

Transient Products but Persistent Trade Patterns

James Cassing & Steven Husted
Department of Economics
University of Pittsburgh

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ABSTRACT

We have combined our findings of widespread bilateral trade-share persistence with some recent empirical evidence of substantial and rapid volatility in the country source of most products in order to extend the implications of this literature in several ways. In particular, we are able to infer that countries are frequently switching to very different products in their export bundles to particular destinations. We also argue that the evidence of rapid product turnover in trade is not inconsistent with traditional factor endowment trade pattern predictions, as has been inferred in the literature. Finally we find that sunk costs in international trade appear to be external to particular products going to particular destinations but internal to the sum total of bilateral trade.

JEL codes: F14, F17

Key Words : Bilateral trade; Duration of trade; Export sunk costs

Correspondence :

Professor James H. Cassing
4908 Wesley W. Posvar Hall
University of Pittsburgh
Pittsburgh PA 15260 USA

e-mail: jcassing@pitt.edu
ph: 412 648 8746
fax: 412 648 1793

1. Introduction

In a series of recent papers Besedeš (2007) and Besedeš and Prusa (2006a, 2006b) (hereafter BP) provide studies of the duration of bilateral trade relationships at the product and industry level in the U.S. import market between 1972 and 2001. These papers contain a number of interesting and somewhat surprising findings. Specifically, they report that trade patterns by product are fleeting: There are many short-lived trade relationships wherein a country sells a product to the United States for a few years and then stops. They find in fact that a majority of all trade relationships are observed for only a single year and roughly 80% are observed for less than five years. BP go on to state that product aggregation within a given industry does not overturn their findings of short-lived trading relationships. While BP look only at U.S. imports, a clear implication of their findings is that country-product trade relationships are transient in world trade, and that this casts doubt on factor endowment based (H-O) explanations of trade while lending support to models such as that developed by Rauch (1999) that emphasize the importance of search costs in understanding trade flows. In addition, BP also show that the degree of transience in international trade relationships depends crucially on the type of product involved. Homogeneous goods are more transient.

In this paper, we focus on the behavior of aggregate bilateral trade flows for a large number of countries over roughly the same period analyzed by BP in their studies. Our analysis helps to answer a number of questions raised by BP; it also shows that some of the BP findings are not inconsistent with factor endowments based trade theory. Indeed, one of our main findings is that, at least for the period in question, even though product/industry level trade may be transient worldwide, country trade patterns are remarkably stable as H-O would predict if

endowments and preferences are not themselves changing rapidly. We argue below that one important finding in BP may help to explain what we characterize as “trade pattern persistence”.

Our paper proceeds as follows. We begin with a brief description of our own research wherein we attempt to quantify the extent to which aggregate trade patterns have changed over the period 1980-2000. The analysis focuses on bilateral trade patterns for the merchandise imports markets of 93 countries including the United States. We show that the trade shares of major exporters to these markets are remarkably constant. Our findings are quite robust in cutting across countries of diverse economic, political, and cultural traits during a fairly turbulent period of economic history. In Section 2, we describe the data and develop some measures of trade pattern change. Then, in Section 3, we return to the BP findings and the questions posed there in order to offer some new insights into evolving product trade patterns. Finally, Section 4 offers some conclusions.

2. Empirics

In this section, we present evidence on the stability of trade patterns for a large number of countries over the past two decades. In developing this evidence, we use data from the International Monetary Fund’s *Direction of Trade Statistics* March 2002 CD-ROM. This database provides figures on the values of merchandise exports and imports by trade partners for 186 countries. In our analysis, we focus on bilateral import totals valued in c.i.f. terms. The database reports these values measured in U.S. dollars for all countries. Our study utilizes annual data from 92 countries and 1 territory (Hong Kong) over the period 1980-2000.¹ The countries chosen for this study cover all geographic regions of the world and employ most

¹ Data prior to 1980 are not available on this CD.

economic systems. We chose not to include data from countries such as the states of the former Soviet Union that did not exist at the start of the sample period or countries such as Kuwait and Sierra Leone, where there were breaks in economic data because of wars or other disruptions. A complete list of countries included in our study can be found in Appendix 1.

Our analysis focuses on the behavior of the nominal market shares of the countries that supply goods to the countries in our sample. We measured these as the ratio of the nominal value of imports from individual countries to total imports (measured in U.S. dollars) times 100. Because of the large number of countries in the database, we present details for only those countries that enjoyed at least 2 percent of a given country's market in 1980. Even with this limitation, we ended up with 926 bilateral trade patterns to analyze, or roughly ten trading partners for each country in the sample.

Using this market share data, we focus on the behavior of trade patterns over time. To clarify the point we would like to make, consider Figure 1. This provides a graph of the import market shares for Tunisia over the sample period. The behavior in this graph typifies most of the patterns we found in our sample.

