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# IS JAPAN'S TRADE (STILL) DIFFERENT?

James Harrigan
Rohit Vanjani

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**ABSTRACT**

Does Japanese trade in manufactured goods differ from the rest-of-the world average and from the U.S.? We use a simple industry-level gravity model and 1981-1998 data to answer this question. We construct a measure of normalized imports by dividing bilateral industry-level imports by the importer's aggregate absorption and the exporter's industry output. We find that Japan imports less than other countries, but also exports less than other countries. Relative to the U.S., Japanese export performance is half as strong today as it was in the mid-1980s. Bilaterally, Japan’s normalized imports from the U.S. are greater than U.S. normalized imports from Japan.

James Harrigan
International Research Department
Federal Reserve Bank of New York
33 Liberty Street
New York, NY 10045
and NBER
james.harrigan@ny.frb.org

Rohit Vanjani
Federal Reserve Bank of New York

## 1. Introduction

Japan is one of the world's great trading nations, accounting for 7.5% of world merchandise exports in 1999[2]. It is also one of the world's great savers, with a cumulated current account surplus of over 1.6 trillion dollars since 1977[3]. Japan's export success combined with its frugality means that it runs large trade surpluses, most notably with the United States, and these surpluses have in the past been a source of political tension between the U.S. and Japan. Many in the U.S. have claimed that Japan artificially keeps out U.S. exports while taking advantage of the open U.S. market (see, for example, Johnson et. al. 1989).

While such mercantilist thinking makes little sense to economists, the large and persistent trade imbalances between the U.S. and Japan have been of interest to researchers, including Lawrence (1987), Leamer (1988), Saxonhouse (1989), and Harrigan (1996). Most of the earlier literature on Japan's openness looked at the mid-1980s, when the dollar was exceptionally strong and U.S. manufacturing was struggling as a result. In this paper we return to the question of Japan's openness, and ask, how does Japan's trade differ from "normal"? We define "normal" with reference to a simple and flexible model of bilateral trade, the gravity model, which has been widely used by trade analysts. Using the model, we perform a detailed but straightforward analysis of industry-level trade and production for a group of OECD countries between 1981 and 1998, and reach some surprising conclusions:

1. Japan does import less than most countries, including the U.S...

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[2] authors' calculations from UNCTAD Handbook of Statistics, 2000, Table 1.1.

[3] authors' calculations from World Bank World Development Indicators database, in current U.S. dollars.

2. ...but Japan also exports much less than most countries, including the U.S.
3. Focusing on the U.S.-Japan bilateral relationship, we find that after the mid-1980s, Japan's relative export performance has been consistently weaker than that of the U.S.
4. As a result, far from finding evidence of Japan being closed to U.S. exporters, we find that the U.S. is comparatively closed to Japanese exporters.

Our results have important implications for the policy debate. Many analysts (most notably Svensson, 2001) have argued that Japan needs a large nominal depreciation of the yen to rescue it from deflation. Such a nominal depreciation would lead to an at least temporary real depreciation, which would boost net exports to the U.S. The political risks of pursuing a weak-yen policy are among the excuses given by Japanese policymakers for not adopting Svensson's proposal. Our analysis suggests that such an adjustment is warranted by the fundamentals of supply and demand for industrial production in the two countries, since in a well-defined sense the U.S. imports "too little" from Japan while Japan imports "too much" from the U.S.

**2. Methodology**

Nobody is surprised that Germany exports more manufactured goods than Uganda, nor does anybody suggest that Saudi Arabia's trade surplus in crude oil is due to unfair Saudi restrictions on imports of oil. Similarly, no one thinks that the small volume of imports by Iceland compared to France is due to greater French openness. The perceived normalcy of such trade patterns is rooted in basic notions of supply and demand: Germany exports a lot of manufactured goods because it produces a lot of manufactures; Iceland doesn't import much because it has a small GNP; Saudi Arabia doesn't import oil because it doesn't need any, etc.

We believe that such common-sense reasoning can be applied to more subtle questions about trade patterns. Since the purpose of our paper is to see if Japan's trade is "different", we need a benchmark for "normal" trade. We begin with an extremely simple benchmark for imports:

$$m_{icd} = s_c y_{id} \quad (1)$$

where

$m_{icd}$ = the nominal value of imports of industry-*i* products by country *c* from country *d*

$s_c$ = country *c*'s share of world expenditure

$y_{id}$ = country *d*'s nominal output in industry *i*.

Equation (1) states that the value of imports is proportional to the exporting country's output, with the factor of proportionality given by the importer's country size. Microfoundations of (1) as the equilibrium of a free-trade model are available from Helpman and Krugman (1985), Eaton and Kortum (2002), and others, but the economic logic could not be simpler: imports depend on supply (exporter output) and demand (importer size). Re-writing (1) slightly gives normalized imports $\hat{M}_{icd}$ as

$$\hat{M}_{icd} = \frac{m_{icd}}{A_c y_{id}} = k \quad (2)$$

where $A_c$ is country *c*'s aggregate absorption (GDP minus the current account surplus) and *k* is a constant (equal to the inverse of world GDP). Note that by controlling for the level of industrial output, equations (1) and (2) implicitly take account of anything that influences output, such as relative factor supplies, technological differences, and economic policy.

Common observation and reams of statistical evidence show that transport costs influence trade patterns, with (ceteris paribus) trade flows decreasing in the distance between trading partners. This effect of distance probably includes more than simple transport costs, and may reflect differences in tastes, communication and coordination costs, and other trade-impeding effects that increase with distance. The recent gravity literature (for example, Deardorff 1998 and Harrigan 2002) emphasizes the importance of relative as well as absolute distance between a pair of countries (the simplest intuition comes from thinking about the example of trade between Australia and New Zealand: these two countries trade a lot, despite the great distance between them, at least in part because both are so far from all their other trading partners). As shown by Harrigan (2002) among others, the effects of relative and absolute distance in a standard gravity model can be captured very simply with country intercepts and information on distance:

$$\log \hat{M}_{icd} = \gamma_c + \gamma_d - \sigma \log d_{cd} \tag{3}$$

where the $\gamma$'s are coefficients on indicator variables for country $c$ as an importer and country $d$ as an exporter respectively, and $\sigma$ is the elasticity of trade with distance.

