending on the dominant buyers, whether wholesalers and retailers on behalf of households, or whether firms purchasing capital equipment and industrial supplies for themselves.

We explore US export patterns across trading partners, usually aggregating them into regional groups. China and Japan are treated separately; the groups are described by the following nicknames:

EU 15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom

Nafta: Canada and Mexico

Latin 6: Argentina, Brazil, Chile, Colombia, Peru, and Venezuela

Tiger: Hong Kong, Korea, Singapore, and Taiwan

OthAs4: Indonesia, Malaysia, Philippines, and Thailand

Other: Australia, Egypt, Israel, New Zealand, South Africa

Highly Aggregated (1-Digit SITC) Patterns for All Merchandise

We start with a broad overview of US comparative advantage. Table 1 records export-based RCA indexes at the one-digit SITC level for 1980 and 1995.

RCAs. Table 1 reveals the familiar US comparative advantage with the rest of the "world"[14] in primary products (except fuels) and in manufactured chemicals, and the familiar mixed pattern across other manufactures. In these other manufactures, the United States does best in machinery and equipment, but shows comparative disadvantage in manufactured materials and finished manufactures. Table 1 also shows that the world-wide cross-product pattern of

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SITC 5: chemicals, plastics, and pharmaceuticals
SITC 6: iron, steel, other metals, products of fibers, wood, paper, rubber, stone
SITC 7: machinery (for power, industry, and metalworking), office machines, electrical, telecommunications, and transportation equipment
SITC 8: apparel, footwear, household goods, scientific and medical instruments

[14]Our "world" made up of 38 countries

broad (1-digit) US comparative advantage did not change much between 1980 and 1995.[15] The correlation between the 1995 pattern and the 1980 pattern is 0.96, though lower (0.88) if the nine observations are weighted by export shares.[16]

RRCAs. In Table 2, these world-wide patterns are broken down into RRCAs – RCAs across regional trading partners. There are noteworthy sub-patterns. The sub-patterns are least parallel across trading partners in the differentiated-manufactures sectors (SITC 7 and 8), as might be expected when the aggregates are not very homogeneous.[17] On balance, measures of both comparative advantage and comparative disadvantage are sharper for Asia than for the rest of the world. The US "wins big" in some sectors and "loses big" in others against its export rivals there.

US comparative advantage in primary products and chemicals (SITC 0-4, 5) is especially strong in Asia, far weaker in Europe, and often non-existent in the Western Hemisphere (where US exports compete against other strong primary product exporters[18]). These regional cross-market patterns are very stable between 1980 and 1995. Five of the first six cross-market correlations at the right of Table 2 are above 0.87.

US disadvantage in manufactured materials (SITC 6) is most pronounced in Japanese markets in 1980, but vanishes by 1995, whereas in Latin American markets US disadvantage develops and deepens over the same period. In Europe and China, US disadvantage in manufactured materials is already deep in 1980 and deepens still more by 1995.[19]

In machinery and equipment (SITC 7), US exports are sharply disadvantaged only in Japanese markets, in both 1980 and 1995. In almost every other market the US is a

[15]Only food, beverages, and tobacco products show significant growth.

[16]Each of our tables provides summary measures for both weighted and unweighted observations. We generally focus on the weighted summary measures in the text summary. Weights are for 1980 and 1995, the same years for which RCAs are calculated. Sectors such as machinery and equipment (SITC 7) and trading partners such as the European Union account for disproportionately large shares of U.S. exports.

[17]The patterns are also quite diverse across trading partners in fuels, SITC 3.

[18]The rival primary producer exporters would include the Latin6 in NAFTA markets, NAFTA rivals in Latin6 markets, and all other (unmeasured) Western Hemisphere rivals in both markets. In Europe, US export performance is being assessed against Asian and other exporters. In Asia, US export performance is being assessed against European and other non-Asian exporters. It may seem paradoxical that US comparative advantage in Asia could be so much stronger than it is in Europe. But there may be no paradox. This relative strength is what we would expect, for example, if US exports were highly competitive against European exports (in Asia and elsewhere), but less competitive against Asian exports (in Europe and elsewhere).

[19]One possible cause of the strange pattern of diminishing US comparative disadvantage in Japan in manufactured materials is US bilateral policy activism. Recurrent US pressure on Japan to open its markets to imports in such products as wood products may have tempted Japanese buyers simply to substitute US suppliers for others. The same pattern is somewhat less pronounced in the Asian Tigers (such as Korea), which were also subject to such policy activism.

comparatively competitive machinery and equipment exporter in both years.[20] However the cross-regional diversity of US machinery and equipment exports was greatly reduced. That is, US RCA indexes moved toward 1 (100) in almost every market between 1980 and 1995. Their weighted dispersion[21] fell by one third from 0.36 to 0.23.

US disadvantage in finished manufactures (SITC 8) is most pronounced in China and Southeast Asia in both 1980 and 1995, with some shift between the Tiger countries and the near-Tigers (Other Asian 4).

Regional RCAs can be used to detect trade diversion suggestively, if not definitively. Table 2's NAFTA countries column can illustrate how. Trade diversion in Canadian and Mexican markets would imply that each is relying more on US exporters after NAFTA in products that are better produced in non-NAFTA countries. US comparative advantage in NAFTA markets would thus shift toward "middling" categories; it would correspondingly decline for categories where it was strongest before NAFTA.[22] This pattern actually occurs in Table 2 -- US RRCA in NAFTA markets is more concentrated on "middling" categories in 1995 and the top 3 RRCAs in 1980 all decline by 1995 in NAFTA markets. But this pattern is much less distinct for manufactures alone and within machinery and equipment at the 2- and 3-digit level of disaggregation summarized in Tables 4 and 6.[23]

Modestly Aggregated (2-Digit SITC) Patterns for Manufactures

The most interesting patterns at the two-digit level are in manufactures, so we neglect primary products from here on.

RCAs, Summary. Table 3 refines the picture of US world-wide comparative advantage revealed in Table 1.[24] Virtually all 2-digit sub-products show stable comparative advantage over

[20]The US had very mild 1980 and 1995 disadvantage in Europe and mild 1995 disadvantage in the Asian Tiger markets.

[21]Our measures of dispersion are the standard deviations of the natural logarithms of the RCA indexes divided by 100 (so as to be centered symmetrically on zero). See Wolff (1998) or Leamer (1997), pp. 13ff., for favoring a similar measure of dispersion, using logarithmic transformations of the RCA indexes, in order to avoid the skewness implicit in a ratio of ratios that is centered on 100 or 1, limited in downward variation to zero, but unlimited in upward variation.

[22]The nature of the index is that if "competitive advantage" rises in some categories compared to others, comparative advantage must rise in the first and fall in the second.