[Insert Figure 1 about here]

In particular, throughout the sample period, one country (here France) held the largest share of the market. Its market share annually averaged about 25 percent. Similarly, for more than two thirds (66 of 93) of the 93 countries in our sample, the same country had the greatest market share throughout the sample period. In addition, the average market share of the primary trade partner was 27 percent in 1980 and 26 percent in 2000. Furthermore, notice that all of the

remaining trading partners also exhibited this pattern of fairly constant market share throughout the entire sample period of over two (fairly turbulent) decades.

The fact that France held the largest share of Tunisia's import market is readily explained. France is a high income, industrialized country located near Tunisia. Perhaps more important, it governed a colonial protectorate in the country for more than 60 years, and, as a result, French is an official language of the country. As it turns out, attributes such as proximity, former colonial relationships, and being the geographically nearest high income industrialized country appear to be extremely important in explaining market share dominance.²

Of course, on a case by case basis every country does not replicate Tunisia. Figures 2-5 provide graphs of the evolution of the market shares for Austria, France, Pakistan, and Uruguay. As the figures indicate there are differences in these patterns from one country to the next. The shares in Figures 2 and 3 also exhibit considerable stability while those in Figures 4 and 5 do not.

[Insert Figures 2-5 about here]

In what follows we will present more systematically evidence that speaks to widespread and pervasive "trade pattern persistence". By this, we mean trade shares that exhibit near zero trend behavior. To our knowledge, no previous work has compared the behavior of market shares over time for a large set of countries.³ We do not have strong priors as to what patterns one should expect to find in these shares. Nonetheless, as we noted in the Introduction, given the findings reported by BP we would not have found it unusual to observe considerable instability in trade patterns and partners. However, as we show in Figure 6, at the *aggregate level* U.S.

² Elsewhere, we discuss in greater detail both the characteristics and the stability of trade relationships of dominant trade partners. See Cassing and Husted (2004).

³ Wall (2002) examines trade share behavior for Japanese exports to various markets between 1986 and 1997.

import market trade shares have not shown the same amount of volatility as BP document *at the product level* in their study. As the figure illustrates with few exceptions the trade shares of most of the major U.S. trading partners over this period have remained relatively constant. Only Japan, whose share rose throughout the 1980s and then fell to its original level, and Mexico, whose share doubled following the introduction of NAFTA preferences, saw significant changes in trade shares over the period in question. In the remainder of this section, we will try to make the case that stability, rather than variation, in trade shares is a strong and recurring phenomenon. Then we will use this in conjunction with BP to extend their analysis.

[Insert Figure 6 about here]

There is no good metric to quantify the behavior we are trying to study, nor are there straightforward statistical hypotheses to test regarding this behavior. Consequently, we have chosen a simple procedure to try to describe the data. In particular, we ran simple regressions of each series of trade shares on a constant and a time trend. As the plots in Figures 1-6 indicate, simple linear models should approximate well the behavior of many share patterns, and we found that to be the case throughout. Our purpose in this exercise was to determine how often we would find that the shares exhibited no trend growth or decline. Our first thought in approaching this question was to see how often we could reject the null hypothesis that the coefficient on the time trend was zero. We also considered testing the joint hypothesis that all of the time trend coefficients were zero. In examining the output from our statistical work, however, it became clear that this would not work well in our context. In particular, if shares were virtually constant, the t statistic on the estimated trend would approach infinity, even as the estimated slope was near zero. Indeed, we found numerous examples of trend coefficient estimates with values

almost identically zero, but with t statistics much larger than two.⁴ This same problem also confounded our ability to test the joint hypothesis that all of the slopes for a given country were zero.⁵ In addition to these problems with standard hypothesis test procedures, in this particular context, R^2 , the usual measure of goodness of fit, no longer provides a clear picture of how well the regression equation performs. This is because the size of R^2 is related to the size of the coefficient on the time trend, the only explanatory variable in the model. The closer is the estimated coefficient to 0, the lower will be the R^2 , since the time trend adds virtually no explanatory power to the regression.⁶ Given these issues, in our discussion of the distributions of point estimates we do not report t statistics or R^2 values.

[Insert Table 1 about here]

Table 1 provides detail on the point estimates from the regression exercise. In order to better interpret the results we multiplied each of the estimates by 21 – the number of years in the sample -- in order to determine the total predicted change over the sample period in each of the trade shares. As the table shows, the predicted change did not exceed 2 percentage points in absolute value for almost half (450 of 927) of the possible trade patterns and was only 5% or more for 203 (22%) of the trends, mostly related to petroleum trade. As the table also shows, falling shares were estimated for well over half the cases. The median projected decline in market share over the sample period was 1.69 percentage points. In about 15 percent of the cases, estimates of trade share falls exceeded 5 percentage points over the sample period. The larger declines were associated with trade shares for petroleum exporting countries. This pattern

⁴ Only 272 of 926 estimated slope coefficients had t values small enough to not reject the null that the slope equaled zero.