A final consideration is that (3) implicitly asserts that the volume of trade is the same for all goods. This is obviously an oversimplification, since some goods and services are nontradeable (restaurant meals, hotel rooms) while others are highly traded (transport equipment - see below for evidence on this). A simple (if ad hoc) way to account for such product-level heterogeneity is to introduce product-specific intercepts $\gamma_i$ into (3):

$$\log \hat{M}_{icd} = \gamma_i + \gamma_c + \gamma_d - \sigma \log d_{cd} \tag{4}$$

As discussed in Harrigan (1996), the product-specific intercepts $\gamma_i$ can be derived from a model of differentiated goods and home bias in demand, where the degree of home bias differs by products. In the absence of product-specific intercepts, (3) can be summed over industries *i* to give the aggregate gravity equation which has served as the basis for innumerable studies. As we show below, however, there are big differences across industries in the share of goods that are traded internationally, suggesting that aggregate gravity equations are misspecified.

Equation (4) has two interpretations. The first is that equilibrium imports depend not just on importer size and exporter output but also on product characteristics and geography. The second interpretation is purely descriptive, and regards the intercepts $\gamma$ and the distance elasticity $\sigma$ as reduced form parameters that describe how actual imports differ from the free-trade benchmark given by (2). Such differences might be due to geography, national trade barriers, comparative advantage, or any other unmeasured influences on trade which are country or product specific.

An alternative way of describing deviations from the free-trade benchmark is to add industry and country-pair intercepts to (2):

$$\log \hat{M}_{icd} = \gamma_i + \gamma_{cd} \qquad (5)$$

Equation (5) does not include a control for bilateral distance since such effects are controlled for by the country-pair intercepts. It is more general than (4) in the way that it allows bilateral factors to influence trade.

**3. Data analysis**

Our approach in the rest of the paper is to use equations (4) and (5) as a basis for discovering how Japan's trade differs from that of the rest of the world. This is a strictly reduced form, descriptive question, and we are not interested in any hypothesis other than "is Japan different?" This is a modest goal, but a sensible answer to this question must precede any more in-depth analysis of Japan's trade performance.

We use a large database on industry output and bilateral imports, primarily within the OECD, from 1981 to 1998. The data is assembled by the World Bank, and is available from their website[4]. Our study builds on the work of Harrigan (1996) in two ways: first, we include measures of distance in (4), and second, we look at a long time series rather than a single year (Harrigan (1996) looked only at 1985). We estimate (4) and (5) using least squares, ignoring any endogeneity between trade, output, GNP and any other unmeasured variables for the simple reason that our questions are reduced form rather than structural questions.

Table 1 lists the 26 3-digit ISIC industries and 24 countries used in the analysis, although not all industry data is available for all countries for all years. The countries include most of Japan’s major trading partners, including the Asian Tigers of Korea, Hong Kong, and Taiwan, but exclude China. Figure 1 shows that the sample includes between 60 and 75 percent of Japan’s trade in manufactured goods for most of the sample. The figure also illustrates the growing importance of China as a source of imports, but not as an export destination. Table 2 shows our first major finding, which is the great heterogeneity across sectors in the share of industry output that is traded. The table reports total bilateral imports within a group of countries divided by total gross output within the same group; since the ratios exclude imports by countries for which we have no output data, it is biased down as a measure of total trade. Table 2 shows that Food is the least-traded large industry, with less than 5 percent of output entering international trade (keep in mind that this category excludes raw agricultural products). The machinery sectors (ISIC 382 to 385) are highly traded, with between 15 and 25 percent of output traded by 1993. The influence of tastes and transport costs are clearly evident: Printing and Publishing (where language is key) is the least traded sector, with (very heavy) cement second from the bottom. There is also a clear upward trend in tradeability in most sectors between 1981 and 1993 (1997 is not comparable because of missing data for three large countries). For our purposes, though, the main point of Table 2 is heterogeneity: countries may differ in their aggregate trade-GDP ratio merely due to a different composition of output.

Table 3 shows our estimates of equation (4) for various years from 1981 through 1998. The dependent variable is normalized imports, as defined in equation (2): gross imports divided by the importer's aggregate absorption and the exporter's industry output. Normalized imports are regressed on bilateral distance and importer, exporter, and industry fixed effects for each year from 1981 to 1998. In each cross-section regression, the U.S. is the excluded importer and exporter fixed effect, so each reported fixed effect measures the proportionate difference with the U.S. The results for Japan are summarized in Figures 2 and 3, and tell a simple story: controlling for country size, industry output, bilateral distance, and industry fixed effects, Japan imports much less than the U.S. does, but also exports much less than the U.S. On the import side, Japan's openness to imports is around 40 percent of the U.S. level, with not much change over the sample. As an exporter there is a striking trend: in the mid-1980s, Japan was exporting about 60 percent as much as the U.S., but this relative success

[4] http://www1.worldbank.org/wbiep/trade/tradeandproduction.html

deteriorated steadily until, by 1998, Japan was exporting just a quarter as much as the U.S.

As an aside, Table 3 contains some surprising results on the importance of distance for trade. The distance estimates are illustrated in Figure 4, and show no trend: the elasticity of trade with respect to distance is -1.25 in the latter half of the 1990s, and this is not significantly different from the level in 1981. So much for the death of distance.

