Home Bias in Trade: Location or Foreign-ness?[1]

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Abstract

With "home bias," a consumer differentiates between domestic goods and imports and tends to purchase the domestic variety. A vast number of empirical studies in the international trade literature report the apparent prevalence of a large degree of home bias (the case of the "missing trade," the "border puzzle"). Many theoretical studies, in turn, assume its presence. Despite this wide usage, the origins of home bias remain cloudy. Do customs officials require extensive paper work, thus making imports prohibitively expensive? Is there some inherent distrust of a foreign product?

This paper probes the causes of "home bias." I ask whether the apparent predilection to purchase domestic goods arises from (1) pure locational factors, such as tariffs or access to a local distribution network; or (2) an inherent preference for domestic goods per se. I am able to make this decomposition through the use of data on the local sales of foreign affiliates of U.S. multinational enterprises, in addition to data on U.S. bilateral exports and domestic sales by host-country firms.

I find that the apparent tendency to purchase domestic goods rather than imports arises almost entirely from pure locational factors. The ad valorem tariff-equivalent of producing at home and shipping to a different country ranges between 51 percent and 105 percent across industries. On the other hand, if a firm establishes and sells from a subsidiary located in the foreign country, its local sales are nearly on a par with those of domestic firms in that market. "Foreign-ness" in and of itself does not appear to impede purchases of imported goods.

JEL Classification: F1

1 Introduction

With "home bias," a consumer differentiates between domestic goods and imports and tends to purchase the domestic variety. A vast number of empirical studies in the international trade literature report the apparent prevalence of a large degree of home bias. For example, Trefler (1995) shows that home bias helps to explain why countries trade with each other less than would be predicted by the Heckscher-Ohlin framework, i.e., the "case of the missing trade." McCallum (1995) and a number of others highlight a "border puzzle," a phenomenon in which a country's internal trade is higher than its international transactions.[1] Many theoretical studies, in turn, assume its presence.

The origins of home bias, however, remain cloudy. Do customs officials require extensive paper work, thus making imports prohibitively expensive? Is there some inherent distrust of a foreign product? Given the apparent importance of home bias, this lack of information on its sources is troubling, for a number of reasons. For one, the welfare and policy implications of home bias depend on why it exists. If consumers simply prefer domestic goods, the policy implications are minimal. This is not the case if home bias emerges from the actions of recalcitrant customs officials. In addition, interpretation of past research incorporating and illustrating home bias may be enhanced by a clearer understanding of its origins.

In a very basic sense, home bias could be created by two factors.[2] Imports could face a variety of impediments in the course of moving from the

[1] Evans (1999, 2000), Helliwell (1997a, 1997b), Helliwell and Verdier (2000), McCallum (1995), Nitsch (2000a, 2000b, 2000c), Wei (1996).

[2] See Wolf (2000b) for a discussion of potential explanations of border effects that could fit into these two broad categories. Also see Wolf (2000a) for a discussion of border effects within the U.S.

location of production in one country to the consumer in another country. These impediments could include high international transport costs, tariffs, or difficulties negotiating a foreign distribution network. Second, consumers could just prefer domestic goods. The utility function could be such that there is an inherent benefit to buying more of the good produced at home. Ultimately, the observed degree of home bias will be determined by these categories of factors, in combination with the elasticity of substitution between domestic goods and imports.[3]

This paper probes the relative magnitude of these two potential causes of "home bias." I ask whether the apparent predilection to purchase domestic goods arises from (1) pure locational factors, such as barriers to imports or access to a local distribution network; or (2) an inherent preference for domestic goods per se.

To do so, I first estimate the overall magnitude of home bias vis a vis imports from the U.S. for a sample of OECD countries. I then decompose these broad numbers into two categories: "location effects" and "nationality effects." Location effects include the components of home bias that are related purely to where a good is produced; they would include factors such as tariffs and any other costs incurred crossing the border. "Nationality effects," on the other hand, are related to the nationality of the producer rather than to the actual location of production.

To estimate all of these elements, I use data on the local sales of foreign

[3] Throughout this paper, I assume that the elasticity of substitution between imports and domestic goods is fixed. However, as Blonigen and Wilson (1999) discuss, differences in the degree of home bias across industries may help to explain some of the variation across industries in these elasticities. Note that in my estimation, the coefficient on the "home bias parameter" represents the combined effect of an elasticity and an ad valorem/price-related term. I discuss this point further in other sections of the paper.

affiliates of U.S. multinational enterprises, in addition to data on U.S. bilateral exports and domestic sales by host-country firms. Using these three sources of information allows me to decompose the overall degree of home bias because, while U.S. exports encounter both the location and nationality components of home bias, foreign affiliates encounter only the nationality effects, while domestic firms clearly face neither. Thus, to assess the overall degree of home bias, I first compare U.S. exports to sales of domestic firms. For the location element, I compare U.S. exports to sales of the foreign subsidiaries of U.S. firms. The nationality effect is then the difference between the overall degree of home bias and the bias due to location alone.

I find that the apparent tendency to purchase domestic goods rather than imports arises almost entirely from pure locational factors. The ad valorem tariff-equivalent of producing at home and shipping to a different country ranges between 51 percent and 105 percent across industries. On the other hand, if a firm establishes and sells from a subsidiary located in the foreign country, its local sales are nearly on a par with those of domestic firms in that market. "Foreign-ness" in and of itself does not appear to impede purchases of imported goods.

2 Theory

I infer the degree of home bias and its components from consumption data. Thus, the model represents the utility maximizing choice among alternative consumption goods; it is a very standard representation of consumption of differentiated products, so only a brief description follows.[4]

In the model, the consumer chooses the optimal consumption quantity from a bundle of goods differentiated by the nationality of the producer and

[4] A more detailed account is in Appendix 1.

by the location of production. The individual may purchase a foreign good produced in a foreign country, a foreign good produced in the home country, or a domestic good produced domestically.[5]

Purchasing a good entails costs which may come from several sources. $p^g_{c'c'n}$ represents the price of good g of nationality n at the factory in the country of production c'. Traditional transport costs (either domestic or international) from location c' to location c are represented by $D^g_{cc'n}$. Finally, any remaining differences between the prices of imports and domestic goods will be captured by a component $T^g_{cc'n}$, which will be used to measure the overall degree of home bias. Thus, the final delivered price takes the following form:

$$p^g_{cc'n} = p^g_{c'c'n} D^g_{cc'n} T^g_{cc'n} \tag{1}$$

where $p^g_{cc'n}$ is the price of good g of nationality n, produced in c', and consumed by c. Note that $T^g_{cc'n} = 1$ for a domestic product purchased within a country, i.e. if $c = c' = n$. The magnitude of home bias will be interpreted as a higher level of these additional costs. These costs could include tariffs on specific products, measured non-tariff barriers to trade, or biases against foreign goods.

Optimization leads to the following expression for imports by country c of g-industry goods of nationality n from location c':

$$\begin{aligned} \log IM^g_{cc'n} &= \log Y_c + \log Y^g_{nc'} - \sigma_g \log D^g_{cc'n} \\ &\quad - \sigma_g \log T^g_{cc'n} \\ &\quad + \log A^g_{c'} + \log A^g_c \end{aligned} \tag{2}$$

where the assumption is made that each good g has a price of one at its

[5] So, for example, a German consumer chooses among a Ford produced in the U.S., a Ford produced in Germany, and a BMW produced in Germany.

location of production. $IM^g_{cc'n}$ is total purchases by country c of the g good of origin n produced in c', Y_c is the income of the consumer in country c, $Y^g_{nc'}$ is the income of the origin country n derived from sales of good g produced in c'. $A^g_{c'}$ and A^g_c are measures of a country's potential alternative trading partners; they measure the distance-weighted GDP of a given country from these alternative partners.[6] The term thus controls for the fact that two countries with other potential trading partners very nearby (England and France) would tend to trade less with each other than would two countries whose alternative partners are very far away (Australia and New Zealand).