⁵ We rejected the null that all slopes equaled zero in every case.

⁶ The mean value of R^2 in our regressions was .2545.

is easy to explain and points to a problem with the fact that limited data availability required us to begin our analysis in 1980. That year coincided with the second world oil shock. In subsequent years, oil prices (and probably oil consumption) fell dramatically leading to significant falls in market shares. These declines are apparent in Figures 1-6.

To provide more context to these results, consider again Figure 2. Based on the slope estimates, the largest predicted change in Austria's import market is for Germany, whose share is estimated to fall by 2.9 percent over the sample period. No other share is predicted to change by more than 1.3 percent. In contrast, Uruguay's trade shares (see Figure 5) are predicted to change dramatically, with Argentina's share estimated to rise 17 percent over the sample period as Nigeria's estimated share falls 14 percent. Finally, as illustrated in Figure 6, most of the U.S. trade shares are predicted to remain relatively constant. Eight of twelve are predicted to change by less than 2 percentage points. Mexico's share is estimated to rise by almost 6 percentage points, while Japan's share is estimated to fall by 3.5 percentage points.

As was the case with primary trade partners reported above, a small number of high income countries held market shares of at least two percent for virtually all countries in the sample over the sample period. And, as with the case of all shares, the shares of these countries were relatively stable. These points are illustrated by the information in Table 2.

[Insert Table 2 about here]

As the table shows, the United States held at least 2 percent of the market in 88 of 92 possible cases in 1980. Both the median and the mean of the projected market share change over the sample period were between zero and negative one percent. Germany, the United Kingdom, and Japan also held at least two percent of the markets in 80 countries or more at the start of the

sample period. Only the mean and median projected change in market shares for Japan exceeded two percent in absolute value. France, Italy, and the Netherlands all held significant market shares in more than half of the sample countries, and the average expected market share changes for all were less than one percent. Only Saudi Arabia, which held at least two percent of the market in 30 countries in 1980, had large (greater than five percent) average projected changes in market share. As noted already, this pattern held true for virtually all oil exporters in virtually all countries.

We conclude that trade shares have remained quite stable for most countries over the past two decades, despite significant changes in the economic and political structure of the world trading relationships. We turn now to discuss the questions posed by BP.

3. Some Further Implications for Trade Pattern Dynamics

As noted in our introduction, Besedeš and Prusa (BP) provide several studies of the duration of bilateral trade relationships at the product and industry level in the U.S. import market between 1972 and 2001. Using data compiled by Feenstra (1996) on more than 23,000 different products imported from about 160 different countries, BP show that individual trade relationships tend to be short-lived (2006A) even at different levels of industry aggregation, but duration increases with the degree of product differentiation and initial purchase size (2006B and 2007).

In concluding, BP pose a number of questions in their studies which they deem – and we agree – to be important:

1. “What happens when a country stops exporting a particular product? Does it switch to similar products or very different products, or does it stop exporting altogether to the U.S. market?” (2006A, p. 293).
2. In all three of their papers BP argue that their findings are at odds with the factor endowments theory and seem to point to models that emphasize search costs and networks to understand how trade patterns develop and how long they last. Can their findings be reconciled with HO?
3. “The median spell length of just a year suggests that sunk costs are recovered immediately as trade starts. But that would imply they are not important, since their recovery does not require prolonged presence in a market....Our results suggest that *if* sunk costs are important in trade, they are important for exporting itself, rather than exporting to a particular market.” (2006A, p. 293) But are these costs important?

The aggregate data analysis of Section 2 above suggests some answers to each of these important questions. First, in light of the short import life of a particular product, do exporting countries switch to similar products or different products, or just stop exporting to the destination country in question (the United States in their study)? BP rule out switching to similar products through some aggregation analysis. But, our findings suggest that exporting countries do not stop exporting altogether to their various export markets, even if individual products cease to be traded. Apparently, the commodity composition of imports from a particular country is what changes, not the share of imports. This in turn raises an important question as to whether it is the same “firms” that are churning their exports to particular destinations or whether new firms and new products are stepping in. The question is an important one because it speaks to the extent of

exporting spillovers to other than the initial exporters. If firms are indeed identified by a particular product, we would conclude that some sort of positive export-orientation spillover exists as noted in Roberts and Tybout (1997).

Second, BP infer from their rapid product turnover findings some inconsistency with the Heckscher-Ohlin (HO) factor endowments model. But, as we report above, aggregate bilateral trade is very persistent indeed. The Heckscher-Ohlin model offers a prediction only about the factor content of trade and is silent on the commodity composition of trade. So, if relative factor endowments are not changing, the prediction would be that the overall relative volume of trade – relative trade shares – should remain constant even as particular products are changing, possibly very rapidly, over time. In this sense, the BP findings are not inconsistent with HO, and our findings are actually supportive of the factor endowment trade theory if relative endowments are slow to change. Of course, what would be inconsistent with HO is if the new product bundle of BP happens to be changing wildly in its relative factor content. It might be of some interest to make this calculation using the BP data.