[23]In Table 4, although 9 out of the top 11 NAFTA RRCAs decline by 1995, so do all 11 of the "middling" RRCAs. In Table 6, although all 12 of the top NAFTA RRCAs decline by 1995, so do 9 out of the 12 "middling" RRCAs.

[24]In Table 3, "all categories" in the definition of the RCA index refers to all manufactured exports; whereas it refers to all merchandise exports in Table 1.

time.[25] For those goods with fairly standardized specifications and production processes (SITC 51-69), US patterns of comparative advantage and disadvantage are also quite uniform across sub-products. But in differentiated goods (SITC 71-89), US patterns of comparative advantage and disadvantage vary diversely across sub-products. The US tends to have stable comparative advantage in producer-goods sub-categories,[26] fairly stable comparative disadvantage in consumer-goods sub-categories,[27] and reversal of comparative advantage between 1980 and 1995 in the one sub-product on the margin of producer and consumer goods, computers and office machines (SITC 75).

RCAs, Detail. More exactly, Table 3 reveals remarkable uniformity of comparative advantage across various types of chemical products (SITC 5), and of disadvantage across various types of manufactured materials (SITC 6). Finished manufactures (SITC 8) shows more diversity, as expected of differentiated sub-products. But it is explicable diversity. The US has strong comparative advantage in instruments (SITC 87), the one producer good among finished manufactures. It has comparative disadvantage in all the consumer goods, sharpest in luggage, apparel, and footwear (SITC 83-85), and less sharp in everything else. Machinery and equipment (SITC 7) seems to show even more diversity, but it, too, is explicable, and falls into the same pattern as finished manufactures. The US has strong comparative advantage in capital equipment -- industrial machinery and in transport equipment except road vehicles (SITC 71-74, 77, 79). It has comparative disadvantage in the largely consumer-goods categories, household electronics (SITC 76) and road vehicles (SITC 78, largely autos).

These sub-product patterns are very stable between 1980 and 1995 with just a few important exceptions. The most noteworthy is the reversal of US comparative advantage in computers and office machines (SITC 75). US comparative advantage also falls modestly for medicinal and pharmaceutical products (SITC 54) but rises modestly for fertilizers (SITC 56). US comparative disadvantage becomes less marked in iron and steel (SITC 67).

An apparent change between 1980 and 1995 is a moderate evening out of US comparative advantage across the 34 2-digit manufacturing sub-sectors. Believers in increasing sectoral "niche" specialization might expect the opposite[28] Sectoral niche specialization shows up only a little better at the 3-digit level for machinery and equipment below. Increased sub-product

[25]The correlation coefficients recording this inter-temporal stability are about the same or higher at the 2-digit level as at the 1-digit level. See Hoekman and Djankov (1997), p. 475, for a similar finding that the inter-temporal stability was similar at their 4-digit level of disaggregation to that at a 2-digit level.

[26]Producer goods are taken to include all sub-categories of SITC 7 except computers, telecom, and road vehicles (SITC 75, 76, 78), plus instruments (SITC 87).

[27]Consumer goods are taken to include telecommunications equipment (a large part of SITC 76, though SITC 76 also includes equipment that is a producer good) and autos (the bulk of SITC 78, which also includes trucks, buses, and motorcycles), plus all of SITC 8 except instruments (SITC 87).

[28]Proudman and Redding (1997, p. 23) find a very similar decline in their measure of RCA dispersion for British and German exports from 1970 to 1993.

specialization is far less pronounced there, however, than increased regional specialization, seen in increased cross-regional dispersion of the RRCA indexes between 1980 and 1995.

RRCAs, Summary. When these world-wide patterns are broken down across trading partners in Table 4, there are noteworthy sub-patterns.

First, the comparative success of US exporters does differ dramatically from market to market, in ways that do not match simple explanations such as proximity or lingual ties. European economic centrality and preferential trade policies do, however, seem to make typical US RCA indexes lower there than elsewhere.

Second, sometimes patterns of US comparative advantage change rapidly over time, especially in China, and especially for consumer goods.

Third, the US has stable global comparative advantage in most varieties of differentiated producer goods, but in Japan stable disadvantage (as if US exports of differentiated producer goods faced discriminatory market barriers,[29] as often alleged).

And, finally, in more standardized producer goods, though US patterns of comparative advantage and disadvantage are stable over time, they are more mixed across trading partners, with comparative advantage in some markets and disadvantage in others, depending on product group.

RRCAs, Detail. In standardized manufactures (SITC 5 and 6), US patterns of comparative advantage are surprisingly different across trading partners, both qualitatively and quantitatively. In chemicals sub-products (SITC 51-59), US comparative advantage is strong across the board in both 1980 and 1995, except in Europe. But it is exceptionally strong in Asia (except China),[30] often ranging above 200. US comparative advantage in paper and wood products (SITC 63 and 64) and in non-ferrous metals (SITC 68) is also exceptionally strong in Asia -- in 1995 especially – and usually non-existent (US disadvantage) elsewhere. In iron and steel (SITC 67), US export performance in both 1980 and 1995 ranges from strong comparative advantage (in OthAs4) to strong comparative disadvantage (in Europe and Japan).

In differentiated manufactures (SITC 7 and 8), there are several varieties of pattern. The first two varieties characterize producer goods and seem very stable over time. The second two varieties characterize consumer goods and are chaotic.

Variety 1: Stable patterns across time, common across trading partners. Instruments (SITC 87) shows strong patterns of US comparative advantage for every set of trading partners, in both 1980 and in 1995.

[29]Especially relative to exports back to Japan from Asian affiliates of Japanese companies.

[30]In China, US chemicals comparative advantage is quite different across sub-products and quite volatile over time.

Variety 2: Stable patterns across time, diverse across trading partners. Producer goods other than instruments show stable comparative advantage over time, but diversity across trading partners. Non-electrical industrial machinery (SITC 71-74) shows strong patterns of US comparative advantage in both 1980 and in 1995 for every set of trading partners except Europe and Japan.[31] Electrical machinery (SITC 77) shows reasonably strong US comparative advantage in both 1980 and 1995 everywhere except Asia. In Asia the main exception to temporal stability is China, where US comparative advantage in electrical machinery in 1980 becomes strong disadvantage by 1995.[32]

Variety 3: Changing patterns across time, diverse across trading partners. Computers and office equipment (SITC 75) shows strong patterns of US comparative advantage for every set of trading partners in 1980, but the comparative advantage remains in 1995 only for non-Asian regions; in Asia, US advantage has turned to marked disadvantage.