In equation 2, $\sigma_g \log T^g_{cc'n}$ represents the overall magnitude of home bias. Note that it is the combination of an elasticity term and a cost term, a point which must be kept in mind when interpreting regression results, since the coefficient on the home bias variable will estimate this overall component. Thus, a given magnitude on the coefficient does not translate directly into a given-sized cost.[7]

While this framework indicates the overall degree of home bias, it does not distinguish between the two elements mentioned in the Introduction, true "location effects" and other elements which may be inherent to foreign products. This distinction matters for a number of reasons. In particular, both the welfare and policy implications of these two elements differ. If location effects are important, distortionary barriers, governments, and

[6] Define $A^g_{c'}$ and A^g_c as measures of the availability of alternative trading partners for, respectively, the exporting and importing country remoteness, where:

$$
\begin{aligned}
A^g_{c'} &= [\sum_c (p^g_{c'c'n} T^g_{cc'n} D^g_{cc'n})^{(1-\sigma_g)} Y_c G_c^{(\sigma_g - 1)}]^{-1} \\
A^g_c &= G_c^{\sigma_g - 1}
\end{aligned}
$$

and G^g_c is an index of prices of all varieties within industry g in country c.

[7] See Evans (1999, 2000) for more extensive discussion of this issue.

policy potentially play an important role. On the other hand, if domestic and foreign products are indeed perceived as "different," welfare and policy implications are minimal.

To examine this issue, first suppose that home bias may be split into two portions. The first I will term "location effects;" this term refers to those barriers which are part of the location of production per se. These elements may be avoided simply by producing in the foreign market. The second type I will term "nationality effects;" this term refers to any residual benefits to domestic firms that may not be enjoyed by a foreign firm, even with local production.[8]

In the context of the model, the price term in equation 1 may be expanded to include these two sorts of effects:

$$p^g_{cc'n} = p^g_{c'c'n} D^g_{cc'n} L^g_{cc'n} C^g_{cc'n}$$

where $C^g_{cc'n}$ represents differences between domestic and foreign products per se (i.e. nationality effects), $L^g_{cc'n}$ is pure location effects, and $T^g_{cc'n} = L^g_{cc'n} C^g_{cc'n}$. $L^g_{cc'n} = C^g_{cc'n} = 1$ for a domestic product purchased within a country, i.e. if $c = c' = n$. In the logarithmic form of the model, then, $\sigma_g \log L^g_{cc'n}$ is the pure location effect, while $\sigma_g \log C^g_{cc'n}$ is the nationality effect. Again, these expressions are the combination of an elasticity term and a cost term.

[8]Note that the greater portion of barriers to imports which are due to location advantages per se, the greater will be the incentives to use local production as a means of serving a given market. If nationality advantages are very important, on the other hand, other options, such as licensing or a joint venture, may become more attractive.

3 Data and Estimation[9]

To estimate the theoretical model, I use data on production and sales for three potential sources of consumption: imports, foreign affiliate production, and domestic goods.[10] For reasons of data availability, I will focus on the foreign affiliates of US multinationals, along with U.S. exporters and foreign firms producing in their own countries.[11] The data cover the activities of U.S. majority-owned non-bank foreign affiliates in 9 OECD countries, Australia, Canada, France, Germany, Italy, Japan, the Netherlands, Spain, and the United Kingdom, between 1985 and 1994. The seven industries included are Chemicals and Allied Products, Electric and Electronic Equipment, Non-electric Machinery, Food and Kindred Products, Primary and Fabricated Metals, Transportation Equipment, and Other Manufacturing.[12] I utilize the data on total sales and on local sales by these foreign affiliates as measures of, respectively, production and sales to domestic consumers. The BEA suppresses some countries/years/industries for reasons of confidentiality, so that I do not have observations for all cells.

[9] Additional information and sources for the data are provided in Appendix 2.

[10] Evans (1999) and Evans (2000) contain sections with methods similar to those used here.

[11] A very extensive source of information on the activities of U.S. multinationals abroad is produced by the U.S. Bureau of Economic Analysis for the affiliates of U.S. firms overseas. Using this data entails several potential problems. First, I measure the "nationality" and "location" barriers only for U.S. firms. Given the extensive activities of U.S. multinationals, this is a valuable exercise, but extrapolation to other national sources of FDI must be made with care. Second, the data on domestic production includes activities of all multinationals producing within that country; this may affect the measure of domestic trade. In an Appendix available from the author, I provide analysis which addresses this issue by partially adjusting the data for the presence of multinationals. Such adjustment does not substantially affect the results.

[12] These are the categories provided in the BEA publicly-available data.

"Domestic trade," i.e. how much a country trades with itself, will be indicated by national production (gross output) within an industry less total exports by that industry. For the measures of production and consumption for exports from the U.S., I use data on U.S. industrial production (gross output) and on exports by industry from the U.S. to the countries in the sample.

The measure of bilateral distance is the great circle distance, generally from capital to capital, between the U.S. and the importing country. For trade within a country, own distances are based on Nitsch (2000b), who proposes using $\frac{1}{\sqrt{\Pi}} * \sqrt{AREA}$, a measure which takes into account a country's own geographic size.[13] For the measure of a country's potential alternative

[13] The correct measure of domestic distance is an important issue. One of the first measures was based on Wei (1996), which used $\frac{1}{4}$ of the distance to the nearest trading partner; for islands, own distance was calculated as $\frac{1}{2}$ of the minor radius of the country. This measure produces reasonable results, but does not take a country's geographic shape into account.

A number of more recent papers (Helliwell and Verdier (2000), Nitsch (2000a, 2000b)) have examined variation across different alternative measures of domestic distance. This more recent work shows that for most countries the Wei measure is too small. A number of alternatives exist. Helliwell and Verdier (2000) suggest a population-weighted average internal distance, which takes a much more detailed account of a country's shape and structure. This is a very data-intensive calculation, which they have performed only for the U.S. and Canada. Nitsch (2000a, 2000b) proposes taking a country's own geographic size into account by using $\frac{1}{\sqrt{\Pi}} * \sqrt{AREA}$ and finds that this method (used here) yields reasonable results for the majority of governmental districts in Germany. Future research in the direction of Helliwell and Verdier should provide valuable additional information on internal country distances.

In addition, note that the measure of domestic distance does not play a role in one of our goals, comparing location effects for foreign affiliates to export effects with domestic firms, since trading distance is the same for both of those sources of production. It does affect the magnitude of these effects, but for both foreign affiliates and domestic firms in trading partners, I use an empirical proxy based on the specification of Helliwell and Verdier (2000):

$$ALT_c = \sum_{c'} \frac{GDP_{c'}}{DIST_{cc'}}$$

where the countries c' are all of c's trading partners in the sample. Although not a direct translation of the theoretical definition of this term, this form captures the essential elements of the variable and embodies a number of desirable characteristics for this variable.[14]

The empirical model follows directly from equation 2:

$$\begin{aligned} \log IM^g_{cc'n} &= \alpha_0 + \beta_1 \log GDP_c + \beta_2 \log PROD^g_{c'n} \\ &+\beta_3 \log DIST_{cc'} + \beta_4 \log ALT_{c'} \\ &+\beta_5 \log ALT_c + \gamma LOCAL \end{aligned} \quad (3)$$

where $IM^g_{cc'n}$ is purchases by a consumer in c from a producer in c' of goods of origin n in industry g, GDP_c is the GDP of country c, $PROD^g_{c'n}$ is production by origin-country n in production-country c' in industry g, $DIST_{cc'}$ is the distance between the location of production and the location of consumption, and $ALT_{c'}$ and ALT_c are the alternative trading partner measures.