Furthermore, we note that our results are in any case not inconsistent with the BP finding of support for a version of the Rauch search costs model and in fact serve to raise another curiosity. In the Rauch model, importers are buying small quantities in order to test product characteristics in search of potential longer-term relationships with certain suppliers. The conjunction of the Rauch search cost theory and the BP churning result seems to suggest that searchers are in fact looking from one country to another (since short-term relationships are transient). Then they find a supplier. Our finding that the overall trade is not shifting much between nations seems then to suggest that when the longer term supplier relationship is

established, the shorter term general search activity in the supplier country diminishes (or else trade would increase overall). In a sense this poses an interesting puzzle: Why should search activity decline when some searcher finds a reliable supplier? One possibility might be that firms from many countries are searching the same country for a supplier (Searching for a reliable supplier across countries is a “wolfpack” activity.) and when the favored supplier(s) is contracted by someone the search ceases or maybe the pack moves on to another country.

Finally, BP allude to the firm heterogeneity literature and the importance of sunk costs. BP conclude that the short life of a particular product import suggests that sunk costs are either not important since they are recovered quickly or that any sunk cost is not market destination specific and so is being recovered by exporting the particular product to other markets. We have an alternative conjecture based on our findings. Apparently, using BP and our “trade pattern persistence” in tandem, a particular product from a particular country is not wedded to a particular export destination but the level (relatively) of exports from a particular country to a particular export destination is. We infer that sunk costs may well be quite important but that these costs are external to the firms and internal to the bilateral trade. Hence the persistent trading patterns in the face of highly variable product mix. Such bilateral trade specific sunk cost externalities might include access to trading routes, commercial networks, cultural or language commonality, and so on. This is consistent with our findings reported above that the major trading partner of countries is well predicted by proximity, former colonial ties, language, etc.

The importance of bilateral trade specific sunk costs may also explain why non-homogenous goods are traded longer according to BP. It seems plausible that trade in

homogeneous goods entails less trust or commonality of culture and language than would more heterogeneous goods -- petroleum versus textbooks. Consequently, allegiance to homogeneous goods suppliers could be fleeting compared with heterogeneous goods. We find some support for this proposition in the sense that we find trade relationships to be long lasting. But most of the import-sourcing countries in our data set are the larger, richer countries (Table 2) which are the countries whose products tend to be more highly differentiated. So even though we have no information at the micro level on product trade shares, our results appear to reaffirm the BP findings on product differentiation and duration of trade.

4. Conclusions

We have combined our findings of widespread bilateral trade-share persistence with the BP evidence of substantial and rapid volatility in the country source of most products in order to extend the BP implications in three ways. In particular, we are able to infer that countries are switching to very different products in their export bundles to particular destinations. We argue that the BP results are not inconsistent with traditional factor endowment trade pattern predictions, which are consistent with trade-share persistence, and so the observed export product type volatility may be occurring within the context of standard HO-like trade. Finally we find that sunk costs in international trade appear to be external to particular products going to particular destinations but internal to the sum total of bilateral trade.

These extensions in turn suggest some other interesting questions. First, it would be important to determine if the new product lines being exported to particular destinations are from the same firms or different ones. This would shed some light on whether any sunk costs which might drive the observed stable trade shares are internal to the firm but external to the product

line, or rather external to the firm and to the product line but internal to the bilateral trade relationship. Second, it would be interesting to ascertain if the relative factor content of the ever-changing bundle of products being imported from a particular destination is itself changing. If not, we should then look hardest for dynamic explanations of the BP product dynamics which are consistent with factor endowments driven trade. Finally, as BP suggest, it would be interesting to confirm that the BP product volatility evidence holds for other bilateral trade relationships beyond just those of the United States. As we have shown, the more aggregated pattern of bilateral trade-share persistence holds worldwide.