Variety 4: Chaotic patterns across time and trading partner. Consumer goods categories (SITC 76, 78, 81-84) all reveal quite erratic patterns, with the exception of footwear and photographic apparatus (SITC 85, 88).[33]

Less Aggregated (3-Digit SITC) Patterns for Machinery and Equipment

To see whether patterns of comparative advantage become even more interesting at the three-digit level, we selected machinery and equipment (SITC 7) for deeper analysis. That sector is both large and tempting as a venue for national industrial policies. The very disaggregated region-by-region export data is, however, unfortunately suspect in the early years for China and emerging Asia, and also for office equipment (SITC 75) and road vehicles (SITC 78).

RCAs. Table 5 refines the picture of US world-wide comparative advantage in machinery and equipment.[34] The US has strong and consistent comparative disadvantage in the three consumer goods categories (SITC 761-762 and 775, radios, televisions, and other household equipment). Among producer goods, the US has strong, stable comparative advantage in some

[31]This pattern is consistent with both Japan and Europe importing preferentially from other countries in our data set. For Japan, such preferential spheres of influence seem likely to include most other Asian exporters; for Europe, such preferential patterns might be seen with exports from former colonies.

[32]This pattern might occur, for example, if US foreign investors in China displaced their previous exports to China faster than rival exporters did.

[33]Footwear (SITC 85) shows enormous US comparative disadvantage, except in Asian "near-Tigers" (OthAs4) and Tigers. US comparative advantage in photographic apparatus, optical goods, and watches (SITC 88) varies dramatically across trading partners, but is reasonably stable except in Japan, where it declines precipitously from strong advantage to strong disadvantage.

[34]In Table 5, "all categories" in the definition of the RCA index refers to all selected three-digit categories of machinery and equipment, whereas it refers to all manufactured exports in Table 3, and to all merchandise exports in Table 1.

categories, but not others. RCAs are high and stable for power-generating equipment (except standard internal-combustion engines), pumps, heating and cooling equipment, agricultural and specialized machinery, and aircraft. But RCAs are lower and less stable for machine tools, electrical equipment, and producer goods for more mature, standardized industries (textiles, paper, printing, railways, and shipping).[35]

RRCAs. Across trading partners, the patterns in Table 6 for machinery and equipment exports recall those of Table 4 for all manufactures.

Producer-goods sub-products mimic "variety 2" above, stable over time[36] (with some exceptions), but very diverse across regional markets. That cross-regional diversity seems to be increasing. The dispersion of US comparative advantage across trading partners increases between 1980 and 1995 for 20 out of 32 producer-goods categories.[37]

The three consumer-goods sub-products mimic "variety 4" above, chaotic over time and regional market. In fact, the dispersions of US comparative advantage across trading partners for radio and television exports are larger than those for any of the 32 producer goods, and the cross-regional dispersion for household equipment is 6th highest among the 35 categories.

There is some, though very limited, evidence of sectoral "niche" specialization. The cross-product dispersion indexes rise between 1980 and 1995 in five of the eight regional markets for US exports. But several (especially China's) are suspect due to the poor quality of the 1980 data. And though US comparative disadvantage becomes sharper for machinery and equipment in the Asian Tigers between 1980 and 1995 (part of a niche specialization story), US comparative advantage does not. Nor is there any evidence of increasing sectoral niche specialization in US exports of machinery and equipment to Europe or Japan.

Addendum: Using Import Data Alone.

Our RCA indexes in this paper are based on US export data alone. Comparative advantage is measured by US versus rival export performance in world and regional markets. Comparative advantage is signaled by indexes that are greater than 100.

But comparative advantage might also be signaled by RCA indexes based on US import data alone. In contrast to export-based measures, these would measure the relative

[35]Moenius and Riker (1998) find that sectoral patterns of US trade in machinery and equipment (SITC 7) are far more volatile over time than in other sectors. Intervening years between 1980 and 1995 may indeed reveal patterns of similar volatility, especially because those years marked a period of exceptionally strong real exchange values for the dollar, especially weak Latin American markets relative to those elsewhere in the world.

[36]The correlations between 1980 RRCAs and 1995 RRCAs drop considerably from their two-digit counterparts.

[37]In Table 4, only 18 of the 34 2-digit sub-manufactures showed increasing cross-regional dispersion between 1980 and 1995.

competitiveness of foreign exporters in US markets. By analogy to the construction above, the import-based measure would be the share of industry i in total US imports divided by the share of industry i in the rest-of-the-world's total imports. US comparative advantage would be signaled by RCA indexes that were less than 100. If the rest of the world in these measures were to include just a sub-set of peer importer countries, then we would have the import-based counterpart to the focus of this paper, our RRCAs, Regional RCA indexes. For example, relative to its NAFTA partners, the US would be said to have comparative advantage in sector i if its import shares of i were lower than those of Canada and Mexico (relative to its import shares of everything else).

It is not clear that the export-based and import-based measures would (or should) reflect the underlying reality of US comparative advantage in a parallel way. The most important reason is that the markets in which US comparative advantage is being measured differ -- non-US markets in one case, US markets in the other. Export-based US RCA measures would be expected to differ from import-based US RCA measures, therefore, for precisely the same reasons that RRCA measures differ across the various trading-partner markets. There is a second reason the measures will differ. With a trading partner where two-way trade was high, both the export-derived RCA and the import-derived RCA might be above 100, signalling simultaneous comparative advantage and disadvantage. The problem is actually in the concept, not the measure; the apparently anomalous measures are accurately reflecting the intrinsic ambiguity of any concept of comparative advantage where two-way trade is high.

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Table 1. US Export RCAs – SITC 1 Digit Level, Merchandise

SITC		RCA	
		1995	**1980**
0	Food and live animals chiefly for food	142.1	128.4
1	Beverages and tobacco	129.9	94.8
2	Crude materials, inedible, except fuels	143.4	137.9
3	Mineral fuels, lubricants and related materials	43.8	40.2
4	Animal and vegetable oils, fats and waxes	127.3	135.6
5	Chemicals and related products, n.e.s.	139.3	141.9
6	Manufactured goods classified chiefly by material	85.8	77.1
7	Machinery and transport equipment	97.8	103.1
8	Miscellaneous manufactured articles	78.6	82.2

Wtd. Cor.[1]	Cross-sectoral correlation coefficient between 1995 and 1980 weighted by export share.	0.88	
Unwtd.[2]	… unweighted ….	0.96	

[1] Cross-sectoral correlation coefficient between 1995 and 1980 weighted by export share.
[2] Cross-sectoral correlation coefficient between 1995 and 1980 unweighted.