Note that, as illustrated in equation 3, this test resembles a standard gravity-type trade model,[15] with three potential trading relationships, rather than only the traditional two-country pairs:

the same direction and amount. All estimations in this paper have also been performed using Wei's measure of internal distance. Results are qualitatively quite similar to those presented here.

[14] See Helliwell and Verdier (2000) and Stein and Weinhold (1999).

[15] A large number of studies document the empirical explanatory power of the gravity model, which predicts that the aggregate volume of trade between two places will be determined by the income of the two countries and the distance between them. Some

(1) a country purchasing goods from its own domestic firms;

(2) a country consuming the goods of U.S. foreign affiliates producing within its borders; and

(3) a country importing goods from the U.S.

The variable $LOCAL$ is a dummy variable which takes on the value of 1 when the producer and consumer are located in the same country, and 0 otherwise. Thus, in the next section, the coefficient on this dummy variable will measure the advantages which domestic firms have over foreign exporters. In the section on pure location effects, on the other hand, it will indicate the differences between local production by foreign affiliates and exporting.

4 Overall Home Bias

I first estimate the overall degree of home bias. As indicated by equation 1, I will assume that the differences between imports and domestic goods take an ad valorem form. In order to measure their magnitude, I use a dummy variable which will measure the extent to which domestic sales exceed imports, after controlling for the other variables in the model, as in equation 3. The coefficient on this dummy variable indicates the overall degree of home bias.

Table 1 reports the results.[16] The coefficient (in Column (i)) of 4.62

common references include Tinbergen (1962), Linneman (1966), and a large number of more recent papers.

[16]The estimation uses industry and year fixed effects and allows the slope on distance to differ across industries. To deal with issues of simultaneity between some of the independent variables and the dependent variable, I use instrumental variables. Following Harrigan (1995, 1996), several endowment measures are used as instruments for production levels. Measures of the log of the number of workers, the log of the capital stock, and

on the dummy variable indicates the extent to which domestic goods are purchased over imports from the U.S. In column (ii), the industry-level estimates indicate variation in magnitudes across industries, but all coefficients are positive and significant. Such results suggest a large tendency to purchase domestic goods over exports.[17]

One interesting issue is whether these impediments may be explained by traditional trade barriers. In Table 2, I provide estimates which include measures of tariffs and non-tariff barriers to trade.[18] For reasons of data availability, the estimates cover only either 1988 or 1993, so columns (i) and (iv) provide benchmarks without the trade barrier measures. As the coefficient on the $LOCAL$ dummy variable illustrates, controlling for these factors does little to explain the discrepancy between domestic sales and imports from the U.S. Thus, even controlling for these traditional trade barriers, there appears to be home bias.

To summarize, these results indicate that the overall magnitude of home bias is large. Further, factors other than traditional barriers to trade appear to be important elements of this effect.

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the log of agricultural land are interacted with industry dummy variables to create a set of $7 * 3 = 21$ instruments for production. Industry-specific regressions of the log of production on the instruments yields R^2s ranging between 0.82 and 0.98.

[17] As noted above, the coefficient represents the combination of an elasticity effect and a barrier effect. In the final section of this paper, I calculate some implied barriers based on certain assumptions about the elasticity of substitution.

[18] The data on tariffs and non-tariff barriers (NTBs) are taken from three sources: Lee and Swagel (1997), Anderson (1994), and OECD (1998). All are based on an UNCTAD Database. The NTB data are in the form of a coverage ratio; they include policies such as quantitative restrictions and voluntary export restraints, but do not include measures which apply within a country's borders and are not intended to affect trade. Both the NTB and tariff data are weighted to the level of aggregation used here, with either import or production weights.

5 The Pure Locational Elements of Home Bias

To examine the magnitude of the pure location effects, I use a framework similar to the previous section, but compare imports from the U.S. to foreign affiliate sales, rather than to domestic trade. The estimation thus measures the degree to which foreign-affiliate sales volume exceeds (or falls short of) the volume of imports from the U.S. Given that both producers are U.S. firms, this test should give some indication of the importance of location, controlling for the nationality of the producer (i.e., the effects of any differences in nationality have been eliminated). This comparison between foreign affiliate sales and imports from the U.S. should thus indicate pure location effects, controlling for any nationality effects. It will suggest the degree to which overall home bias arises from the disadvantages of producing in a different country.

Table 3 contains the results. The coefficient on the $LOCAL$ dummy variable (in column (i)) indicates the extent to which foreign-affiliate products are purchased over U.S. exports, after controlling for the other variables in the model. The industry-level effects vary (in column (ii)), but are generally quite large. Table 4 contains results when controlling for the policy variables. Large location effects remain after eliminating the impact of the trade-barrier measures. (Note that columns (i) and (iv) are benchmarks, as in Table 2.)

Thus, it appears that location effects are an important element of the overall degree of home bias.

6 The Nationality Elements of Home Bias

While the previous section showed that pure location effects are large, one remaining issue is whether location is the only factor that creates home bias. Alternatively, are there disadvantages inherent to foreign products per se?

To examine the magnitude of such nationality effects, suppose that only location effects, and no nationality effects, exist. If this is indeed the case, then comparing U.S. exports either to foreign-affiliate sales or to domestic sales should suggest the same degree of home bias, since only location per se impedes the volume of exports. To make this comparison, I use a test consisting of running two separate equations simultaneously in a three-stage-least-squares framework. The first equation contains data on imports from the U.S. and domestic sales; it measures the extent to which the volume of domestic trade exceeds international trade. The second contains data on imports from the U.S. and on the sales of the foreign affiliates of U.S. multinationals producing within the foreign country. It measures the degree to which foreign-affiliate sales volume exceeds (or falls short of) the volume of imports from the U.S. I compare the results of the two different equations to derive the nationality effect.

Table 5 provides the results.[19] Column (i) shows that the coefficients for nearly all of the variables are quite similar whether I compare imports to domestic sales or to foreign affiliate sales. In particular, the coefficient on the $LOCAL$ variable is 4.36 for the domestic sales case and 4.33 for the foreign-affiliate sales case. The p-value listed is the probability associated with the hypothesis that the effects of foreign-affiliate sales and domestic sales are equal. As shown by this p-value, I am unable to reject the hypothesis

[19] In this section, I use instruments as described above within the three-stage-least-squares framework.

that the two are equal. Thus, the overall magnitude of "home bias" is very similar whether I compare imports to domestic producers or to affiliates of U.S. multinationals located in the country.

Column (ii) provides the breakdown by industry. Again, the coefficients for the $LOCAL$ dummy variable are quite similar across all industries, and I am unable to reject the hypothesis that they are equal for five of the seven industries. For the industries where foreign-affiliate and domestic effects do indeed differ, the effects of location per se remain larger than any difference between foreign-affiliate and domestic effects. In other words, in all cases the magnitude of the lower of the two location effects is greater than their difference; the "location" effect is much larger than the impact of "nationality."

To summarize, it appears that local production indeed allows a firm to avoid a large portion of home bias.

7 Interaction with Ownership Advantages

One fundamental and pervasive element of the theory of the multinational enterprise is the assumption that the firm possesses a proprietary asset. This asset could be a patent, a brand name, or specialized knowledge, but it is something that gives a firm an advantage over rivals.[20] Such an asset serves as a prime motivation for the development of an overseas affiliate, as overseas production may allow the firm to better exploit the proprietary

[20] Caves (1996) describes such assets as having the following properties: "The firm owns or can appropriate the assets or their services; they can differ in productivity from comparable assets possessed by competing firms; the assets or their productivity effects are mobile between national markets; they may be depreciable (or subject to augmentation), but their lifespans are not short relative to the horizon of the firm's investment decision." (p.3)

asset.[21] In terms of my analysis, this framework suggests that foreign affiliates may be fundamentally different from the other sources of production due to possession of such an asset. If foreign affiliates do differ systematically from U.S. exporters through possession of some proprietary asset, then my analysis picks up the effects of such characteristics, in addition to those of location per se.