Table 3 is striking evidence that, after controlling for country size, distance, and industry composition in a simple way, Japan is not a very open country, if openness is taken to mean the share of output which is exported and the share of consumption which is imported. But such a measure of openness is not directly germane to the politically sensitive question of bilateral trade imbalances. Figure 5 illustrates the U.S.-Japan manufacturing trade balance, which has been consistently negative. Is this imbalance partly due to Japanese import barriers (either explicit or implicit)? We address this question by estimating equation (5), which regresses log-normalized imports on product and country-pair fixed effects. The estimated country-pair effects control for influences on bilateral imports that are specific to that importer-exporter pair, such as average transport costs, import barriers, and taste differences. There are two parameters estimated for any pair of trading partners $c$ and $d$, one each for $c$ as an importer from $d$ ($\lambda_{cd}$) and for $d$ as an importer from $c$ ($\lambda_{dc}$). This suggests a natural test for bilateral symmetry in the trading relationship: is $\lambda_{cd}$ equal to $\lambda_{dc}$? This can be interpreted as a test for trade balance in normalized imports, and answers the question: once supply, demand, and common bilateral factors have been controlled for, is there any difference in bilateral openness between $c$ and $d$?

Table 4 reports the results of such a symmetry test for the U.S. and Japan in each year of the sample. Equation (5) is estimated separately each year using all available data for that year. The table reports the difference between the fixed effect for U.S. imports from Japan and the fixed effect for Japanese imports from the U.S., $\lambda_{US,Japan} - \lambda_{Japan,US}$ ; this is then transformed by exponentiating the difference and subtracting one to give the proportionate difference between U.S. imports from Japan and Japanese imports from the U.S. The null hypothesis of equal bilateral openness is tested using a *t*-test, and the results are graphed in Figure 6. Strikingly, in no year is Japan less open to the U.S. than the U.S. is to Japan. The point estimates for the mid-1980s suggest that Japan was slightly less open to the U.S. than vice versa, but this difference is never statistically significant. A decade later, however, the point estimate is that the U.S. is half as open to imports from Japan as Japan is from the U.S., and this difference is statistically significant from zero at the 10% level. In short, controlling for industry output and country size, the U.S. runs a trade *surplus* in manufactures with Japan!

This is not a result that sits easily with the raw data of Figure 5, which shows a large and persistent bilateral U.S.-Japan trade deficit in manufactures. What accounts for our results? Two things:

1. Japan has a manufacturing sector which is larger as a share of GDP (24 percent in 1988) than the U.S.'s (16 percent). This means that Japanese supply of manufactured goods is proportionately larger than U.S. supply.
2. Japan has large and persistent current account surpluses (3 percent of GDP in 1998), while the U.S. has large and persistent current account deficits (-2.5 percent). This means that the U.S. has a proportionately larger demand for manufactured goods than does Japan.

These two factors together mean that normalized U.S. imports from Japan are larger than normalized Japanese imports from the U.S. Actual U.S. imports as a share of normalized imports are smaller than Japanese normalized imports as a share of actual imports, and this is what accounts for the results showing a "normalized" U.S. manufacturing trade surplus with Japan.

## 4. Conclusions

This paper has addressed the question of its title using a lot of data and a little bit of economics. We defined normalized imports as bilateral imports adjusted for supply (exporter output) and demand (importer absorption). Normalized imports are equilibrium imports in a free-trade model of trade in differentiated goods such as that developed in Helpman-Krugman (1985), but the motivation for such a normalization is nothing more than basic supply and demand.

Our results are striking. We confirm the conventional wisdom that Japan imports relatively little, and verify the less-well known fact that Japan exports relatively little - indeed, compared to the U.S., Japan's export performance has been deteriorating for more than 15 years. Turning to the perennially contentious U.S.-Japan bilateral relationship, we find that Japan is *more*, not less, open to imports from the U.S. than the U.S. is to imports from Japan.

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**Table 1**
**Dataset features**

*Importing/Exporting Countries*

Australia, Austria, Canada, Denmark, Finland, France, Great Britain, Germany, Greece, Hong Kong, Hungary, Ireland, Italy, Japan, S. Korea, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Taiwan, and USA.

*Product Classification System*

The three digit level of the International Standard Industrial Classification (ISIC), which consists of 26 manufacturing categories whose official titles are

| | |
|---|---|
| 311 | Food |
| 313 | Beverages |
| 314 | Tobacco |
| 321 | Textiles |
| 322 | Clothing |
| 323 | Leather, except clothing and shoes |
| 324 | Leather shoes Leather shoes |
| 331 | Wood products except furniture |
| 332 | Wood furniture |
| 341 | Paper and paper products |
| 342 | Printing and publishing |
| 351 | Basic chemicals |
| 352 | Misc. chemical products |
| 355 | Rubber products |
| 356 | Misc. plastic products |
| 361 | Pottery, China, and earthenware |
| 362 | Glass and glass products |
| 369 | Cement, clay products, etc. |
| 371 | Basic iron and steel |
| 372 | Basic non-ferrous metals |
| 381 | Various fabricated metal products |
| 382 | Non-electrical machinery |
| 383 | Electrical machinery |
| 384 | Transport equipment |
| 385 | Cameras, clocks, measuring equip., etc. |
| 390 | Misc. manufactures |

Industries 353, Products of oil refineries, and 354, Misc. products of petroleum and coal were excluded.

*Sources*

Import and output data for the years covering 1981-1998 were taken from the World Bank Trade and Production database.