Table 2. US Export RCAs *by Regions* – SITC 1 Digit Level, Merchandise

1995												
SITC	EU15	NAFTA	Latin6	Japan	Tiger	OthAs4	China	Others	Wtd. Disp.[5]	Disp.[6]	Wtd. Cor.[7]	Cor.[8]
0	130.1	100.4	57.8	271.1	209.3	100.0	213.0	100.1	0.50	0.52	0.91	0.80
1	91.3	45.5	76.8	274.1	231.9	220.8	142.8	120.2	0.61	0.62	0.91	0.69
2	180.6	76.6	76.7	271.4	228.2	127.1	247.3	56.5	0.53	0.61	0.94	0.89
3	86.1	23.6	15.1	228.5	181.8	61.8	36.8	67.0	0.99	0.94	0.87	0.64
4	88.5	124.5	140.1	243.5	232.6	16.0	288.0	146.5	0.58	0.92	0.22	0.91
5	98.9	132.4	156.2	158.5	206.0	217.5	211.7	110.6	0.29	0.30	0.93	0.56
6	64.7	94.4	72.4	102.6	98.0	107.8	63.6	53.7	0.21	0.26	0.22	0.13
7	99.3	106.3	154.3	57.7	96.5	116.2	135.3	122.5	0.23	0.30	0.78	0.89
8	93.3	122.3	100.5	118.4	36.6	37.2	15.9	97.7	0.47	0.74	0.88	0.85

Wtd. Disp.[1]	0.22	0.23	0.51	0.69	0.53	0.39	0.71	0.28				
Disp.[2]	0.29	0.57	0.72	0.55	0.63	0.84	0.99	0.36				

1980												
SITC	EU15	NAFTA	Latin6	Japan	Tiger	OthAs4	China	Others	Wtd. Disp.[5]	Disp.[6]		
0	137.0	115.7	69.2	233.4	186.7	102.9	122.5	50.2	0.42	0.50		
1	69.8	34.2	82.0	238.7	210.6	229.1	21.6	141.4	0.63	0.91		
2	150.1	69.1	78.0	246.2	214.7	90.3	115.1	68.0	0.46	0.50		
3	84.1	26.9	14.5	241.9	152.0	3.2	1.6	47.3	1.02	1.78		
4	135.1	183.7	146.3	230.8	224.2	5.8	125.0	156.2	0.34	1.21		
5	107.4	124.8	161.7	185.1	219.1	265.3	101.0	129.4	0.32	0.35		
6	76.3	82.6	104.6	56.2	73.0	95.7	83.8	58.0	0.17	0.22		
7	90.0	129.2	164.6	37.7	111.1	202.7	126.3	143.3	0.36	0.51		
8	95.7	150.2	123.9	79.2	16.1	78.5	17.1	119.1	0.50	0.88		

Wtd. Disp.[1]	0.24	0.40	0.53	0.80	0.64	0.63	0.30	0.43				
Disp.[2]	0.27	0.66	0.75	0.74	0.86	1.59	1.48	0.49				

Wtd. Cor.[3]	0.84	0.78	0.94	0.94	0.96	0.67	0.69	0.92				
Cor.[4]	0.74	0.95	0.99	0.97	0.98	0.75	0.69	0.79				

[1]RCA dispersion across sectors by region weighted by export share, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[2]RCA dispersion across sectors by region un-weighted, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[3]Cross-sectoral correlation coefficient weighted by export share, between 1995 and 1980.
[4]Cross-sectoral correlation coefficient un-weighted, between 1995 and 1980.
[5]RCA dispersion across regions by sector weighted by export share, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[6]RCA dispersion across regions by sector un-weighted, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[7]Cross-region correlation coefficient by sector weighted by export share, between 1995 and 1980.
[8]Cross-region correlation coefficient by sector un-weighted, between 1995 and 1980.

Table 3. US Export RCAs - SITC 2 Digit Level, Manufacturing

	SITC	**1995**	**1980**
Organic chemicals	51	135.7	133.0
Inorganic chemicals	52	120.3	114.2
Dyeing, tanning and coloring materials	53	131.2	117.5
Medicinal and pharmaceutical products	54	120.4	159.1
Essential oils & perfume mat,; toilet-cleansing mat	55	138.2	134.9
Fertilizers, manufactured	56	154.4	124.2
Artif. Resins, plastic mat., Cellulose esters/ethers	58	153.0	161.5
Chemical materials and products, n.e.s.	59	153.4	162.6
Leather, leather manuf., N.e.s. And dressed furskisg	61	86.8	108.4
Rubber manufactures, n.e.s.	62	92.5	62.7
Cork and wood manufactures (excl. Furniture)	63	73.0	50.9
Paper, paperboard, artic. Of paper, paper-pulp/board	64	92.3	78.8
Textile yarn, fabrics, made-upart., Related products	65	98.4	116.1
Non-metallic mineral manufactures, n.e.s.	66	74.8	62.9
Iron and steel	67	68.7	48.3
Non-ferrous metals	68	86.8	90.2
Manufactures of metal, n.e.s.	69	94.5	92.8
Power generating machinery and equipment	71	111.8	126.3
Machinery specialized for particular industries	72	123.6	133.0
Metalworking machinery	73	102.3	91.3
General industrial machinery & equipment, and parts	74	113.4	137.2
Office machines & automatic data processing equip.	75	95.2	143.2
Telecommunications & sound recording apparatus	76	78.8	63.9
Electrical machinery, apparatus & appliances n.e.s.	77	105.1	104.1
Road vehicles (incl. Air cushion vehicles)	78	70.9	59.5
Other transport equipment	79	145.6	142.1
Sanitary, plumbing, heating and lighting fixtures	81	64.9	82.8
Furniture and parts thereof	82	67.2	58.8
Travel goods, handbags and similar containers	83	15.9	13.3
Articles of apparel and clothing accessories	84	31.0	25.4
Footwear	85	8.5	13.5
Professional, scientific & controlling instruments	87	145.8	148.0
Photographic apparatus, optical goods, watches	88	70.6	84.9
Miscellaneous manufactured articles, n.e.s.	89	92.4	96.5

Wtd. Cor.[1]	SITC 51 – 59		0.77	
	SITC 61 – 69		0.96	
	SITC 71 – 79		0.91	
	SITC 81 – 89		0.99	
Cor.[2]	SITC 51 – 59		0.35	
	SITC 61 – 69		0.80	
	SITC 71 – 79		0.85	
	SITC 81 – 89		0.97	

[1] Cross-sectoral correlation coefficient between 1995 and 1980 weighted by export share.
[2] Un-weighted.