To check the robustness of my results to this possibility, I use both a direct and an indirect approach.[22] As for the direct approach, possession of a proprietary asset may affect the price perceived by consumers, either because of different costs of production or because of some ability to overcome barriers inherent to foreign products. To control for these effects, I incorporate the level of a proprietary asset as a regressor, using a functional form of $ln(1 + PA)$,[23] where PA is the proxy for the level of proprietary

[21] This broad framework is often termed "OLI" (ownership-location-internalization). The OLI theory of foreign direct investment posits that multinationals develop affiliates overseas in order to exploit a proprietary asset of the parent company. "OLI": Ownership, Location, Internalization. See Dunning (1988, 1993). The more recent literature on the multinational shares many of the features of Dunning's OLI framework. See Markusen (1995) for an overview of the literature.

[22] As another way of dealing with this issue, I also compare the location effects when comparing exports of U.S. multinationals to sales of subsidaries. For reasons of data availability, the number of observations is quite limited, but the results support the conclusion of this section that proprietary assets alone do not explain the differences between U.S. exports and the sales of foreign affiliates. Despite the fact that both the U.S. multinationals and the foreign affiliates possess proprietary assets, the evidence suggests the existence of large location effects. I thank Kei-Mu Yi for suggesting this method as an alternative way of addressing this issue.

[23] The given functional form follows from a price specified as (for example) $p^g_{cc'} = p^g_{c'c'} * \tau^g_{cc'} * (\rho^g_{cc'})^{-1}$, where $p^g_{c'c'}$ represents the price at the factory, $\tau^g_{cc'}$ represents barriers to trade, and $\rho^g_{cc'}$ represents the effects of the proprietary asset. Since a zero level of proprietary assets should leave the perceived price unchanged, I use the functional form

assets.

As an indirect approach, I also measure the impact of changes in the level of proprietary assets on location effects. If foreign affiliates indeed leverage proprietary assets in order to create advantages over exporters, location effects should be higher in the presence of proprietary assets. To examine this hypothesis, I incorporate a term which is an interaction between the proprietary-asset proxy and the $LOCAL$ dummy variable. The coefficient represents the effects of changes in the level of the proprietary asset on the location effect. Thus, for example, a positive sign would indicate that higher levels of proprietary assets are associated with industries/countries/years where location effects are high.

As measures of proprietary assets, I use the R&D to sales ratio of foreign affiliates and of the U.S. industry; royalties and license fees paid by foreign affiliates to their parent companies divided by sales of the parent companies; and the advertising to sales ratio within a U.S. industry.[24] Column (ii) of Table 6 provides the results when controlling for proprietary assets, as proxied by the R&D to sales ratio of foreign affiliates and of the U.S.. (I am constrained to use data only for 1989 to 1994 due to data availability,

of $1 + \frac{P.A.\,Proxy}{Sales}$. The logarithmic form follows from the transformation of the import demand equation into logs.

[24] The R&D to sales ratio should indicate resources expended in order to capture a potentially valuable proprietary asset. As for royalties and license fees, these payments represent, "receipts by U.S. parents from their foreign affiliates of fees for the use or sale of intangible property or rights, such as patents, industrial processes, trademarks, copyrights, franchises, designs, expertise, formulas, techniques, manufacturing rights, and other intangible assets or proprietary rights," and should thus be a good indication of the level of proprietary assets leveraged by the foreign affiliate. (Caves and More (1994) find that these data indeed are a good indicator of such information.) Finally, the advertising to sales ratio indicates the extent to which the production of heavily branded goods, which could benefit from a local presence, differentiate exporters and foreign affiliates.

so column (i) provides a benchmark for these same observations.) For direct inclusion, the coefficient on the $LOCAL$ dummy variable remains significant, and the magnitude changes only slightly in comparison to the benchmark. The coefficient on the interaction version of the proxy (column (iv)) is negative, but is not significant.

The interaction term for the royalties and license fees of foreign affiliates yields a negative coefficient and is significant (column (v)).[25] Thus, industries/countries/years with higher royalty and license fees payments would tend to have lower location effects. In other words, the apparent predilection for purchasing foreign affiliate products over imports would be lower in these industries, a finding which does not support the hypothesis that high levels of a proprietary asset lead to high location effects.[26] Note that with the interaction term included, I estimate the location effect where there is a zero level of proprietary assets present. By doing so, I eliminate any portion of the foreign-affiliate location effect due to the possession of proprietary assets.

In order to control for the possibility of locational effects due to brand advantages, I incorporate the advertising to sales ratio in columns (vii) and (viii), with (vi) as a benchmark.[27] Columns (vii) and (viii) show that controlling either directly or indirectly for advertising intensity has very little impact on the effects of borders.[28] Note that the positive and significant

[25] Since, for exporters, there is no comparable magnitude to the royalties and license fees paid by foreign affiliates, only an interaction version is used.

[26] As in Evans (2000), these effects could indicate that border effects fall with a decrease in the elasticity of substitution among varieties within an industry, where a higher R&D to sales ratio proxies for a lower elasticity of substitution.

[27] The years that I analyze are limited, again due to reasons of data availability.

[28] The functional form is $ln(1 + AD/Sales)$, for reasons such as described above in relation to the proprietary asset analysis.

coefficient on the $LOCAL$ dummy variable, 4.66, may be interpreted as the location effect with a zero level of industry advertising.

Additional results are in Table 7, where I examine the magnitude of location versus nationality advantages when controlling for proprietary assets. (Note that columns (i) and (iv) provide benchmark results.) Doing so has essentially no effect on the conclusions described above.

Thus, controlling for the possession of proprietary assets has very little effect on the conclusion that home bias arises largely from the effects of location, rather than from some inherent aversion to foreign products per se.

8 The Components of Home Bias

Table 8 provides some back-of-the-envelope calculations of the ad valorem tariff equivalents of home bias and of the two elements estimated here, location effects and nationality effects.[29] These calculations require an assumption about the elasticity of substitution among varieties, so I provide results for two values, 5 and 8. Of course, there will actually be variation across goods in these elasticities, so that these calculations are intended only as an indication of order of magnitude.[30] With an elasticity of 8, the ad valorem

[29] These calculations are based on the results in Table 5. As noted in footnote 9, the measure of domestic distance affects the magnitude of the $LOCAL$ coefficients, and thus the magnitude of the implied ad valorem effects. However, the main point of the table, which is that "nationality effects" are far smaller than either the overall degree of home bias or "location" effects, should hold true with other measures of domestic distance. I have re-estimated all results using the Wei measure of distance, and the results remain similar to those in Table 8.

[30] See Blonigen and Wilson (1999) for estimates of Armington elasticities, as well as for analysis of the relationship between these elasticities and home bias.

disadvantage of exports over domestic products ranges between 46 percent and 104 percent. The pure location effects are between 50 percent and 105 percent. Implied nationality effects, on the other hand, are quite small, with foreign affiliates actually enjoying a small advantage in some industries, although this difference is not statistically significant in most cases.

9 Summary and Conclusions

With "home bias," a consumer differentiates between domestic goods and imports and tends to purchase the domestic variety. In a very basic sense, home bias could be created by two factors. Imports could face a variety of impediments in the course of moving from the location of production in one country to the consumer in another country. Alternatively, consumers could just prefer domestic goods. This distinction matters, as both the welfare and policy implications of home bias depend on the relative importance of the two elements.

This paper probes these two potential causes of "home bias." I ask whether the apparent predilection to purchase domestic goods arises from (1) pure locational factors, such as barriers to imports or access to a local distribution network; or (2) an inherent preference for domestic goods per se.