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Figure 1: Tunisia: Major Import Suppliers

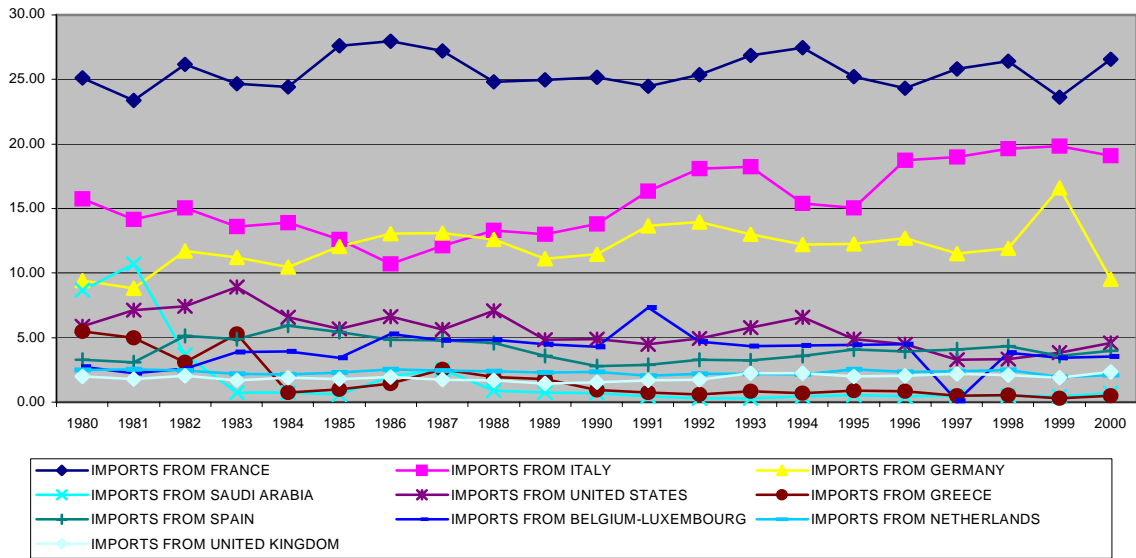


Figure 2: Austria: Major Import Suppliers

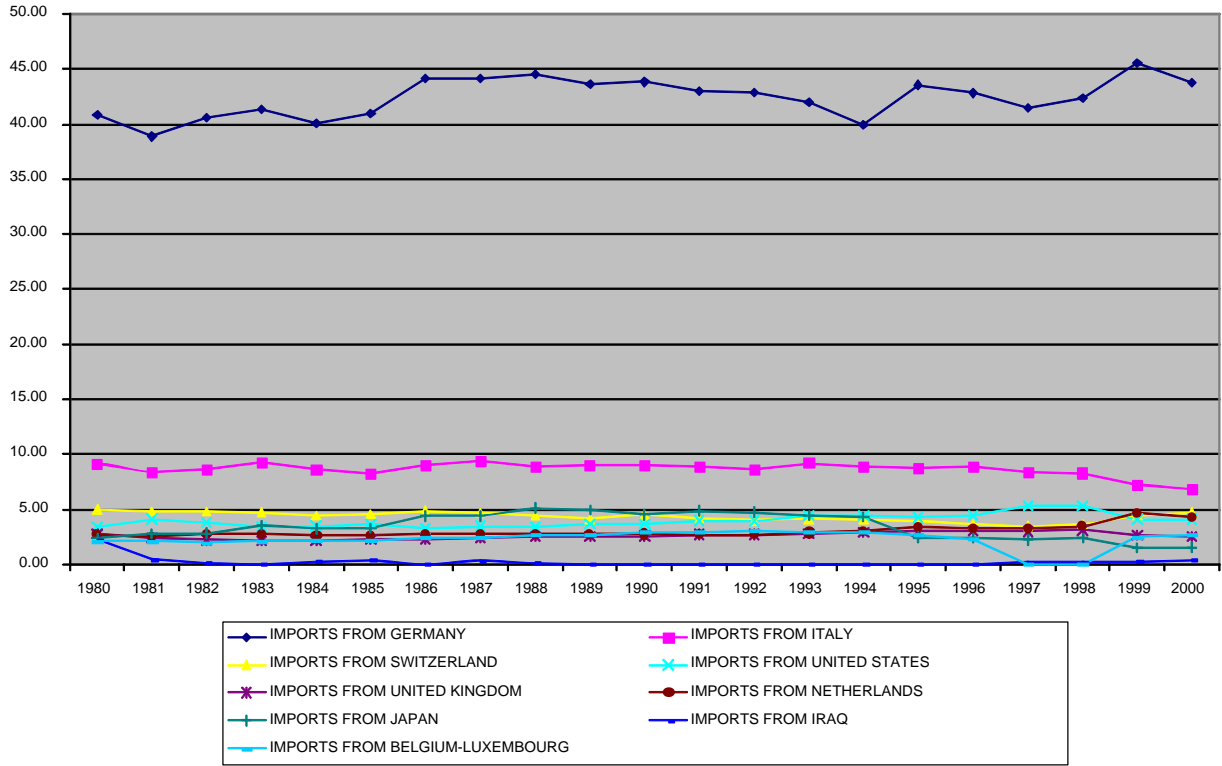


Figure 3: France: Major Import Suppliers

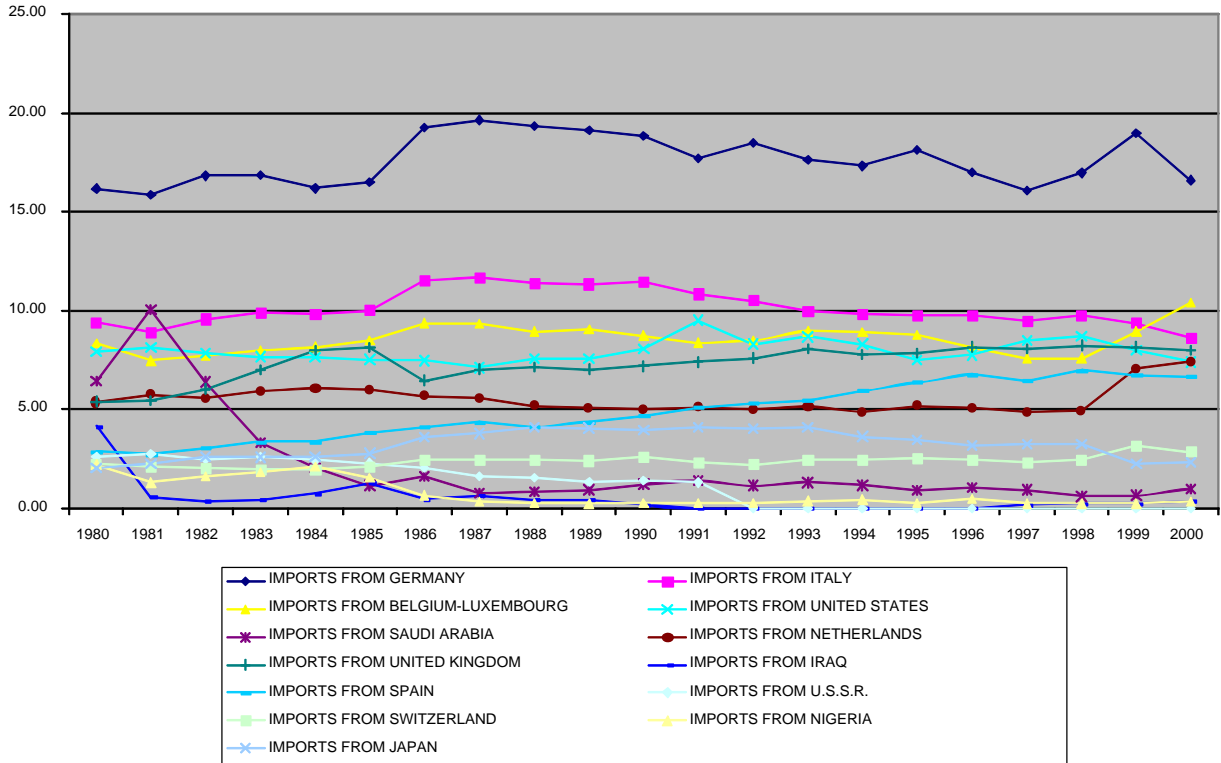


Figure 4: Pakistan: Major Import Suppliers

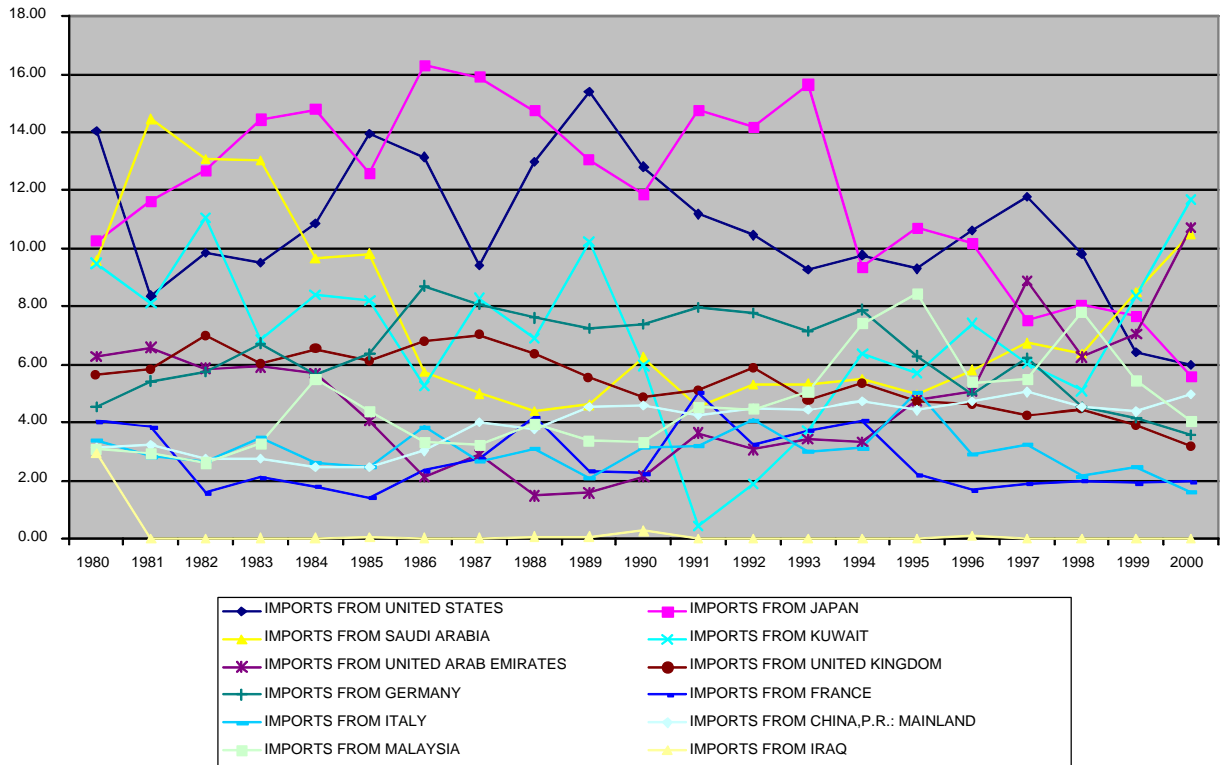


Figure 5: Uruguay: Major Import Suppliers

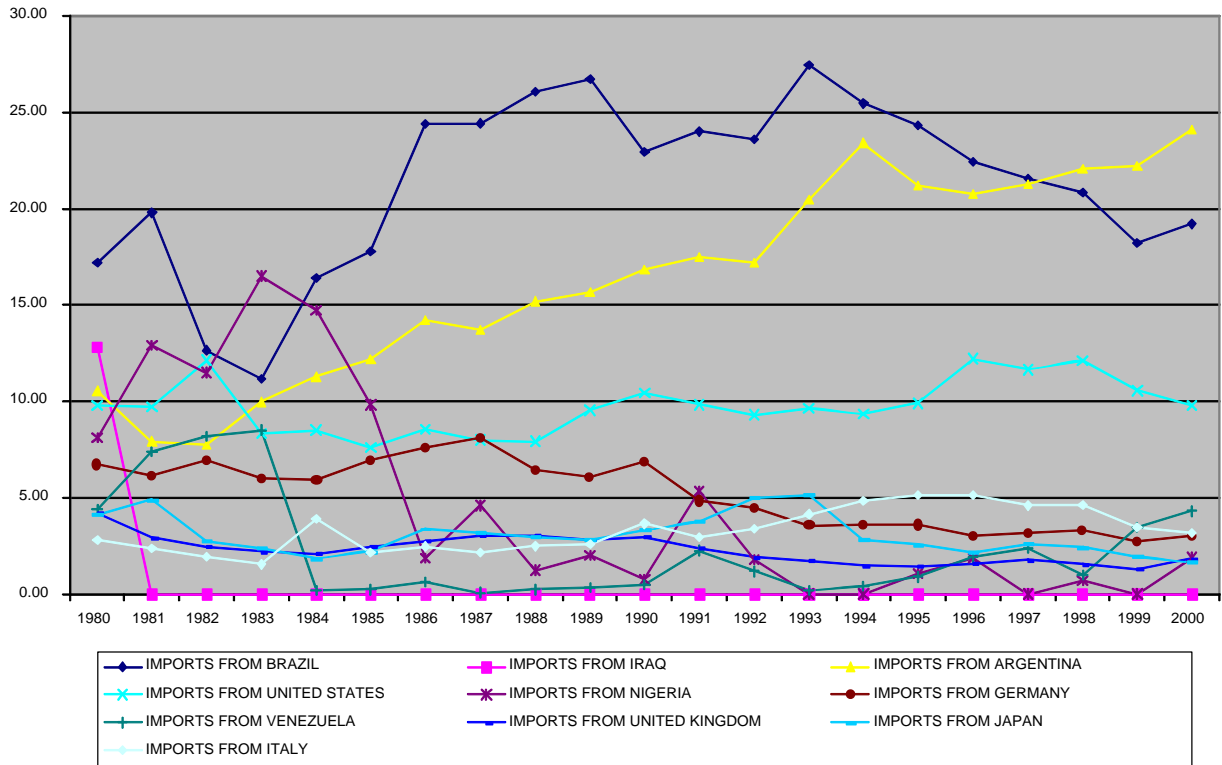


Figure 6: United States: Major Import Suppliers