Table 4. US Export RCAs *by Regions* – SITC 2 Digit Level, Manufacturing

1995													
	SITC	EU15	NAFTA	Latin6	Japan	Tiger	OthAs4	China	Others	Wtd. Disp.[5]	Disp.[6]	Wtd. Cor.[7]	Cor.[8]
Organic chemicals	51	89.9	129.4	153.1	125.3	210.2	219.8	176.7	112.2	0.35	0.31	0.93	0.61
Inorganic chemicals	52	90.9	83.0	122.2	220.8	223.5	241.9	48.1	72.3	0.51	0.60	0.87	0.94
Dyeing, tanning and coloring materials	53	81.8	163.0	155.4	101.4	189.8	203.7	102.4	121.8	0.34	0.33	0.98	0.97
Medicinal and pharmaceutical products	54	87.7	160.6	171.7	186.6	191.7	235.0	34.9	98.1	0.38	0.62	0.98	0.97
Essential oils & perfume mat,; toilet-cleansing mat	55	79.7	150.4	146.3	229.7	183.1	212.3	95.3	126.0	0.37	0.37	0.94	0.61
Fertilizers, manufactured	56	136.3	40.5	177.0	267.5	241.0	229.3	289.1	144.3	0.62	0.64	0.47	0.90
Artif. Resins, plastic mat., Cellulose esters/ethers	58	134.0	135.7	163.2	121.6	201.3	232.9	272.0	139.4	0.22	0.29	0.44	0.31
Chemical materials and products, n.e.s.	59	118.4	173.0	163.7	155.4	213.4	175.4	182.3	98.0	0.23	0.25	0.72	0.46
Leather, leather manuf., N.e.s. And dressed furskisg	61	46.8	124.0	8.3	237.0	159.1	128.9	80.0	17.7	0.62	1.16	0.98	0.83
Rubber manufactures, n.e.s.	62	76.4	123.1	107.5	55.5	44.3	49.7	12.9	98.3	0.35	0.72	0.58	0.05
Cork and wood manufactures (excl. Furniture)	63	123.6	49.1	37.8	270.8	79.3	12.2	40.3	112.1	0.74	0.94	0.64	0.56
Paper, paperboard, artic. Of paper, paper-pulp/board	64	76.6	64.7	138.4	203.2	183.2	220.0	205.3	145.8	0.52	0.47	0.91	0.81
Textile yarn, fabrics, made-upart., Related products	65	76.4	142.6	107.4	98.4	63.7	51.6	22.2	86.6	0.39	0.57	0.95	0.54
Non-metallic mineral manufactures, n.e.s.	66	49.0	109.5	69.6	101.6	121.1	99.5	54.8	29.2	0.50	0.49	0.96	0.73
Iron and steel	67	31.8	97.1	44.5	33.7	108.5	158.4	107.8	35.2	0.52	0.65	0.90	0.76
Non-ferrous metals	68	92.3	64.7	31.6	200.8	212.7	195.2	170.5	26.1	0.62	0.85	0.76	0.25
Manufactures of metal, n.e.s.	69	71.4	135.8	137.9	58.9	40.3	127.2	31.9	88.7	0.44	0.56	0.96	0.73
Power generating machinery and equipment	71	94.0	125.6	123.9	60.5	177.1	212.9	214.1	127.4	0.31	0.43	0.85	0.74
Machinery specialized for particular industries	72	73.8	146.1	167.8	58.3	199.5	236.0	261.5	122.5	0.47	0.54	0.93	0.80
Metalworking machinery	73	75.7	154.3	128.6	42.2	158.3	215.5	237.7	118.0	0.51	0.57	0.85	0.84
General industrial machinery & equipment, and parts	74	74.7	135.5	143.6	39.2	155.9	191.8	196.9	132.9	0.39	0.54	0.97	0.80
Office machines & automatic data processing equip.	75	145.3	122.7	172.6	67.9	46.0	61.1	90.4	129.3	0.46	0.47	0.83	0.10
Telecommunications & sound recording apparatus	76	142.1	79.9	154.5	52.9	67.0	44.8	84.6	100.2	0.41	0.44	0.59	0.44
Electrical machinery, apparatus & appliances n.e.s.	77	110.3	130.0	164.7	76.7	92.4	127.4	66.4	113.9	0.21	0.30	0.92	0.57
Road vehicles (incl. Air cushion vehicles)	78	55.7	84.1	147.6	31.5	100.3	169.8	75.7	136.5	0.38	0.56	0.85	0.93
Other transport equipment	79	113.5	90.6	145.0	198.5	221.2	180.7	280.2	120.8	0.36	0.38	0.84	0.39
Sanitary, plumbing, heating and lighting fixtures	81	68.9	102.1	22.6	44.8	112.6	180.9	15.1	142.6	0.64	0.89	0.76	0.28
Furniture and parts thereof	82	45.1	88.9	23.8	11.5	91.0	168.7	5.6	106.3	0.52	1.20	0.89	0.96
Travel goods, handbags and similar containers	83	14.3	61.1	3.6	1.1	84.3	266.2	0.2	111.6	1.57	2.50	0.52	0.81
Articles of apparel and clothing accessories	84	44.7	45.3	3.4	1.1	85.1	256.7	1.0	13.9	1.04	2.07	0.26	0.87
Footwear	85	16.2	6.9	1.8	1.0	79.0	273.0	0.4	73.2	1.64	2.32	0.96	0.94

Professional, scientific & controlling instruments	87	131.5	172.0	169.2	201.0	154.1	137.1	187.4	117.7	0.14	0.18	0.86	0.59
Photographic apparatus, optical goods, watches	88	84.1	158.3	44.0	46.4	138.1	38.9	16.5	133.9	0.55	0.79	0.96	0.43
Miscellaneous manufactured articles, n.e.s.	89	96.0	131.5	47.5	82.7	136.4	134.0	15.2	104.7	0.42	0.75	0.89	0.95

Wtd. Disp.[1]		0.32	0.26	0.32	0.62	0.61	0.52	0.78	0.34				
Disp.[2]		0.54	0.35	0.80	0.70	1.26	1.58	1.81	0.61				

1980													
	SITC	EU15	NAFTA	Latin6	Japan	Tiger	OthAs4	China	Others	Wtd. Disp.[5]	Disp.[6]		
Organic chemicals	51	92.5	134.3	151.7	162.3	218.9	268.1	87.4	147.7	0.33	0.38		
Inorganic chemicals	52	84.5	78.1	158.2	209.4	227.4	266.0	53.7	123.1	0.46	0.58		
Dyeing, tanning and coloring materials	53	67.4	169.4	153.7	107.2	211.5	265.2	75.3	125.6	0.48	0.48		
Medicinal and pharmaceutical products	54	131.2	172.4	160.5	202.5	211.2	259.7	46.2	150.6	0.21	0.53		
Essential oils & perfume mat,; toilet-cleansing mat	55	92.3	168.9	135.9	191.9	203.5	202.6	4.4	146.9	0.34	1.30		
Fertilizers, manufactured	56	144.1	30.5	177.4	244.3	232.9	270.2	128.3	99.8	0.56	0.71		
Artif. Resins, plastic mat., Cellulose esters/ethers	58	118.6	179.8	177.3	154.6	214.2	265.5	128.3	154.6	0.26	0.26		
Chemical materials and products, n.e.s.	59	121.4	171.6	160.2	208.4	222.5	267.3	77.9	103.7	0.34	0.42		