I find that the apparent tendency to purchase domestic goods rather than imports arises almost entirely from pure locational factors. The ad valorem tariff-equivalent of producing at home and shipping to a different country ranges between 51 percent and 105 percent across industries. On the other hand, if a firm establishes and sells from a subsidiary located in the foreign country, its local sales are nearly on a par with those of domestic firms in that market. "Foreign-ness" in and of itself does not impede purchases of imported goods.

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1 Theory Appendix

The model is a very standard representation of trade in differentiated products. References include Helpman and Krugman (1985) and Deardorff (1995). All countries $c^{'}$ produce and trade g differentiated products, which are distinguished by their country of origin and by their location of production. Assume identical technologies across countries and a two-tier utility function in country c with Cobb-Douglas upper-level and Spence-Dixit-Stiglitz lower-level utility.

$$U^c = \Pi_g (X_c^g)^{\mu^g}$$
$$\sum_g \mu^g = 1$$

$$X_c^g = [\sum_{c'} \sum_n \beta^g_{c'n} (x^g_{cc'n})^{\epsilon_g}]^{\frac{1}{\epsilon_g}}$$
$$\epsilon_g = \frac{\sigma_g - 1}{\sigma_g}$$

X_c^g is the aggregate quantity over all varieties of good g consumed in country c, $x^g_{cc'n}$ is the quantity of good g of origin n produced in country c' and consumed in country c, and σ_g is the elasticity of substitution between varieties of the good.

The representative consumer optimizes subject to a budget constraint:

$$\sum_g [\sum_{c'} \sum_n p^g_{cc'n} x^g_{cc'n}] = Y_c$$

We solve the model using a two-stage budgeting procedure.

Solving the lower-level optimization problem, we find that:

$$\frac{(x^g_{cc'n})^{\epsilon_g - 1}}{(x^g_{cc'n'})^{\epsilon_g - 1}} = \frac{p^g_{cc'n} \beta^g_{c'n'}}{p^g_{cc'n'} \beta^g_{c'n}}$$

so

$$x^g_{cc'n'} = x^g_{cc'n}(p^g_{cc'n'})^{\frac{-1}{1-\epsilon_g}}(p^g_{cc'n})^{\frac{1}{1-\epsilon_g}}(\beta^g_{c'n'})^{\frac{1}{1-\varepsilon_g}}(\beta^g_{c'n})^{\frac{-1}{1-\varepsilon_g}}$$

substituting into the aggregator X^g_c and solving for $x^g_{sc'}$, we have:

$$x^g_{cc'n} = \frac{(p^g_{cc'n})^{\frac{-1}{1-\epsilon_g}}(\beta^g_{c'n})^{\frac{1}{1-\varepsilon_g}}}{[\sum_{c'}\sum_j(\beta^g_{c'j})^{\frac{1}{1-\varepsilon_g}}(p^g_{cc'j})^{\frac{\epsilon_g}{\epsilon_g-1}}]^{\frac{1}{\epsilon_g}}} X^g_c$$

Define a price index:

$$\begin{aligned} G^m_c &= [\sum_{c'}\sum_{n'}(\beta^g_{c'n'})^{\frac{1}{1-\varepsilon_g}}(p^g_{cc'n'})^{\frac{\epsilon_g}{\epsilon_g-1}}]^{\frac{\epsilon_g-1}{\epsilon_g}} \\ &= [\sum_{c'}\sum_{n'}(\beta^g_{c'n'})^{\sigma_g}(p^g_{cc'n'})^{1-\sigma_g}]^{\frac{1}{1-\sigma_g}} \end{aligned}$$

So, we have that:

$$x^g_{cc'n} = (\frac{p^g_{cc'n}}{G^g_c\beta^g_{c'n}})^{-\sigma_g}X^g_c$$

substituting into total expenditure on manufactures, we find that this total expenditure is $G^c_g X^c_g$. Solving the upper-level utility maximization problem, we find:

$$x^g_{cc'n} = \frac{\mu^g Y^c(\beta^g_{c'n})^{\sigma_g}}{(p^g_{cc'n})^{\sigma_g}(G^g_c)^{1-\sigma_g}}$$

Purchasing a good entails costs which may come from several sources. $p^g_{c'c'n}$ represents the price of good g at the factory in the country of production c'. Traditional transport costs (either domestic or international) from location c' to location c are represented by $D^g_{cc'n}$. Finally, any remaining differences between the prices of imports and domestic goods will be captured by a component $T^g_{cc'n}$, which will be used to measure the overall degree of home bias. Thus, the final delivered price takes the following form:

$$p^g_{cc'n} = p^g_{c'c'n}D^g_{cc'n}T^g_{cc'n} \tag{4}$$

where $p^g_{cc'n}$ is the price of good g of nationality n, produced in c', and consumed by c. Note that $T^g_{cc'n} = 1$ for a domestic product purchased within a country, i.e. if $c = c' = n$. The magnitude of home bias will be interpreted as a higher level of these additional costs. These costs could include tariffs on specific products, measured non-tariff barriers to trade, or biases against foreign goods.

While this framework indicates the overall degree of home bias, it does not distinguish between true "location effects" and other elements which may be inherent to foreign products. Suppose that home bias may be split into two portions: "location effects," barriers which are part of the location of production per se, and "nationality effects," any residual benefits to domestic firms that may not be enjoyed by a foreign firm, even with local production.

The price term in equation 1 may be expanded to include these two sorts of effects:

$$p^g_{cc'n} = p^g_{c'c'n} D^g_{cc'n} L^g_{cc'n} C^g_{cc'n}$$

where $C^g_{cc'n}$ represents differences between domestic and foreign products per se (i.e. nationality effects), $L^g_{cc'n}$ is pure location effects, and $T^g_{cc'n} = L^g_{cc'n} C^g_{cc'n}$. $L^g_{cc'n} = C^g_{cc'n} = 1$ for a domestic product purchased within a country, i.e. if $c = c' = n$.

We now have:

$$G^g_c = [\sum_{c'} \sum_{n'} (\beta^g_{c'n'})^{\sigma_g} (p^g_{c'c'n'} D^g_{cc'n'} L^g_{cc'n'} C^g_{cc'n'})^{1-\sigma_g}]^{\frac{1}{1-\sigma_g}}$$

Thus, consumption in location c of a good of origin n produced in c' is:

$$x^g_{cc'n} = \frac{\mu^g Y^c (\beta^g_{c'n})^{\sigma_g}}{(G^g_c)^{1-\sigma_g} (p^g_{c'c'n} D^g_{cc'n} L^g_{cc'n} C^g_{cc'n})^{\sigma_g}}$$

Since total shipments must account for transport costs and ad valorem barriers, we find that total shipments from a country c' to a country c of goods of origin n in industry g are:

$$EX^{g}_{cc'n} = \frac{\mu^{g} Y_c (\beta^{g}_{c'n})^{\sigma_g}}{(G^{g}_{c})^{1-\sigma_g}(p^{g}_{c'c'n})^{\sigma_g}(D^{g}_{cc'n}L^{g}_{cc'n}C^{g}_{cc'n})^{\sigma_g-1}}$$

Thus, we may define the portion of national income for country n obtained from sales of good g produced in country c' as:

$$Y^{g}_{nc'} = p^{g}_{c'c'n} * (\mu^{g}(\beta^{g}_{c'n})^{\sigma_g}(\sum_{c} \frac{Y^{c}}{(G^{g}_{c})^{1-\sigma_g}(p^{g}_{c'c'n})^{\sigma_g}(D^{g}_{cc'n}L^{g}_{cc'n}C^{g}_{cc'n})^{\sigma_g-1}}))$$

Solving for $\beta^{g}_{c'n}$, substituting in the expression for consumption of an individual variety imported by country c of a good of origin n produced in country c', we find:

$$IM^{g}_{cc'n} = \frac{Y_c Y^{g}_{nc'}}{(G^{g}_{c})^{1-\sigma_g}(p^{g}_{c'c'n}D^{g}_{cc'n}L^{g}_{cc'n}C^{g}_{cc'n})^{\sigma_g}\sum_{c}\frac{Y_c}{(p^{g}_{c'c'n}D^{g}_{cc'n}L^{g}_{cc'n}C^{g}_{cc'n})^{\sigma_g-1}(G^{g}_{c})^{1-\sigma_g}}}$$

where $IM^{g}_{cc'n}$ is total imports by country c of the g good of origin n produced in c', Y_c is the income of the importer, $Y^{g}_{ns'}$ is the income of the origin country derived from sales of good g produced in c', and G^{c}_{g} is a price index, as noted above.

