

**Dynamic Measures of Competitiveness:  
Are the Geese Still Flying in Formation?**

**Andrew K. Rose**

**U.C. Berkeley and visiting scholar, FRB San Francisco**

**Haas School of Business, Berkeley CA 94720-1900**

**Tel: (510) 642-6609; Fax (510) 642-4700; arose@haas.berkeley.edu**

Draft: April 29, 1997

**Introduction**

In this paper I examine new dynamic measures of competitiveness. I define a country to be “competitive” if it consistently export goods faster than others do. I use these measures to ask whether East Asian exports follow a pattern known informally as the “Flying Geese.” According to folklore, Japan tends to produce and export new goods before other Asian countries. As these goods become standardized and profit margins shrink, production shifts from Japan to the “four tigers” (Hong Kong, Korea, Singapore, and Taiwan), to take advantage of their lower labor costs, while Japanese production shifts to newer goods. Production and exports of the goods then continue to shift for much the same reasons from the four tigers to Malaysia and Thailand, on to Indonesia, and finally China. This pattern of exports across countries – the “geese flying in formation” -- is an empirical phenomenon often asserted in the literature, e.g., Petri (1992). This letter tests the Asian pattern of dynamic comparative advantage.

My estimates are mostly quite consistent with the folk wisdom. The Asian countries, to a first approximation, have exported goods in a pattern, which accords well with the “flying geese” pattern. I also show that Asian countries are quite “competitive” in the sense that they tend to export goods quickly compared to the rest of the world. Asian competitiveness has also increased since the early 1970s. In fact, I only find one piece of evidence inconsistent with folk wisdom. China seems to be much more competitive than is consistent with the “flying geese” pattern, and much more “competitive” than commonly considered.

**Measuring Export Competitiveness**

To gauge “competitiveness” I use the measure developed in Feenstra and Rose (1997); further details are available in that paper.

Intuitively, our measure relies on the fact that a country can be gauged to be “competitive” compared to other countries if it consistently exports goods faster than others do. Feenstra and I use this idea to rank the countries of the world by examining a large number of finely dis-aggregated goods. We exploit a comprehensive data set of American imports, which is dis-aggregated by source country and commodity at the 5-digit Standard International Trade Classification (SITC) level. This data set is available between 1972 and 1994. Our data span 160 countries and other geographical jurisdictions (which we refer to as “countries” for simplicity), and 1,434 commodities (“goods”). Examples of such commodities include: “Human Hair” (SITC code 29191); “Varnish Solvents” (59897); “Cotton Yarn 14-40 KM/KG” (65132), “High Carbon Steel Coils” (67272), and “Piston Aircraft Engines” (71311).

For each good and each country, we use only one datum, the *first year of export* to the United States. We then rank countries by the speed with which it exports goods. Countries that consistently export a randomly chosen good faster than others will be ranked high and considered to be “competitive.” Since we have many commodities, we can rank countries using cross-country variation in the year of first export.

Since our measure of competitiveness only uses the first year of export, it suffers from potential problems. Our measure ignores whether the trade is: artificial (it might be prompted by trade barriers); unimportant (in that trade volume might be very low), or profitable (in that the exports may not constitute value-added for the country). On the other hand, our measure is based only on dis-aggregated trade data for a comprehensive set of countries and commodities, and is consistent with a number of standard dynamic theories of international trade. There is certainly no presumption that the measure will work either well or poorly in practice; we let the data decide.

Our estimated country rankings turn out to be intuitive and sensible. Table 1 tabulates the “top twenty” and “bottom ten” countries in our rankings. Canada, Japan, the UK and Germany are ranked at the very top of our competitiveness orderings; Djibouti, Chad, the Falkland Islands and Equatorial Guinea appear at the bottom. Reassuringly, these country rankings are also robust to minor perturbations in our

statistical methodology. Further, our rankings, estimated solely with dis-aggregated bilateral trade data, turn out to be closely linked with macroeconomic phenomena. “Competitive” countries are systematically both richer (in terms of real GDP and productivity) and grow faster than others, even taking into account a variety of control factors. (My working paper with Feenstra provides further details.)