Leather, leather manuf., N.e.s. And dressed furskisg	61	88.7	127.0	6.7	174.2	165.0	139.3	126.2	101.0	0.40	1.07		
Rubber manufactures, n.e.s.	62	32.1	104.1	170.2	10.0	19.4	196.3	124.6	112.0	0.75	1.10		
Cork and wood manufactures (excl. Furniture)	63	113.9	50.1	93.6	76.2	3.9	3.5	30.0	120.4	0.63	1.45		
Paper, paperboard, artic. Of paper, paper-pulp/board	64	123.2	34.1	164.3	212.9	181.2	269.8	126.7	154.6	0.74	0.62		
Textile yarn, fabrics, made-upart., Related products	65	104.4	170.3	125.5	60.2	53.7	115.0	63.4	139.9	0.35	0.43		
Non-metallic mineral manufactures, n.e.s.	66	40.7	132.3	123.9	58.9	126.6	126.1	9.5	22.2	0.69	0.98		
Iron and steel	67	30.8	100.9	91.1	4.4	54.6	262.1	128.2	33.5	0.72	1.24		
Non-ferrous metals	68	111.8	51.1	60.6	153.9	131.4	31.3	47.5	56.4	0.43	0.56		
Manufactures of metal, n.e.s.	69	83.8	137.7	136.3	33.7	42.4	245.8	82.2	113.0	0.45	0.65		

Power generating machinery and equipment	71	87.2	146.2	155.7	96.6	194.8	268.9	127.1	150.4	0.33	0.36		
Machinery specialized for particular industries	72	78.0	152.8	176.2	87.9	212.0	266.9	127.9	150.0	0.37	0.42		
Metalworking machinery	73	58.1	159.9	156.7	32.4	129.5	269.7	104.0	144.5	0.57	0.66		
General industrial machinery & equipment, and parts	74	94.8	162.0	171.4	79.6	184.3	267.6	121.7	147.8	0.32	0.39		
Office machines & automatic data processing equip.	75	138.7	140.7	166.5	110.6	110.2	264.7	128.2	146.3	0.11	0.28		
Telecommunications & sound recording apparatus	76	117.2	131.2	161.2	12.1	33.8	178.9	122.9	140.9	0.71	0.95		
Electrical machinery, apparatus & appliances n.e.s.	77	108.2	165.0	156.3	59.0	69.0	83.8	114.8	142.9	0.36	0.38		
Road vehicles (incl. Air cushion vehicles)	78	23.6	103.9	160.1	3.9	80.5	268.4	128.1	149.4	0.66	1.37		
Other transport equipment	79	117.1	130.7	159.7	174.1	176.2	268.6	128.3	120.8	0.25	0.28		

Sanitary, plumbing, heating and lighting fixtures	81	67.2	156.2	47.9	212.0	139.9	127.1	34.8	21.2	0.60	0.82		

Furniture and parts thereof	82	43.5	119.2	10.6	9.5	99.5	88.2	3.2	113.2	0.59	1.40		
Travel goods, handbags and similar containers	83	12.7	33.1	3.5	38.7	151.6	62.7	0.4	116.1	1.44	2.01		
Articles of apparel and clothing accessories	84	76.6	112.3	1.2	2.1	135.2	71.8	0.0	49.5	0.81	2.94		
Footwear	85	22.6	11.1	0.5	1.7	65.4	120.5	0.0	132.9	0.90	2.18		
Professional, scientific & controlling instruments	87	120.9	170.2	178.5	260.5	166.0	155.8	127.1	141.6	0.19	0.24		
Photographic apparatus, optical goods, watches	88	101.6	174.8	46.0	229.3	150.1	38.0	105.4	144.5	0.50	0.63		
Miscellaneous manufactured articles, n.e.s.	89	99.5	147.8	20.3	98.9	155.6	81.5	8.3	118.2	0.43	1.05		

Wtd. Disp.[1]		0.36	0.31	0.22	0.82	0.69	0.44	0.38	0.38				
Disp.[2]		0.59	0.47	0.75	1.06	1.61	1.45	1.85	0.53				

Wtd. Cor.[3]		0.89	0.93	0.76	0.82	0.79	0.43	0.51	0.87				
Cor.[4]		0.85	0.88	0.92	0.73	0.92	0.83	0.79	0.56				

[1]RCA dispersion across sectors by region weighted by export share, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[2]RCA dispersion across sectors by region un-weighted, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[3]Cross-sectoral correlation coefficient weighted by export share, between 1995 and 1980.
[4]Cross-sectoral correlation coefficient un-weighted, between 1995 and 1980.
[5]RCA dispersion across regions by sector weighted by export share, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[6]RCA dispersion across regions by sector un-weighted, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[7]Cross-region correlation coefficient by sector weighted by export share, between 1995 and 1980.
[8]Cross-region correlation coefficient by sector un-weighted, between 1995 and 1980.

Table 5. US Export RCAs - SITC 3 Digit Level, Machinery and Equipment

	SITC	1995	1980
Steam & other vapour generating boilers & parts	711	169.4	141.7
Steam & other vapour power units, steam engines	712	185.0	152.0
Internal combustion piston engines & parts	713	94.0	119.7
Engines & motors, non-electric	714	131.9	126.9
Rotating electric plant and parts	716	105.2	138.3
Other power generating machinery and parts	718	94.6	107.4
Agricultural machinery and parts	721	152.7	123.5
Tractors fitted or not with power take-offs, etc.	722	95.3	129.8
Civil engineering & contractors plant and parts	723	142.3	157.3
Textile & leather machinery and parts	724	69.3	89.6
Paper & pulp mill mach., Mach for manuf. Of paper	725	117.3	99.3
Printing & bookbinding mach. And parts	726	91.5	118.6
Food processing machines and parts	727	120.2	141.7
Mach. & equipment specialized for particular ind.	728	130.8	130.1
Mach. Tools for working metal or met. Carb., Parts	736	103.3	90.6
Metal working machinery and parts	737	80.5	125.1
Heating & cooling equipment and parts	741	143.1	156.8
Pumps for liquids, liq. Elevators and parts	742	126.1	136.8
Pumps & compressors, fans & blowers, centrifuges	743	114.6	147.3
Mechanical handling equip. And parts	744	120.9	146.7
Other non-electrical mach. Tools, apparatus & parts	745	120.8	134.6
Ball, roller or needle roller bearings	749	84.4	107.2
Television receivers	761	33.0	84.4
Radio-broadcast receivers	762	22.7	14.8
Telecommunications equipment and parts	764	94.0	69.7
Electric power machinery and parts thereof	771	81.4	95.1
Elect.app.such as switches, relays, fuses, plugs etc.	772	104.8	121.3
Equipment for distributing electricity	773	99.6	129.6
Electric apparatus for medical purposes, (radiolog)	774	114.1	87.0
Household type, elect. & non-electrical equipment	775	70.3	72.3
Thermionic, cold & photo-cathode valves, tubes, parts	776	114.3	88.7
Electrical machinery and apparatus, n.e.s.	778	93.5	120.3
Railway vehicles & associated equipment	791	93.8	88.3
Aircraft & associated equipment and parts	792	156.2	150.8
Ships, boats and floating structures	793	64.5	69.9

Wtd. Cor.[1]		0.86	
Cor.[2]		0.81	

[1] Cross-sectoral correlation coefficient between 1995 and 1980, weighted by export share.