Define $A^{g}_{c'}$ and A^{g}_{c} as measures of, respectively, the exporting and importing country's potential alternative trading partners, where:

$$\begin{aligned} A^{g}_{c'} &= [\sum_{c}(p^{g}_{c'c'n}L^{g}_{cc'n}C^{g}_{cc'n}D^{g}_{cc'n})^{(1-\sigma_g)}Y_c G^{(\sigma_g-1)}_{c}]^{-1} \\ A^{g}_{c} &= G^{\sigma_g-1}_{c} \end{aligned}$$

Assuming that each good m has a price of 1 at its location of production, we thus have:

$$\begin{aligned}\log IM^g_{cc'n} &= \log Y_c + \log Y^g_{nc'} - \sigma_g \log D^g_{cc'n} \\ &-\sigma_g \log L^g_{cc'n} \\ &-\sigma_g \log C^g_{cc'n} + \log A^g_{c'} + \log A^g_c\end{aligned}$$

2 Data Appendix

Trade and Production Data Data on exports from the U.S. to the countries in the sample are taken from Feenstra (1997), with the original sources as Bureau of the Census (1978-1988 and 1989-1994). They were converted from the SITC classification to the BEA classification using the concordance in Feenstra, Lipsey, and Bowen (1997). Production (gross output) data within industries for the U.S. are from the OECD Statistical Analysis Database.

Domestic trade for manufactured goods is production (gross output) within each industry less exports from that industry. Domestic production, employment, and total export data are from the OECD Statistical Analysis Database. They were converted to U.S. dollars using the annual exchange rate in the Database.

Data on the activities of foreign affiliates of U.S. multinationals are from BEA (1985-1994), as provided in Feenstra (1997). Total sales and local sales by foreign affiliates are used as, respectively, production and consumption.

Data for employment for all three sources of production are taken from the same sources as the production data.

GDP; Population; Distance; HOME, Common Language, and E.U. dummy variables The international bilateral distance data were kindly provided by John Helliwell. $DIST_{cc'}$ is the distance from the U.S. to importer c. It is generally measured from capital to capital and calculated using Great Circle Distances from Latitude and Longitude given in *Direct Line Distances*, by Fitzpatrick (1986). For trade within a country, own distances are based on Nitsch (2000b), who proposes using $\frac{1}{\sqrt{\Pi}} * \sqrt{AREA}$, a measure which takes into account a country's own geographic size. Data on area are from the Central Intelligence Agency. *The World Factbook 1990, Electronic Version.*

GDP data are taken from the OECD National Accounts Statistics; population data are from the PENN World Tables and the U.N. Demographic Yearbook.

Trade Policy Variables Trade policy data are taken from Lee and Swagel (1997), Anderson (1994), and OECD (1998). For all, the original source was the UNCTAD Database on Trade Control measures. The Lee and Swagel and Anderson data were aggregated using total imports by each of the recipient countries. OECD (1998) provides trade policy measures aggregated to the 3-digit ISIC level using production, value-added, and import weights. The OECD tariff and NTB data for 1993 are originally from the UNCTAD database. I utilize the data on Australia, Canada, Japan, and the E.U. The data are provided at the 3-digit ISIC level and are weighted using 1988 import weights, 1993 value-added weights, or 1993 production weights. The E.U. production and value-added weights are based on data for Germany. These were then aggregated to the classification used here using data provided in OECD (1998). Please contact the author for additional details on aggregation and country coverage. For domestic trade, a 0 tariff is assumed.

Other Variables Data on research and development expenditures are from BEA(various issues) for foreign affiliates and for parent companies. For the U.S., the data are private expenditures on research and development as provided in National Science Foundation (1997).

For the measure of a country's potential alternative trading partners, I use an empirical proxy based on the specification of Helliwell and Verdier (2000):

$$ALT_c = \sum_{c'} \frac{GDP_{c'}}{DIST_{cc'}}$$

where the countries c' are all of c's trading partners in the sample. Although not a direct translation of the theoretical definition of this term, this form captures the essential elements of the variable and embodies a number of desirable characteristics for this variable. Population is used instead of GDP for some of the analyses.

Data on advertising are from the COMPUSTAT Database.

Endowment data used as instruments were provided by James Harrigan, with the original source as Penn World Tables (workers, capital stock) and World Bank World Development Indicators (agricultural land). For some years, instruments are from OECD (1998) (labor force), World Bank World Development Indicators (agricultural land), and the Penn World Tables (capital stock). For the capital stock data, the last two years were extrapolated from a 1985 to 1992 series.

Table 1
Overall Home Bias

Dependent Variable: ln(Bilateral Trade)

	(i)	(ii)
ln(GDP Consumer)	**0.32**	**0.36**
	(0.04)	**(0.04)**
ln(Production)	**1.18**	**1.10**
	(0.05)	**(0.04)**
ln(Alternatives Consumer)	-0.04	-0.06
	(0.04)	(0.04)
ln(Alternatives Producer)	**-0.99**	**-0.93**
	(0.06)	**(0.06)**
ln(Distance)	**-0.69**	**-0.53**
	(0.04)	**(0.06)**
Export Effects:		
Local (1 for domestic sales, 0 otherwise)	**4.62**	
	(0.14)	
CHEM*Local		**4.66**
		(0.23)
ELEC*Local		**3.96**
		(0.23)
FOOD*Local		**5.77**
		(0.22)
MACH*Local		**3.59**
		(0.24)
OTHER*Local		**4.99**
		(0.22)
PFMET*Local		**4.69**
		(0.21)
TRANS*Local		**3.33**
		(0.22)
Number of Observations	1234	1234
Estimation	IV	IV
Industry Fixed Effects	Yes	Yes
Distance-Industry Interaction	Yes	Yes
Time Period	1985-1994	1985-1994
Year Fixed Effects	Yes	Yes

Numbers in bold are significant at the 5% level.