**Table 2**
**Share of gross industry output which is traded**

| Industry | Product Description | Within-group imports as a percent of gross output 1981 | 1985 | 1989 | 1993 | 1997 |
|---|---|---|---|---|---|---|
| 311 | Food | 3.7 | 3.9 | 4.5 | 4.6 | 3.3 |
| 313 | Beverages | 6.1 | 6.8 | 7.6 | 7.5 | 3.8 |
| 314 | Tobacco | 4.6 | 3.8 | 3.9 | 4.4 | 3.8 |
| 321 | Textiles | 9.8 | 10.8 | 12.2 | 11.9 | 6.9 |
| 322 | Clothing | 9.1 | 11.2 | 14.5 | 12.0 | 6.5 |
| 323 | Leather, except clothing and shoes | 18.9 | 21.9 | 22.3 | 20.2 | 12.0 |
| 324 | Leather shoes | 21.5 | 30.9 | 34.5 | 26.1 | 13.9 |
| 331 | Wood products except furniture | 9.6 | 9.9 | 10.6 | 10.0 | 11.2 |
| 332 | Wood furniture | 5.5 | 7.5 | 8.7 | 7.9 | 6.2 |
| 341 | Paper and paper products | 10.5 | 11.0 | 13.6 | 12.3 | 8.5 |
| 342 | Printing and publishing | 2.3 | 2.2 | 2.5 | 2.3 | 1.7 |
| 351 | Basic chemicals | 13.7 | 16.0 | 18.4 | 15.1 | 13.2 |
| 352 | Misc. chemical products | 8.2 | 9.1 | 10.6 | 11.5 | 8.3 |
| 355 | Rubber products | 10.3 | 10.9 | 14.1 | 15.6 | 11.0 |
| 356 | Misc. plastic products | 5.0 | 5.0 | 5.7 | 5.3 | 3.5 |
| 361 | Pottery, China, and earthenware | 11.9 | 13.9 | 11.9 | 12.7 | 9.9 |
| 362 | Glass and glass products | 8.7 | 10.6 | 12.5 | 13.5 | 10.4 |
| 369 | Cement, clay products, etc. | 3.4 | 4.0 | 4.8 | 3.7 | 2.4 |
| 371 | Basic iron and steel | 8.3 | 9.2 | 9.9 | 8.2 | 6.5 |
| 372 | Basic non-ferrous metals | 11.2 | 12.7 | 15.1 | 13.8 | 11.2 |
| 381 | Various fabricated metal products | 6.2 | 6.9 | 7.7 | 7.2 | 5.4 |
| 382 | Non-electrical machinery | 13.6 | 16.9 | 19.6 | 18.9 | 13.1 |
| 383 | Electrical machinery | 10.4 | 12.9 | 15.3 | 16.0 | 13.3 |
| 384 | Transport equipment | 17.0 | 19.7 | 20.7 | 20.2 | 15.1 |
| 385 | Cameras, clocks, measuring equip., etc. | 20.5 | 22.8 | 22.8 | 23.5 | 16.5 |
| 390 | Misc. manufactures | 14.3 | 15.4 | 18.8 | 16.0 | 12.9 |

Countries included are Austria, Canada, Germany, Denmark, Spain, Finland, France, Great Britain, Greece, Ireland, Italy, Japan, Korea, Portugal, Sweden, and USA through 1994. The basket of countries excludes Germany, France and Italy from 1994 to 1997. Excluded Industries are 353 (Products of oil refineries) and 354 (Misc. products of petroleum and coal). Missing output values for individualized countries, years and industries include:
France 361 for all years, Germany 331, 351, and 390 in 1993, Great Britain 369, 371 in 1993, and Finland 351, 382 in 1997.
For all of these values, the imports and output values are not included in the calculation of the ratio.

**Table 3**
**Japanese import/export estimates with respect to the US**

| | Log distance | Importer Fixed Effects Est. | Importer Fixed Effects e^(Est) | Exporter Fixed Effects Est. | Exporter Fixed Effects e^(Est) |
|---|---|---|---|---|---|
| 1981 | -1.329 | -.932 | 0.394 | -.656 | 0.519 |
| | *.021* | *.104* | | *.102* | |
| 1982 | -1.298 | -.818 | 0.441 | -.571 | 0.565 |
| | *.021* | *.103* | | *.101* | |
| 1983 | -1.332 | -.846 | 0.429 | -.513 | 0.598 |
| | *.021* | *.102* | | *.100* | |
| 1984 | -1.333 | -.966 | 0.380 | -.459 | 0.632 |
| | *.021* | *.101* | | *.100* | |
| 1985 | -1.324 | -1.087 | 0.337 | -.449 | 0.638 |
| | *.020* | *.099* | | *.097* | |
| 1986 | -1.279 | -1.240 | 0.289 | -.706 | 0.493 |
| | *.020* | *.098* | | *.097* | |
| 1987 | -1.265 | -1.121 | 0.326 | -.734 | 0.480 |
| | *.020* | *.097* | | *.096* | |
| 1988 | -1.267 | -.983 | 0.374 | -.955 | 0.385 |
| | *.020* | *.096* | | *.095* | |
| 1989 | -1.281 | -.775 | 0.461 | -1.092 | 0.335 |
| | *.020* | *.095* | | *.094* | |
| 1990 | -1.261 | -.677 | 0.508 | -1.166 | 0.312 |
| | .020 | .095 | | *.093* | |
| 1991 | -1.258 | -.761 | 0.467 | -1.319 | 0.267 |
| | *.019* | *.094* | | *.091* | |
| 1992 | -1.250 | -.844 | 0.430 | -1.328 | 0.265 |
| | *.019* | *.094* | | *.091* | |
| 1993 | -1.165 | -1.017 | 0.362 | -1.401 | 0.246 |
| | *.020* | *.095* | | *.089* | |
| 1994 | -1.186 | -.991 | 0.371 | -1.500 | 0.223 |
| | *.020* | *.096* | | *.090* | |
| 1995 | -1.227 | -.873 | 0.418 | -1.682 | 0.186 |
| | *.021* | *.103* | | *.093* | |
| 1996 | -1.249 | -.877 | 0.416 | -1.585 | 0.205 |
| | *.022* | *.108* | | *.094* | |
| 1997 | -1.254 | -.777 | 0.460 | -1.497 | 0.224 |
| | *.023* | *.109* | | *.091* | |
| 1998 | -1.258 | -.813 | 0.443 | -1.314 | 0.269 |
| | *.026* | *.120* | | *.091* | |

Partial regression results for equation (4) where the dependent variable is log normalized imports. Standard errors in italics.