[2] Cross-sectoral correlation coefficient between 1995 and 1980, Un-weighted.

Table 6. US Export RCAs *by Regions* – SITC 3 Digit Level, Machinery and Equipment

1995													
	SITC	EU15	NAFTA	Latin6	Japan	Tiger	OthAs4	China	Others	Wtd. Disp.[5]	Disp.[6]	Wtd. Cor.[7]	Cor.[8]
Steam & other vapour generating boilers & parts	711	125.3	65.5	180.0	254.7	240.4	249.9	288.0	151.8	0.51	0.49	0.25	0.10
Steam & other vapour power units, steam engines	712	108.8	125.4	176.8	221.8	223.4	250.4	289.2	145.5	0.29	0.35	0.79	-0.09
Internal combustion piston engines & parts	713	69.7	134.7	99.8	10.9	192.1	246.2	181.4	146.1	0.49	0.99	0.92	0.84
Engines & motors, non-electric	714	104.9	107.7	140.6	237.3	185.9	214.8	234.6	110.5	0.34	0.36	0.97	0.30
Rotating electric plant and parts	716	84.5	109.0	141.5	45.9	121.3	170.8	144.0	131.6	0.29	0.41	0.78	0.75
Other power generating machinery and parts	718	48.7	146.7	142.3	26.3	198.0	248.5	254.5	126.8	0.60	0.80	0.99	0.93
Agricultural machinery and parts	721	132.9	140.9	164.0	179.0	198.9	247.3	251.6	126.0	0.16	0.27	0.60	0.10
Tractors fitted or not with power take-offs, etc.	722	73.3	109.2	161.6	10.7	208.2	250.6	202.7	151.5	0.51	1.02	0.78	0.91
Civil engineering & contractors plant and parts	723	81.5	173.6	167.2	18.6	178.0	249.7	282.4	146.5	0.44	0.87	0.89	0.29
Textile & leather machinery and parts	724	32.6	193.0	141.1	16.1	85.8	235.5	153.7	134.8	0.87	0.94	0.99	0.89
Paper & pulp mill mach., Mach for manuf. Of paper	725	52.3	155.1	170.6	91.3	199.1	248.1	241.8	144.7	0.54	0.53	0.98	0.62
Printing & bookbinding mach. And parts	726	54.9	137.0	175.7	39.8	220.4	241.8	280.4	60.9	0.67	0.76	0.87	0.42
Food processing machines and parts	727	56.4	156.2	171.9	142.8	202.6	239.8	282.8	129.8	0.57	0.49	0.92	0.25
Mach. & equipment specialized for particular ind.	728	81.7	141.4	172.6	82.3	210.8	228.4	272.7	117.2	0.44	0.46	0.82	0.21
Mach. Tools for working metal or met. Carb., Parts	736	77.5	159.4	128.7	42.9	158.4	214.2	235.2	116.6	0.51	0.56	0.86	0.70
Metal working machinery and parts	737	37.9	98.1	122.7	9.3	151.6	249.8	284.5	148.6	0.72	1.12	0.59	0.61
Heating & cooling equipment and parts	741	93.0	152.5	163.6	75.2	196.1	175.8	277.1	134.1	0.33	0.41	0.87	-0.06
Pumps for liquids, liq. Elevators and parts	742	84.6	170.0	111.3	48.2	193.1	246.6	229.3	141.3	0.43	0.55	0.92	0.89
Pumps & compressors, fans & blowers, centrifuges	743	60.8	163.6	85.8	31.1	162.5	155.5	205.4	147.1	0.47	0.64	0.82	0.25
Mechanical handling equip. And parts	744	81.6	128.6	168.9	28.9	163.0	245.3	181.2	142.5	0.40	0.67	0.98	0.63
Other non-electrical mach. Tools, apparatus & parts	745	85.6	156.8	170.8	66.0	115.5	231.2	248.6	137.8	0.37	0.46	0.96	0.18
Ball, roller or needle roller bearings	749	52.8	113.8	135.4	22.5	109.8	162.0	79.5	104.1	0.45	0.64	0.98	0.93
Television receivers	761	89.1	26.3	180.1	10.5	82.7	4.4	7.1	134.4	0.90	1.44	-0.47	0.15
Radio-broadcast receivers	762	61.3	78.2	32.0	10.8	5.2	0.7	0.1	17.3	0.89	2.33	0.93	-0.01
Telecommunications equipment and parts	764	143.8	99.5	178.1	58.6	80.0	65.7	127.1	105.7	0.36	0.39	0.79	0.53
Electric power machinery and parts thereof	771	81.8	105.3	159.5	52.5	46.1	65.6	32.6	119.1	0.38	0.53	0.69	0.60
Elect.app.such as switches, relays, fuses, plugs etc.	772	101.9	133.6	153.4	38.8	94.0	83.9	94.8	83.1	0.31	0.41	0.89	0.60
Equipment for distributing electricity	773	135.7	97.7	146.4	75.8	91.3	67.1	111.5	137.4	0.18	0.29	-0.72	-0.18
Electric apparatus for medical purposes, (radiolog)	774	76.2	167.9	177.8	142.4	234.0	246.7	286.3	112.7	0.47	0.44	0.90	0.56
Household type, elect. & non-electrical equipment	775	72.0	118.8	171.7	116.0	20.0	31.3	4.4	142.2	0.64	1.26	0.83	0.24
Thermionic, cold & photo-cathode valves, tubes, parts	776	126.2	163.8	176.0	90.8	103.4	137.0	176.0	123.2	0.22	0.24	0.77	0.34
Electrical machinery and apparatus, n.e.s.	778	107.6	112.9	164.4	48.9	75.2	123.0	64.1	112.5	0.30	0.39	0.65	0.86
Railway vehicles & associated equipment	791	46.2	91.9	123.4	32.4	227.8	249.8	252.3	127.1	0.36	0.77	0.47	0.88
Aircraft & associated equipment and parts	792	119.8	97.2	143.3	227.4	233.1	179.8	281.4	119.9	0.36	0.38	0.87	0.01
Ships, boats and floating structures	793	51.0	53.5	166.5	50.3	21.2	216.2	209.8	129.5	0.61	0.84	0.25	0.47