Table 2
Overall Home Bias and Measures of Trade Barriers

Dependent Variable: ln(Bilateral Trade)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
ln(GDP Consumer)	**0.37**	**0.35**	**0.34**	**0.34**	**0.31**	**0.31**	**0.29**	**0.25**
	(0.13)	**(0.14)**	**(0.12)**	**(0.13)**	**(0.15)**	**(0.14)**	**(0.13)**	**(0.12)**
ln(Production)	**1.07**	**1.09**	**1.08**	**1.13**	**1.14**	**1.15**	**1.15**	**1.17**
	(0.15)	**(0.15)**	**(0.14)**	**(0.16)**	**(0.16)**	**(0.16)**	**(0.14)**	**(0.14)**
ln(Alternatives Consumer)	-0.03	-0.04	0.23	-0.08	0.06	-0.08	0.28	0.30
	(0.13)	(0.14)	(0.14)	(0.15)	(0.16)	(0.15)	(0.16)	(0.15)
ln(Alternatives Producer)	**-1.53**	**-1.51**	**-1.69**	**-1.51**	**-1.58**	**-1.52**	**-1.74**	**-1.70**
	(0.32)	**(0.33)**	**(0.31)**	**(0.38)**	**(0.36)**	**(0.38)**	**(0.33)**	**(0.33)**
ln(Distance)	**-0.67**	**-0.65**	**-0.56**	**-0.85**	**-0.82**	**-0.84**	**-0.71**	**-0.62**
	(0.14)	**(0.14)**	**(0.13)**	**(0.15)**	**(0.14)**	**(0.15)**	**(0.13)**	**(0.13)**
Local (1 for domestic sales, 0 for imports from the U.S.)	**5.03**	**4.93**	**4.84**	**4.39**	**3.97**	**4.20**	**3.94**	**4.09**
	(0.46)	**(0.52)**	**(0.43)**	**(0.54)**	**(0.56)**	**(0.61)**	**(0.48)**	**(0.47)**
Barriers:								
Tariffs, Bilateral Import Weight		-1.86						
		(4.41)						
NTBs, Bilateral Import Weight			**-3.66**					
			(1.02)					
Tariffs, Production Weight					-4.49			
					(3.79)			
Tariffs, Import Weight						-3.12		
						(4.70)		
NTBs, Production Weight							**-8.22**	
							(2.11)	
NTBs, Import Weight								**-10.78**
								(2.01)
Number of Observations	118	118	118	116	104	116	104	116
Estimation	IV	IV	IV	IV	IV	IV	IV	IV
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance-Industry Interaction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Period	1988	1988	1988	1993	1993	1993	1993	1993
Year Fixed Effects	NA	NA	NA	NA	NA	NA	NA	NA

Numbers in bold are significant at the 5% level.

Table 3
Location Elements

Dependent Variable: ln(Bilateral Trade)	(i)	(ii)
ln(GDP Consumer)	**0.39**	**0.39**
	(0.03)	**(0.03)**
ln(Production)	**1.33**	**1.35**
	(0.04)	**(0.04)**
ln(Alternatives Consumer)	**-0.10**	**-0.10**
	(0.04)	**(0.04)**
ln(Alternatives Producer)	**-1.01**	**-0.99**
	(0.07)	**(0.06)**
ln(Distance)	**-0.78**	**-0.54**
	(0.05)	**(0.07)**
Location Effects:		
Local (1 for foreign-affiliate sales, 0 for imports from the U.S.)	**5.47**	
	(0.19)	
CHEM*Local		**5.53**
		(0.25)
ELEC*Local		**5.13**
		(0.26)
FOOD*Local		**7.04**
		(0.27)
MACH*Local		**4.44**
		(0.25)
OTHER*Local		**6.42**
		(0.28)
PFMET*Local		**6.12**
		(0.28)
TRANS*Local		**4.20**
		(0.24)
Number of Observations	1139	1139
Estimation	IV	IV
Industry Fixed Effects	Yes	Yes
Distance-Industry Interaction	Yes	No
Time Period	1985-1994	1985-1994
Year Fixed Effects	Yes	Yes

Numbers in bold are significant at the 5% level.

Table 4
Location Elements and Measures of Trade Barriers

Dependent Variable: ln(Bilateral Trade)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
ln(GDP Consumer)	**0.35**	**0.33**	**0.32**	**0.40**	**0.40**	**0.39**	**0.38**	**0.36**
	(0.11)	**(0.11)**	**(0.10)**	**(0.11)**	**(0.12)**	**(0.12)**	**(0.11)**	**(0.10)**
ln(Production)	**1.40**	**1.41**	**1.41**	**1.21**	**1.18**	**1.21**	**1.20**	**1.19**
	(0.14)	**(0.14)**	**(0.13)**	**(0.14)**	**(0.14)**	**(0.15)**	**(0.13)**	**(0.13)**
ln(Alternatives Consumer)	-0.06	-0.09	0.19	-0.12	0.00	-0.12	0.20	0.22
	(0.13)	(0.14)	(0.15)	(0.15)	(0.16)	(0.15)	(0.16)	(0.15)
ln(Alternatives Producer)	**-1.66**	**-1.63**	**-1.80**	**-1.02**	**-1.11**	**-1.02**	**-1.24**	**-1.21**
	(0.36)	**(0.36)**	**(0.34)**	**(0.24)**	**(0.23)**	**(0.24)**	**(0.21)**	**(0.21)**
ln(Distance)	**-0.78**	**-0.76**	**-0.66**	**-0.84**	**-0.82**	**-0.83**	**-0.72**	**-0.66**
	(0.17)	**(0.17)**	**(0.16)**	**(0.20)**	**(0.19)**	**(0.20)**	**(0.18)**	**(0.18)**
Local (1 for foreign-affiliate sales, 0 for imports from the U.S.)	**6.28**	**6.08**	**6.15**	**4.68**	**4.25**	**4.51**	**4.21**	**4.30**
	(0.62)	**(0.69)**	**(0.59)**	**(0.66)**	**(0.70)**	**(0.75)**	**(0.58)**	**(0.59)**
Barriers:								
Tariffs, Bilateral Import Weight		-2.97						
		(4.50)						
NTBs, Bilateral Import Weight			**-3.42**					
			(1.12)					
Tariffs, Production Weight					-3.43			
					(3.87)			
Tariffs, Import Weight						-2.22		
						(4.79)		
NTBs, Production Weight							**-7.77**	
							(2.22)	
NTBs, Import Weight								**-9.76**
								(2.09)
Number of Observations	104	104	104	106	94	106	94	106
Estimation	IV	IV	IV	IV	IV	IV	IV	IV
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance-Industry Interaction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Period	1988	1988	1988	1993	1993	1993	1993	1993
Year Fixed Effects	NA	NA	NA	NA	NA	NA	NA	NA

Numbers in bold are significant at the 5% level.

Table 5
Nationality Elements

Dependent Variable: ln(Bilateral Trade)

	(i)			(ii)		
	Domestic Sales	Foreign Affiliate Sales	P-Value*	Domestic Sales	Foreign Affiliate Sales	P-Value*
ln(GDP Consumer)	**0.39**	**0.38**		**0.39**	**0.37**	
	(0.03)	**(0.03)**		**(0.03)**	**(0.03)**	
ln(Production)	**1.08**	**1.03**		**1.07**	**1.02**	
	(0.02)	**(0.02)**		**(0.02)**	**(0.02)**	
ln(Alternatives Consumer)	-0.08	-0.07		**-0.08**	-0.06	
	(0.04)	(0.04)		**(0.04)**	(0.04)	
ln(Alternatives Producer)	**-0.96**	**-0.87**		**-0.94**	**-0.85**	
	(0.07)	**(0.07)**		**(0.07)**	**(0.06)**	
ln(Distance)	**-0.73**	**-0.66**		**-0.54**	**-0.45**	
	(0.05)	**(0.05)**		**(0.07)**	**(0.07)**	
Export/ Location Effects:						
Local	**4.36**	**4.33**	0.78			
(1 for dom. or foreign-affil. sales, 0 for imports from U.S.)	**(0.11)**	**(0.12)**				
CHEM*Local				**4.63**	**4.44**	0.11
				(0.22)	**(0.21)**	
ELEC*Local				**3.87**	**3.82**	0.65
				(0.21)	**(0.21)**	
FOOD*Local				**5.69**	**5.73**	0.75
				(0.22)	**(0.23)**	
MACH*Local				**3.51**	**3.22**	0.03
				(0.22)	**(0.22)**	
OTHER*Local				**4.99**	**4.97**	0.91
				(0.22)	**(0.22)**	
PFMET*Local				**4.65**	**4.53**	0.36
				(0.21)	**(0.22)**	
TRANS*Local				**3.02**	**3.29**	0.02
				(0.22)	**(0.22)**	
Number of Observations	1116	1116		1116	1116	
Estimation	3SLS			3SLS		
Industry Fixed Effects	Yes			Yes		
Distance-Industry Interaction	Yes			Yes		
Time Period	1985-1994			1985-1994		
Year Fixed Effects	Yes			Yes		

* P-value is the probability associated with the hypothesis that domestic sales and foreign affiliate sales effects are equal. A low value indicates that we are able to reject that hypothesis, I.e. that the two differ from each other significantly.
Numbers in bold are significant at the 5% level.