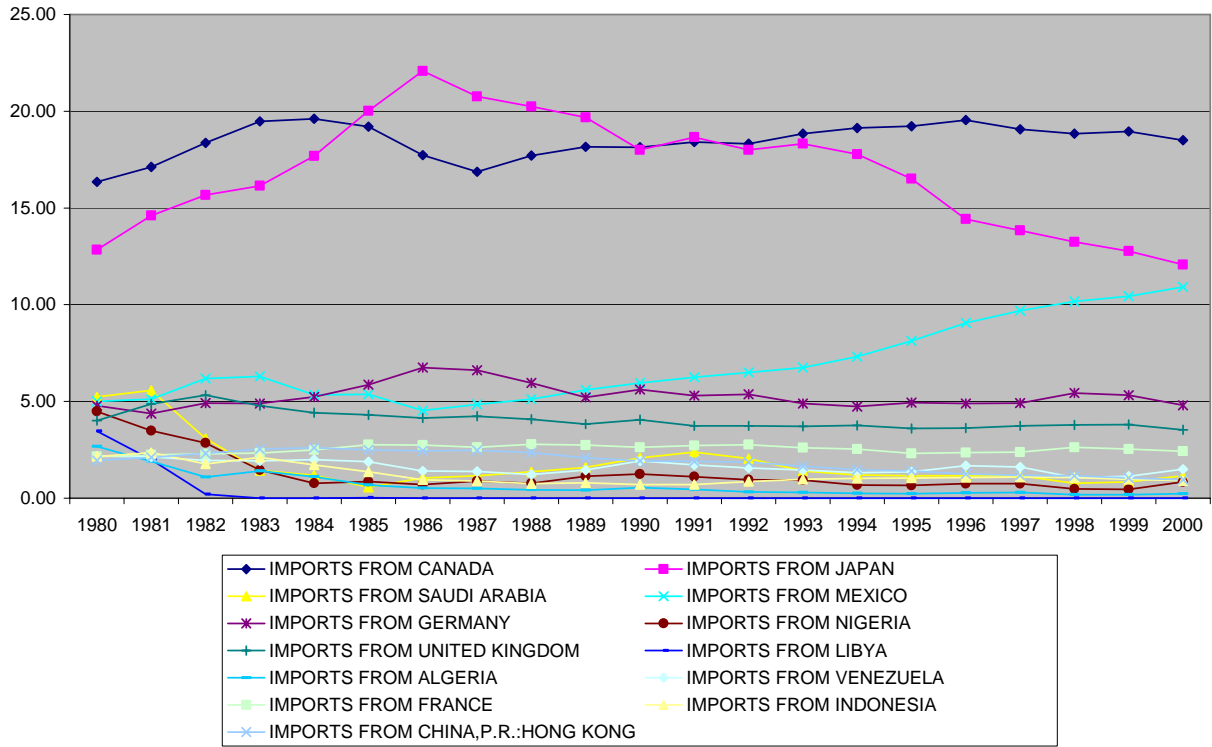


Table 1
Distribution of Estimated Share Growth (coefficients on time trend × 21)

	No.	Percent of total
5% or more	60	6.5%
between 2% and 5%	82	8.9%
between 0% and 2%	162	17.5%
between -2% and 0%	288	31.1%
between -2% and -5%	191	20.6%
-5% or less	143	15.4%

Table 2
Market Share Trend Patterns for Selected Countries

	#	median	mean
United States	88	-0.81381	-0.26414
Germany	84	-1.45281	-1.48571
United Kingdom	83	-1.59655	-2.74939
Japan	80	-2.53008	-3.32239