### **Shifting Patterns of Asian Competitiveness**

Our methodology allows us to rank *commodities*, relying on exactly the same sort of intuition as we use to estimate the country-rankings of Table 1. The idea is to exploit the variation across goods in the average year that they are first exported to the United States, and use this to rank commodities. We rely on the notion that goods exported more recently are more “sophisticated” than older goods. Given an estimate of the “sophistication” of a good, we can then estimate the “competitiveness” of say Canada in 1972, by averaging the rankings of individual goods by actual Canadian exports in 1972, and comparing this to the average for other countries in 1972. In this way we can construct competitiveness measures which vary year by year, as a country’s export basket changes over time. Countries that systematically shift their export basket towards newer, more “sophisticated” goods will then rise in our rankings and gain competitiveness over time.

In Figure 1, I plot the rankings from 1972 through 1994 of nine East Asian countries, which together constitute the “geese flying in formation”. As in Table 1, a lower number indicates a more competitive country; a country with a falling ranking is gaining competitiveness. Thus the Japanese data portrayed in the top left graphic indicate that Japan had a consistently high ranking – estimated level of competitiveness -- throughout the period.

The four tigers are ranked as roughly comparable by the end of the period, and quite competitive compared to the rest of the world. However, the data portray Hong Kong and Taiwan as consistently highly ranked throughout the period, while in contrast, Korea and Singapore enjoyed rising levels of competitiveness. Malaysia and Thailand start from initially lower rankings than the tigers, but experienced improving

competitiveness through the period. Indonesia started further back still, but also has shifted its export base rapidly and consequently has experienced rising competitiveness.

Taken as a whole, the country rankings are quite supportive of the “geese flying in formation” pattern. East Asian countries are also ranked vis-à-vis each other and the rest of the world in a very sensible and intuitive way. The measures further indicate that the countries are gaining competitiveness over time in a plausible fashion.

There is one striking and important exception: China. It is no surprise that China’s competitiveness has risen over time, as portrayed in the figure. The issue is that the *level* of Chinese competitiveness is much higher than commonly considered. The estimate of Chinese competitiveness is very high throughout the period, relative to both other Asian countries and the rest of the world. This high ranking is inconsistent with common sense, given that: a) the data sample begins before the Cultural Revolution of 1976, and b) China is still a relatively poor country. Unfortunately, I am currently unable to explain the mysteriously competitive ranking of China. It does not appear to stem from data anomalies linked to the special relationship of China and Hong Kong. It also does not seem to depend on the size of Chinese exports, since Chinese rankings weighted by import values are broadly comparable to the unweighted averages portrayed in figure 1. Then again, perhaps the Chinese ranking is not anomalous at all. As a large country, China might have had the capacity to maintain a (small) competitive export-based sector throughout the sample period.

## **Conclusion**

The East Asian “geese” seem to be “flying in formation” in close accordance with folk wisdom. Japan’s exports are consistently more competitive than those of the four tigers; the four tigers export goods faster than Malaysia, Thailand and Indonesia. Asian competitiveness is both high relative to the rest of the world and growing. All this seems intuitive and reasonable. The data only throw up one apparent anomaly. Chinese competitiveness is consistently much higher than one might expect. Given the importance of China and Chinese trade frictions in the world economy, this subject warrants further investigation.