Table 6
Location Elements and Proprietary Assets

Dependent Variable: ln(Bilateral Trade)

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
ln(GDP Consumer)	**0.44**	**0.41**	**0.45**	**0.39**	**0.43**	**0.43**	**0.43**
	(0.04)	**(0.04)**	**(0.04)**	**(0.03)**	**(0.04)**	**(0.04)**	**(0.04)**
ln(Production)	**1.28**	**1.30**	**1.27**	**1.32**	**1.27**	**1.27**	**1.27**
	(0.06)	**(0.06)**	**(0.06)**	**(0.04)**	**(0.06)**	**(0.06)**	**(0.06)**
ln(Alternatives Consumer)	**-0.12**	**-0.11**	**-0.13**	**-0.10**	**-0.12**	**-0.12**	**-0.12**
	(0.05)	**(0.05)**	**(0.05)**	**(0.04)**	**(0.06)**	**(0.06)**	**(0.06)**
ln(Alternatives Producer)	**-0.99**	**-1.07**	**-0.96**	**-1.00**	**-0.96**	**-0.96**	**-0.96**
	(0.09)	**(0.09)**	**(0.09)**	**(0.07)**	**(0.09)**	**(0.09)**	**(0.09)**
ln(Distance)	**-0.87**	**-0.82**	**-0.86**	**-0.77**	**-0.84**	**-0.84**	**-0.82**
	(0.07)	**(0.07)**	**(0.07)**	**(0.05)**	**(0.07)**	**(0.07)**	**(0.07)**
Local (1 for foreign-affiliate sales, 0 otherwise)	**4.94**	**5.30**	**4.96**	**5.81**	**4.95**	**4.95**	**4.66**
	(0.27)	**(0.28)**	**(0.27)**	**(0.21)**	**(0.27)**	**(0.27)**	**(0.31)**
R&D/Sales, Direct Effects:							
R&D/Sales		**13.17**					
		(3.33)					
R&D, Interaction with Local:							
R&D/Sales			-6.32				
			(4.49)				
Royalties and License Fees, Interaction with Local:							
Parents' receipts from all countries				**-28.22**			
				(5.96)			
Advertising/Sales, Direct Effects:							
Advertising/Sales						-4.59	
						(12.17)	
Advertising, Interaction with Local:							
Advertising/Sales							26.23
							(14.86)
Number of Observations	644	644	644	1137	594	594	594
Estimation	IV	IV	IV	IV	IV	IV	IV
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance-Industry Interaction	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Period	1989-1994	1989-1994	1989-1994	1985-1994	1990-1994	1990-1994	1990-1994
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Numbers in bold are significant at the 5% level.

Table 7
Nationality Elements and Proprietary Assets

Dependent Variable: ln(Bilateral Trade)

	(i)			(iii)			(iii)			(iv)			(vi)		
	Domestic Sales	Foreign Affiliate Sales	P-Value*	Domestic Sales	Foreign Affiliate Sales	P-Value*	Domestic Sales	Foreign Affiliate Sales	P-Value*	Domestic Sales	Foreign Affiliate Sales	P-Value*	Domestic Sales	Foreign Affiliate Sales	P-Value*
ln(GDP Consumer)	**0.43**	**0.40**		**0.43**	**0.40**		**0.43**	**0.41**		**0.39**	**0.38**		**0.39**	**0.38**	
	(0.04)	**(0.04)**		**(0.04)**	**(0.04)**		**(0.04)**	**(0.04)**		**(0.03)**	**(0.03)**		**(0.03)**	**(0.03)**	
ln(Production)	**1.06**	**0.97**		**1.05**	**0.98**		**1.04**	**0.97**		**1.08**	**1.03**		**1.09**	**1.02**	
	(0.02)	**(0.02)**		**(0.03)**	**(0.02)**		**(0.02)**	**(0.02)**		**(0.02)**	**(0.02)**		**(0.02)**	**(0.02)**	
ln(Alternatives Consumer)	**-0.11**	-0.09		**-0.11**	-0.09		**-0.11**	-0.09		-0.08	-0.07		-0.08	-0.07	
	(0.05)	(0.05)		**(0.05)**	(0.05)		**(0.05)**	(0.05)		(0.04)	(0.04)		(0.04)	(0.04)	
ln(Alternatives Producer)	**-0.94**	**-0.81**		**-0.94**	**-0.82**		**-0.93**	**-0.79**		**-0.96**	**-0.87**		**-0.96**	**-0.87**	
	(0.09)	**(0.09)**		**(0.09)**	**(0.09)**		**(0.09)**	**(0.09)**		**(0.07)**	**(0.07)**		**(0.07)**	**(0.07)**	
ln(Distance)	**-0.80**	**-0.75**		**-0.80**	**-0.76**		**-0.80**	**-0.75**		**-0.73**	**-0.66**		**-0.73**	**-0.65**	
	(0.06)	**(0.07)**		**(0.06)**	**(0.06)**		**(0.06)**	**(0.06)**		**(0.05)**	**(0.05)**		**(0.05)**	**(0.05)**	
R&D/Sales, Direct					-0.32										
					(1.43)										
R&D/Sales, Interaction with Local								**-3.74**							
								(1.78)							
Royalties and License Fees, Interaction with Local														**-11.11**	
														(2.59)	
Location Effects:															
Local	**3.93**	**3.72**	0.05	**3.93**	**3.74**	0.12	**3.89**	**3.73**	0.14	**4.36**	**4.33**	0.78	**4.36**	**4.44**	0.41
(1 for dom. or foreign-affil. sales, 0 otherwise)	**(0.13)**	**(0.15)**		**(0.14)**	**(0.15)**		**(0.13)**	**(0.14)**		**(0.11)**	**(0.12)**		**(0.11)**	**(0.12)**	
Number of Observations	627	627		627	627		627	627		1116	1116		1116	1116	
Estimation	3SLS			3SLS			3SLS			3SLS			3SLS		
Industry Fixed Effects	Yes			Yes			Yes			Yes			Yes		
Distance-Industry Interaction	Yes			Yes			Yes			Yes			Yes		
Time Period	1989-1994			1989-1994			1989-1994			1985-1994			1985-1994		
Year Fixed Effects	Yes			Yes			Yes			Yes			Yes		

* P-value is the probability associated with the hypothesis that domestic sales and foreign affiliate sales effects are equal.
A low value indicates that we are able to reject that hypothesis, i.e. that the two differ from each other significantly.

Numbers in bold are significant at the 5% level.

Table 8
The Elements of Home Bias

Industry	Overall Home Bias	Ad Valorem Equivalent (%)		Location Element	Ad Valorem Equivalent (%)		Nationality Element	Ad Valorem Equivalent (%)	
		Elasticity = 5	Elasticity = 8		Elasticity = 5	Elasticity = 8		Elasticity = 5	Elasticity = 8
Chemicals and Allied Products	103.02	152.69	78.49	84.51	142.88	74.13	1.22	4.04	2.51
Electric and Electronic Equipment	48.14	117.02	62.30	45.45	114.54	61.14	1.06	1.15	0.72
Food and Kindred Products	294.65	211.79	103.55	307.18	214.40	104.61	0.96	-0.83	-0.52
Non-electric Machinery	33.56	101.91	55.14	25.15	90.59	49.65	1.33	5.94	3.67
Other Manufacturing	146.48	171.12	86.52	144.37	170.33	86.18	1.01	0.29	0.18
Primary and Fabricated Metals	104.22	153.27	78.75	92.52	147.31	76.11	1.13	2.41	1.50
Transportation Equipment	20.39	82.76	45.77	26.94	93.24	50.94	0.76	-5.42	-3.42