**Figure 1**
**Japan's trade in manufactured goods**

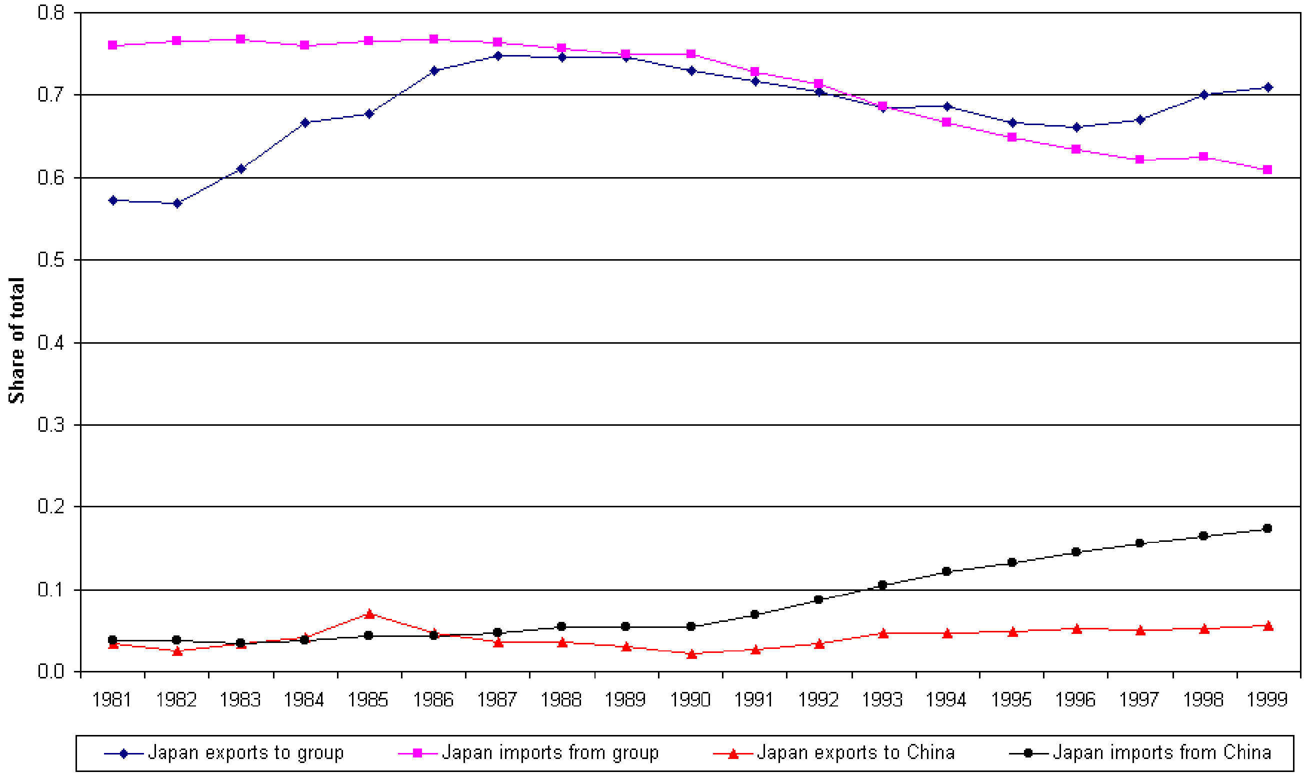


**Figure 2**
**Imports relative to the US**

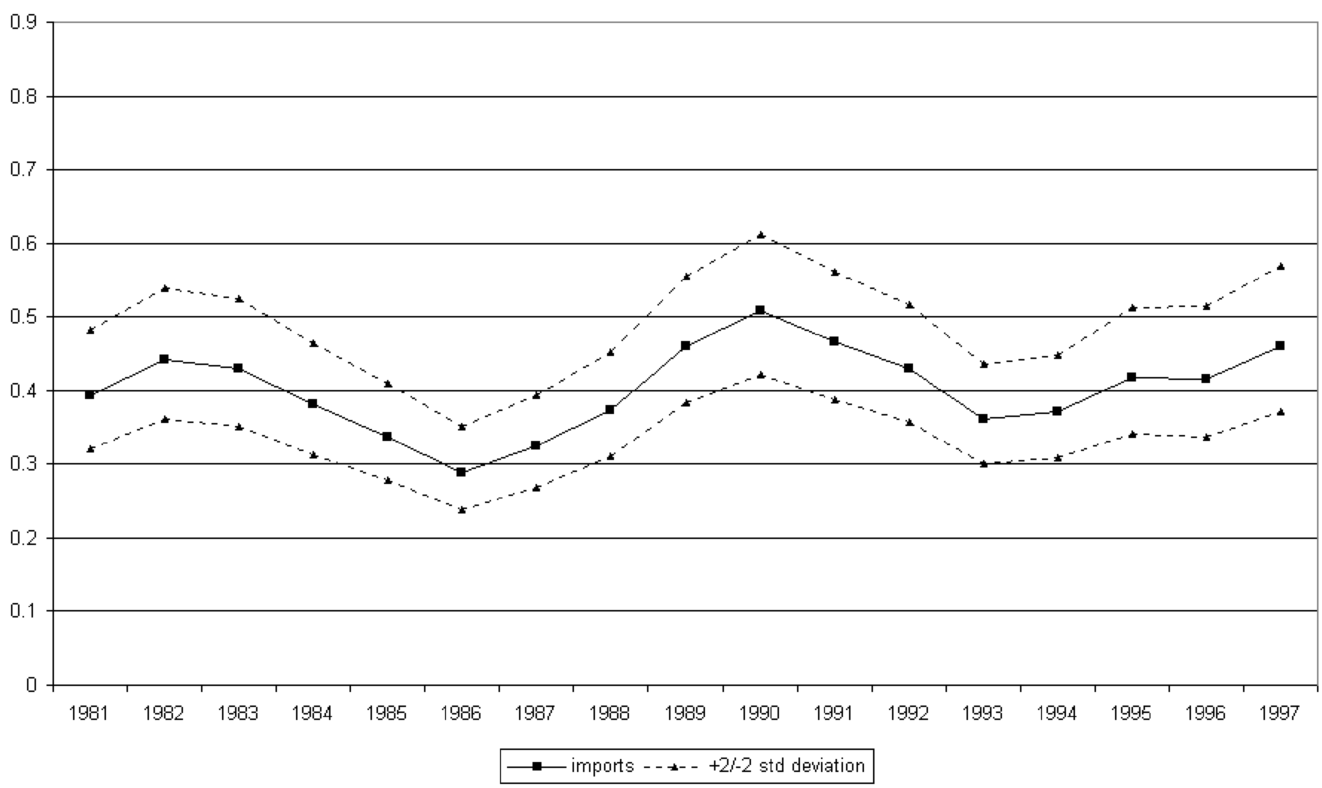

**Figure 3**
**Exports relative to the US**

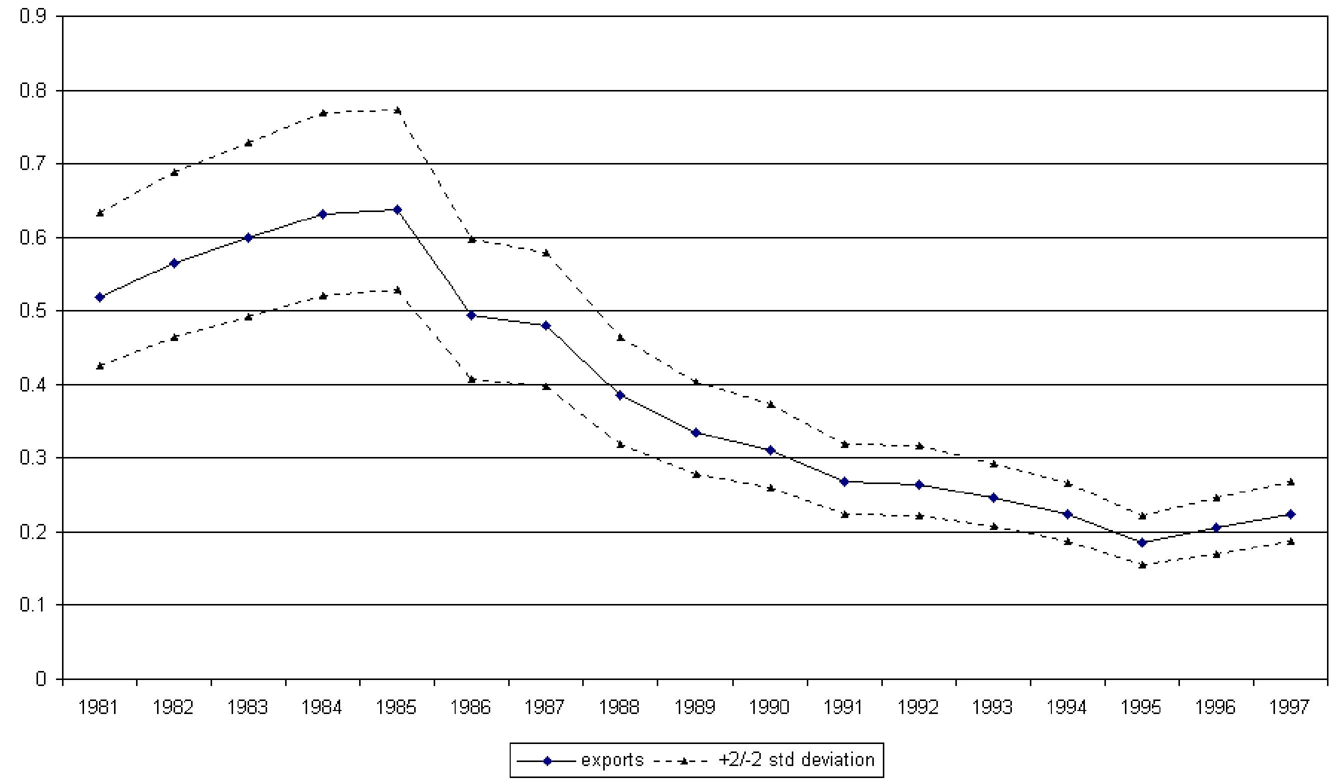


**Figure 4**
**Trade elasticity with respect to distance**

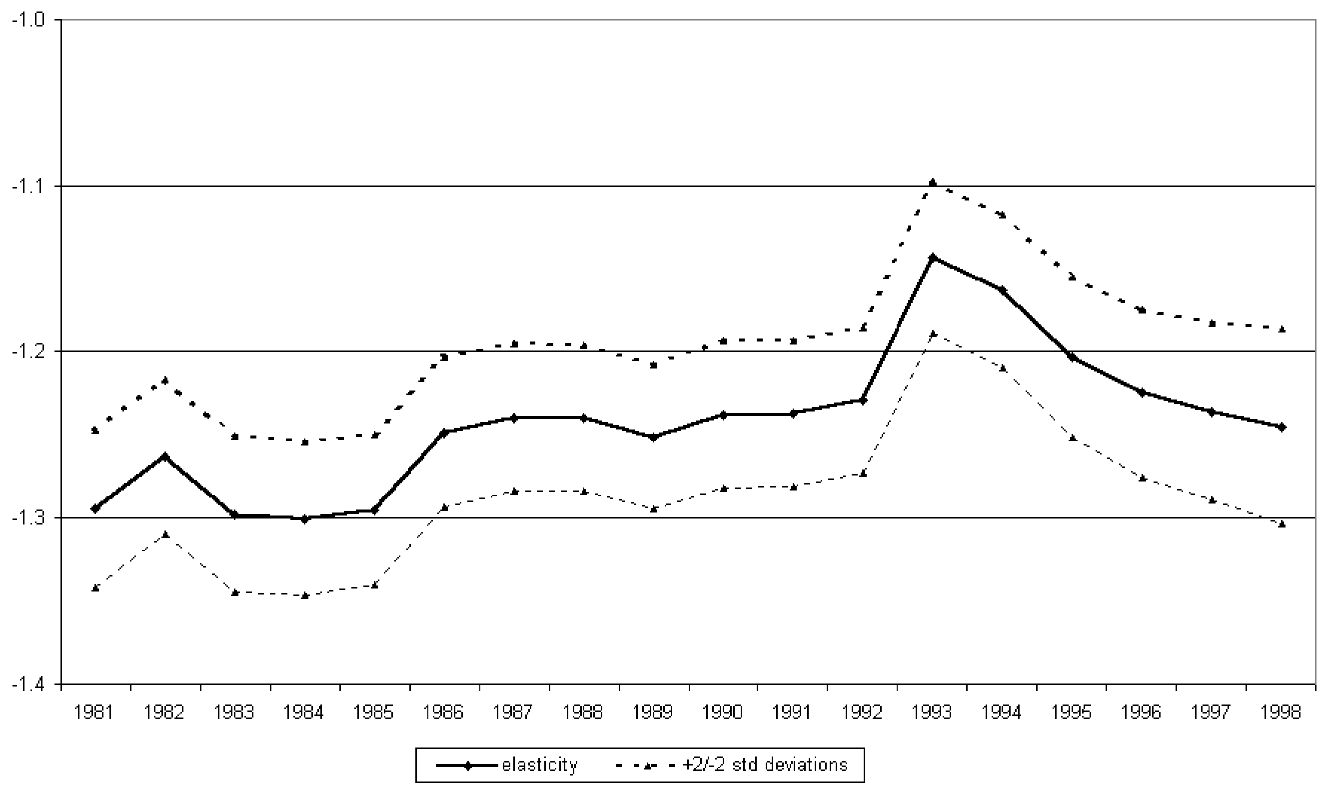