Wtd. Disp.[1]		0.28	0.25	0.19	0.68	0.46	0.39	0.48	0.17				
Disp.[2]		0.37	0.39	0.32	0.97	0.83	1.23	1.58	0.38				

1980													
	SITC	EU15	NAFTA	Latin6	Japan	Tiger	OthAs4	China	Others	Wtd. Disp.[5]	Disp.[6]		
Steam & other vapour generating boilers & parts	711	63.2	146.8	175.5	130.7	226.8	270.2	64.2	156.7	0.41	0.53		
Steam & other vapour power units, steam engines	712	107.4	145.4	178.7	62.8	232.9	270.2	64.2	156.7	0.41	0.54		
Internal combustion piston engines & parts	713	69.5	155.6	131.8	27.8	215.4	269.8	64.2	153.1	0.43	0.75		
Engines & motors, non-electric	714	95.3	112.4	174.2	242.0	188.3	267.2	64.2	146.8	0.37	0.48		
Rotating electric plant and parts	716	106.5	171.8	176.7	40.3	159.1	269.5	64.2	151.9	0.34	0.62		
Other power generating machinery and parts	718	54.6	181.5	172.0	65.7	202.5	270.2	n.a.	114.1	0.55	0.60		
Agricultural machinery and parts	721	111.8	119.4	176.8	152.6	206.1	270.2	64.2	139.8	0.15	0.43		
Tractors fitted or not with power take-offs, etc.	722	41.8	170.3	176.7	21.6	231.7	262.3	128.3	156.9	0.49	0.88		
Civil engineering & contractors plant and parts	723	112.0	162.1	177.6	101.3	227.8	268.0	64.2	153.6	0.28	0.46		
Textile & leather machinery and parts	724	50.8	168.4	163.5	29.7	105.4	260.9	64.2	142.8	0.64	0.73		
Paper & pulp mill mach., Mach for manuf. Of paper	725	55.4	123.1	174.1	86.7	229.8	270.2	64.2	155.9	0.50	0.58		
Printing & bookbinding mach. And parts	726	90.4	125.8	179.0	72.7	226.2	267.9	64.2	154.3	0.34	0.52		
Food processing machines and parts	727	86.2	175.5	177.2	174.4	204.9	266.4	64.2	145.2	0.36	0.47		
Mach. & equipment specialized for particular ind.	728	76.8	161.9	175.6	144.4	218.2	266.8	64.2	135.4	0.43	0.49		
Mach. Tools for working metal or met. Carb., Parts	736	59.0	162.1	155.4	32.0	128.2	269.6	64.2	144.5	0.58	0.69		
Metal working machinery and parts	737	91.2	139.8	179.1	51.0	226.1	270.2	64.2	144.8	0.29	0.59		
Heating & cooling equipment and parts	741	113.1	174.5	174.2	132.9	229.1	268.9	64.2	152.5	0.27	0.44		
Pumps for liquids, liq. Elevators and parts	742	81.6	171.1	167.4	92.3	203.1	269.8	n.a.	139.2	0.39	0.42		
Pumps & compressors, fans & blowers, centrifuges	743	99.6	184.2	174.7	100.3	167.8	269.2	64.2	147.3	0.32	0.45		
Mechanical handling equip. And parts	744	110.5	151.6	177.4	68.5	191.8	265.3	64.2	155.2	0.26	0.50		
Other non-electrical mach. Tools, apparatus & parts	745	98.0	156.8	173.0	104.6	200.3	268.6	64.2	146.3	0.29	0.45		
Ball, roller or needle roller bearings	749	69.6	150.1	159.5	40.2	125.6	264.3	64.2	134.0	0.45	0.61		
Television receivers	761	34.1	177.3	179.1	2.2	27.8	270.2	64.2	157.0	0.64	1.58		
Radio-broadcast receivers	762	51.0	154.2	54.2	0.0	1.0	77.9	64.2	66.7	0.88	2.95		
Telecommunications equipment and parts	764	119.7	119.1	177.7	17.2	43.9	189.2	64.2	142.7	0.63	0.82		
Electric power machinery and parts thereof	771	70.2	129.7	166.5	39.9	79.3	230.8	64.2	143.6	0.45	0.58		
Elect.app.such as switches, relays, fuses, plugs etc.	772	106.3	167.7	163.7	75.5	133.5	69.9	64.2	145.4	0.29	0.39		
Equipment for distributing electricity	773	114.3	144.1	122.4	59.8	163.4	269.6	64.2	149.0	0.25	0.49		
Electric apparatus for medical purposes, (radiolog)	774	38.6	135.1	179.0	193.8	225.6	264.4	64.2	82.4	0.74	0.68		
Household type, elect. & non-electrical equipment	775	58.9	176.5	168.1	18.0	20.2	268.0	64.2	154.1	0.80	1.02		
Thermionic, cold & photo-cathode valves, tubes, parts	776	115.1	156.4	130.5	62.4	82.6	71.1	64.2	150.5	0.33	0.38		
Electrical machinery and apparatus, n.e.s.	778	104.0	180.1	148.1	51.1	103.3	239.6	64.2	144.6	0.39	0.52		
Railway vehicles & associated equipment	791	16.8	108.1	83.9	9.8	230.4	270.2	64.2	96.4	0.50	1.16		

Aircraft & associated equipment and parts	792	120.6	136.2	170.5	230.8	204.6	268.6	64.2	123.4	0.32	0.46		
Ships, boats and floating structures	793	93.8	130.4	132.5	6.4	47.1	268.1	64.2	88.7	0.54	1.11		

Wtd. Disp.[1]		0.25	0.14	0.13	0.86	0.56	0.44	0.08	0.10				
Disp.[2]		0.44	0.15	0.24	1.62	1.05	0.37	0.12	0.20				

Wtd. Cor.[3]		0.76	0.29	0.50	0.94	0.86	0.55	-0.29	0.28				
Cor.[4]		0.48	0.15	0.74	0.56	0.92	0.49	0.06	0.60				

[1]RCA dispersion across sectors by region weighted by export share, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[2]RCA dispersion across sectors by region un-weighted, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[3]Cross-sectoral correlation coefficient weighted by export share, between 1995 and 1980.
[4]Cross-sectoral correlation coefficient un-weighted, between 1995 and 1980.
[5]RCA dispersion across regions by sector weighted by export share, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[6]RCA dispersion across regions by sector un-weighted, 1995 and 1980. Dispersion = standard deviation of natural logs of indexes/100.
[7]Cross-region correlation coefficient by sector weighted by export share, between 1995 and 1980.
[8]Cross-region correlation coefficient by sector un-weighted, between 1995 and 1980.