France	64	-0.64854	-2.3053
Italy	56	-0.08782	0.71017
Netherlands	54	-0.3731	-0.30761
Belgium-Luxembourg	34	0.318948	0.241521
Saudi Arabia	31	-5.67525	-6.95684

Appendix 1 Sample Countries

Algeria	Ghana	Nigeria
Argentina	Greece	Norway
Australia	Guatemala	Oman
Austria	Guinea	Pakistan
Bangladesh	Guinea-Bissau	Papua New Guinea
Belize	Guyana	Paraguay
Benin	Haiti	Peru
Bolivia	Honduras	The Philippines
Brazil	Iceland	Portugal
Brunei	India	Qatar
Burkina Faso	Indonesia	Saudi Arabia
Burundi	Ireland	Senegal
Cameroon	Israel	Singapore
Canada	Italy	Spain
Central African Rep.	Jamaica	Sri Lanka
Chad	Japan	Suriname
Chile	Jordan	Sweden
Hong Kong	Kenya	Switzerland
Peoples Rep. of China	Korea	Tanzania
Colombia	Malawi	Thailand
Costa Rica	Malaysia	Tunisia
Cote d'Ivoire	Mali	Turkey
Cyprus	Mauritania	Uganda
Denmark	Mauritius	United Arab Emirates
Djibouti	Mexico	United Kingdom
Fiji	Morocco	United States
Finland	Mozambique	Uruguay
France	Nepal	Vanuatu
Gabon	The Netherlands	Venezuela
Gambia	New Zealand	Zambia
Germany	Niger	Zimbabwe