**Figure 5**
**Aggregate Japan-USA trade in manufactures**

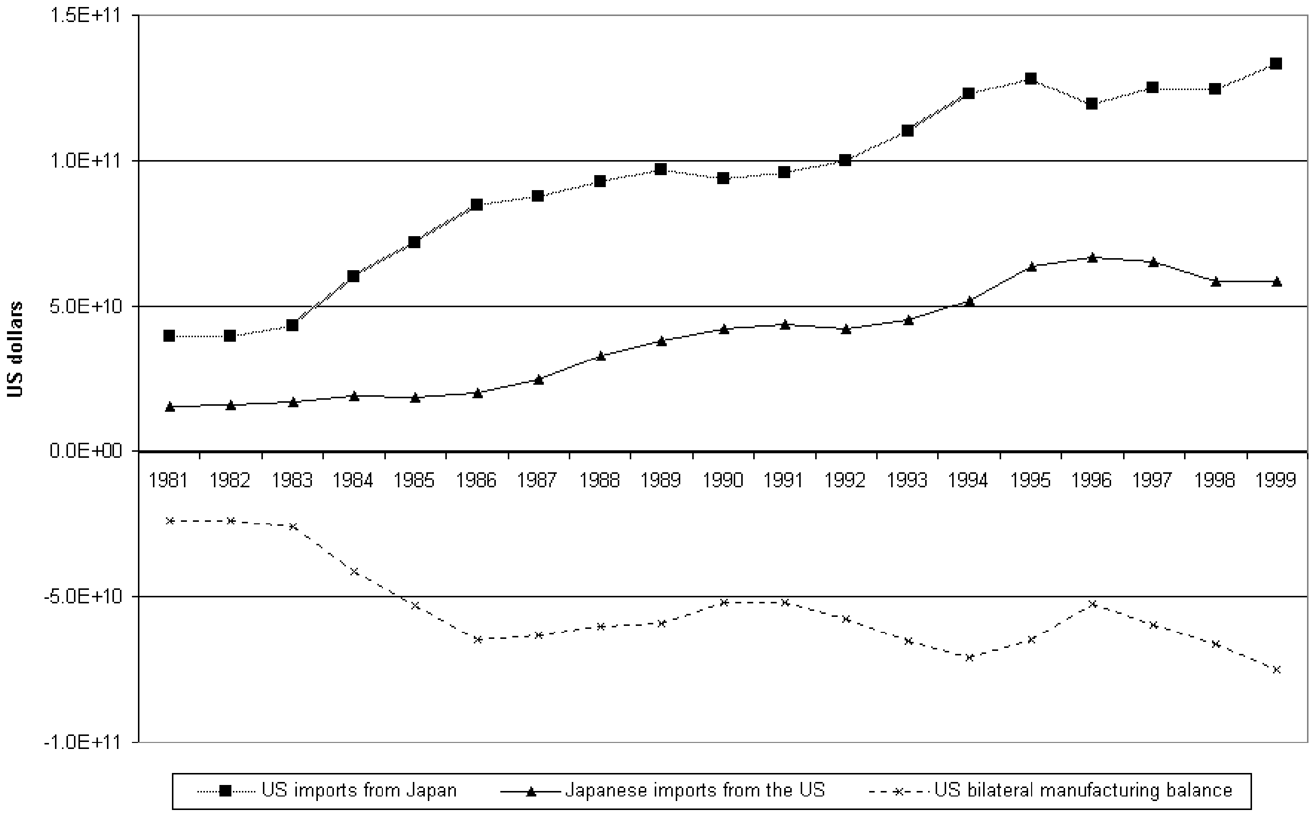


**Figure 6**
**US importer dummy - Japan importer dummy**

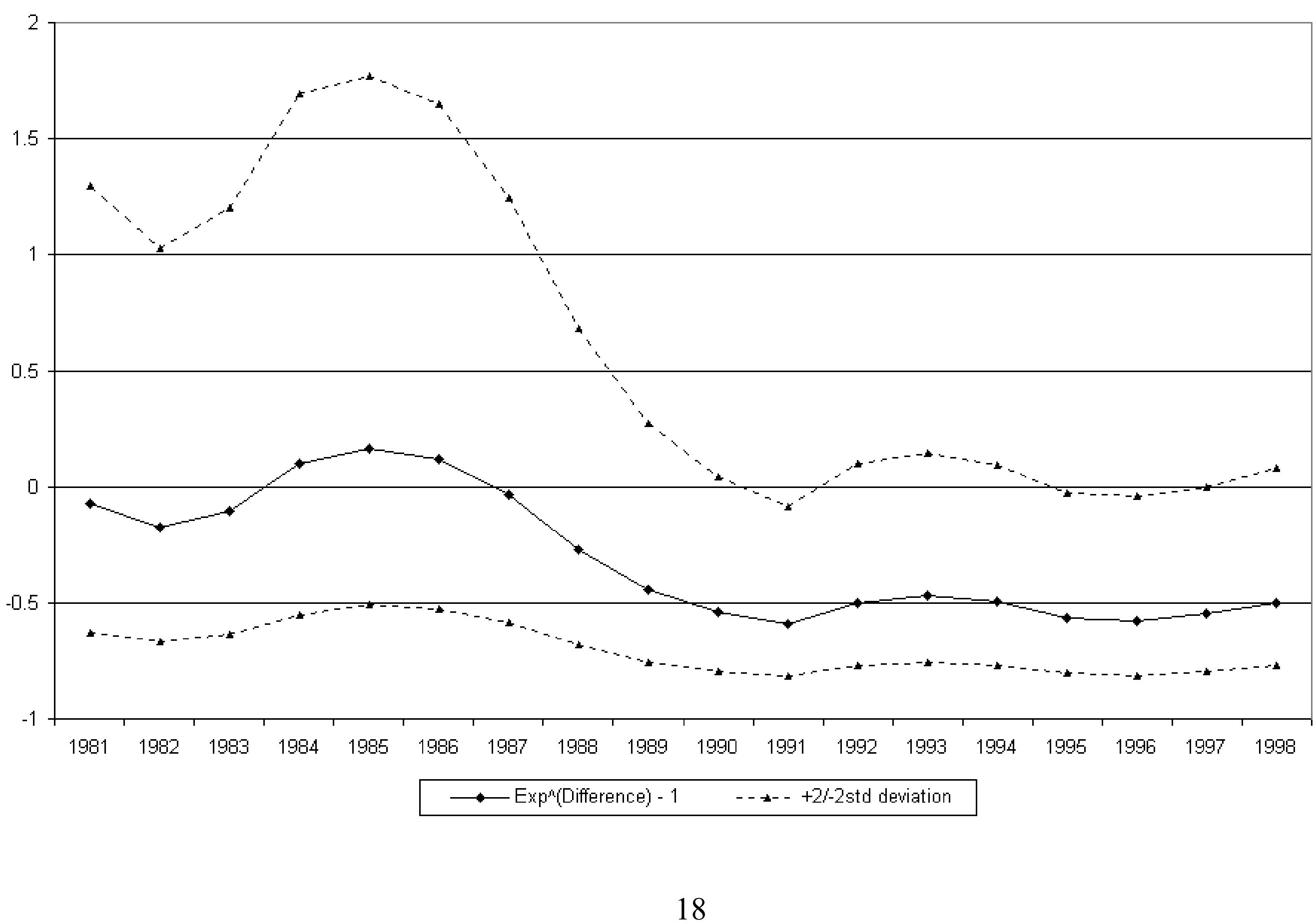

**Table 4**
**Bilateral symmetry in the US-Japan trading relationship**

| Year | US dummy-Japan dummy | t-statistic | e^(Difference) - 1 |
|---|---|---|---|
| 1981 | -0.078 | 0.172 | -0.075 |
| 1982 | -0.194 | 0.430 | -0.176 |
| 1983 | -0.111 | 0.246 | -0.104 |
| 1984 | 0.096 | 0.215 | 0.101 |
| 1985 | 0.153 | 0.352 | 0.165 |
| 1986 | 0.115 | 0.268 | 0.122 |
| 1987 | -0.035 | 0.084 | -0.035 |
| 1988 | -0.314 | 0.754 | -0.270 |
| 1989 | -0.587 | 1.418 | -0.444 |
| 1990 | -0.770 | 1.897 | -0.537 |
| 1991 | -0.887 | 2.214 | -0.588 |
| 1992 | -0.691 | 1.758 | -0.499 |
| 1993 | -0.633 | 1.647 | -0.469 |
| 1994 | -0.683 | 1.763 | -0.495 |
| 1995 | -0.826 | 2.074 | -0.562 |
| 1996 | -0.856 | 2.105 | -0.575 |
| 1997 | -0.785 | 2.000 | -0.544 |
| 1998 | -0.691 | 1.801 | -0.499 |

Partial regression results for equation (5), reporting the difference between the fixed effect for US imports from Japan and the fixed effect for Japanese imports from the US. The t-statistic tests the null that the difference is zero.