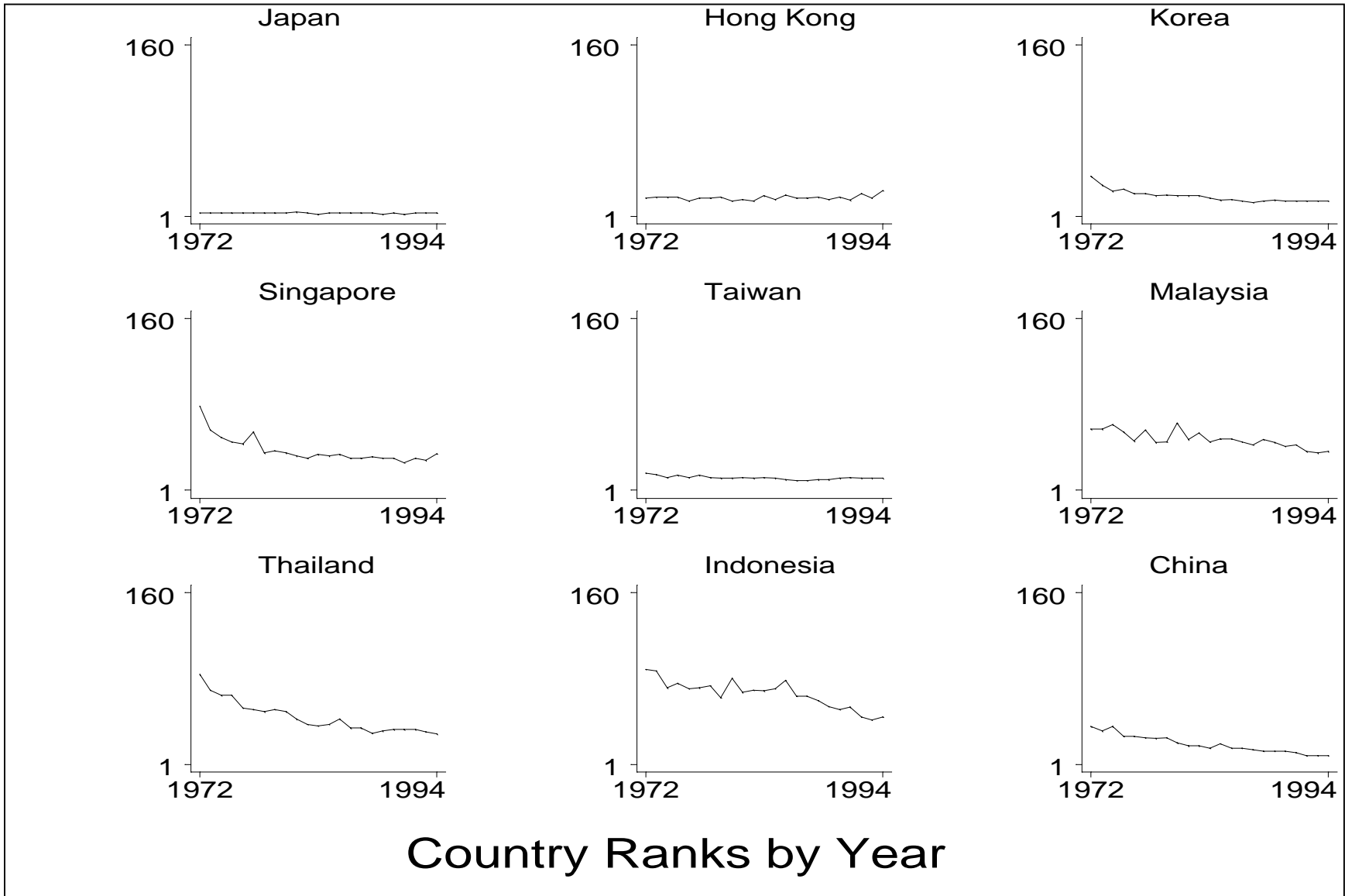
## **References**

Feenstra, Robert C. and Andrew K. Rose (1997) "Putting Things in Order: Patterns of Trade Dynamics and Growth" *National Bureau of Economic Research Working Paper #5975*.

Petri, Peter (1992) "One Bloc, Two Blocs or None?" in *The U.S.-Japan Economic Relationship in East and Southeast Asia* (Okuzumi, Calder and Gong, Eds.) Significant Issues Series, XIV-1, Washington, Center for Strategic and International Studies.

**Table 1: Top and Bottom 20 Country Rankings**

<b>CANADA</b>	1
<b>U.K.</b>	2
<b>GERMANY</b>	3
<b>JAPAN</b>	4
<b>FRANCE</b>	5
<b>ITALY</b>	6
<b>MEXICO</b>	7
<b>NETHLD</b>	8
<b>BELG/LUX</b>	9
<b>SWITZLD</b>	10
<b>SWEDEN</b>	11
<b>SPAIN</b>	12
<b>TAIWAN</b>	13
<b>HONG KONG</b>	14
<b>DENMARK</b>	15
<b>BRAZIL</b>	16
<b>AUSTRIA</b>	17
<b>AUSTRALIA</b>	18
<b>INDIA</b>	19
<b>S KOREA</b>	20
...	
<b>CAMBODIA</b>	151
<b>MONGOLIA</b>	152
<b>GAMBIA</b>	153
<b>C AFRICA</b>	154
<b>SOMALIA</b>	155
<b>FR INDO</b>	156
<b>CHAD</b>	157
<b>DJIBOUTI</b>	158
<b>FALK IS</b>	159
<b>EQ GNEA</b>	160



**Figure 1: Asian Competitiveness Rankings**