INTRANATIONAL HOME BIAS IN TRADE

Holger C. Wolf*

Abstract—A number of recent studies have found intranational trade to be excessive compared to international trade, based on a gravity specification. The preferred explanation for this finding has been the presence of formal and informal trade barriers, with associated welfare consequences. If such barriers were indeed the sole culprit, home bias should not exist on the subnational level. We find, however, that home bias is present within U.S. states, suggesting the presence of other causes of excessive home trade.

I. Introduction

A NUMBER of recent econometric studies have found intranational trade to be much larger than would be expected based on a gravity specification. McCallum (1995), Helliwell (1996b, 1997, 1998) and Helliwell and McCallum (1995) document that Canadian provinces trade approximately ten times more with other Canadian provinces than with equidistant and equisized U.S. states. Wei (1996), using a different approach, finds that the intranational trade of OECD economies—again controlling for distance and other factors—exceeds their international trade by a factor of approximately two to three. Applying the same specification to both data sets yields quite comparable home-bias effects of around ten (Helliwell, 1997; Nitsch, 1997).[1]

National trade barriers provide an intuitive explanation. Trade barriers (whether official, informal, or accidental) generate additional costs from inter- versus intranational transactions, deterring the former on the margin and thus generating a home bias. Whether national trade barriers provide a full explanation, however, remains an open question. The main puzzle is the size of the bias, which appears prima facie at odds with the available evidence on the size and the associated elasticity of trade barriers.[2] Lock-in effects provide one possible explanation. To the extent that there are substantial fixed costs to relocation, or substantial spatial spillovers, (higher) past trade barriers determining past location decisions can continue to exert an important influence on current trade patterns.[3]

In principle, the trade-barrier explanation of home bias is readily testable. If such barriers are indeed at the root of the effect, then the home-bias effect should vanish once measures of trade barriers are added to the trade specification. To my knowledge, no systematic attempt in this direction has been undertaken to date. Partial support for an important role of trade barriers is, however, provided by Frankel, Stein, and Wei (1995), who find a positive trade effect of common membership in a trade bloc, and by Helliwell (1998), who finds that the Canadian home bias diminished after the Free Trade Agreement (FTA) came into effect. Some evidence also points to a trade-deterrence effect of informational barriers. Countries sharing a common language generally have larger bilateral trade, ceteris paribus. Perhaps more intriguing, inward migration appears to be robustly associated with export growth, consistent with informal explanations focusing on the importance of contacts and personal links in establishing trade connections.[4]

In this paper, we subject the trade-barrier explanation of home bias to a different test. If (explicit or implicit) national trade barriers are at the root of home bias in trade, we should not find home bias on the subnational level. We test this hypothesis based on the 1993 Commodity Flow Survey, which provides detailed data on trade within and across the individual U.S. states. The contiguous U.S. states arguably provide an almost ideal sample for our purpose. The strong constitutional protection of interstate commerce implies an absence of formal trade barriers. The all but irrevocably fixed exchange rate between states, the fairly high degree of cultural and institutional homogeneity, and the very high degree of interstate migration suggests that most of the informal trade barriers mentioned in the literature also do not play a mayor role in deterring trade between states. In consequence, a finding of home bias on the state level could be interpreted as evidence that factors other than trade barriers might also operate on the national level.

We next describe the data set. We then replicate the standard home-bias tests, detecting significant state-level home bias. The final section of the paper explores some potential causes of these effects.

II. The Commodity Flow Survey

The empirical results presented below are based on the 1993 U.S. Commodity Flow Survey (CFS). The CFS was collected by the Census Bureau on behalf of the U.S. Department of Transportation with the aim of providing data on the flow of goods and materials by mode of transport. The data and a more detailed description are available online at www.bts.gov and can also be obtained on CD from the Bureau of the Census (CD-CFS-93-1).

Received for publication February 11, 1997. Revision accepted for publication December 14, 1999.

* George Washington University and NBER

The paper has benefitted substantially from comments received on earlier versions. I particularly thank Donald Davis, John Helliwell, Russ Hillberry, Shang-Jin Wei, and two anonymous referees for very helpful comments.

[1] For an earlier work on the same issue, see Gunnar Törnqvist (Ohlin, 1976), who concludes on the effect of borders on regional trade that "Interaction is on much the same scale as if the regions were thousands of kilometers away from each other in the same country" (p. 151). See also Ohlin (1933) and Isard and Peck (1954) for earlier perspectives.

[2] Helliwell (1997) provides informal survey evidence suggesting that the Canadian-U.S. home bias substantially exceeds economists' ex ante expectations.

[3] For two recent views on the role of history in trade, see Rauch (1993) and Eichengreen and Irwin (1996).

[4] See Egan and Mody (1992), Gould (1994), Head and Ries (1998), and Helliwell (1997).

The Review of Economics and Statistics, November 2000, 82(4): 555–563

The survey covers nine transportation modes[5] and more than twenty sectors.[6] The sample excludes shipments from/to foreign sources/destinations.[7] The sample also excludes shipments by farms, forestry enterprises, fisheries, construction, transportation, oil/gas extraction, government, households, and most services.[8] Surveyed establishments were requested to list the destination addresses, weight, and value of their shipments for four two-week sample periods spaced over the year.

III. Methodology

''Excessive'' intrastate (or home-state bias) is by its nature only defined residually vis a vis a baseline model of ''normal'' trade. Despite substantial progress, a consensus model of trade determination—and even more so a consensus specification—remains elusive. The home-bias literature has sidestepped this debate, instead specifying baseline trade via a modified version of the gravity approach linking trade to distance and activity.[9] The gravity specification provides a useful benchmark for two reasons.[10] First, it imposes quite mild restrictions, and is hence consistent with a wide range of trade models, including relative endowment and increasing-returns models (Bergstrand, 1985, 1989; Deardorff, 1995). Second, it boasts a remarkably good track record in accounting for spatial patterns of transactions, including trade.[11]

The term *gravity equation* comprises a number of alternative specifications. The most commonly used specification uses a log-log format:[12]

$$\begin{aligned} \ln(Export_{ij}) = \alpha &+ \beta_1 \ln(Y_i) + \beta_2 \ln(Y_j) \\ &+ \beta_3 \ln(D_{ij}) + \beta_4 \ln(Remote_{i,j}) \\ &+ \beta_5 \ln(Remote_{j,i}) + u_t, \end{aligned} \quad (1)$$

where $Export_{ij}$ denotes exports from state i to state j (taken from the commodity flow survey) and Y denotes gross state output, taken from the United States Statistical Abstract. In principle, GDP per capita and population could enter with different elasticities; however, previous findings (Helliwell, 1998) suggest that, within countries (though not across countries), per capita GDP and population enter with approximately equal sign. We hence use the more parsimonious specification with total GDP.

D_{ij} denotes the distance between the two states, measured as the minimum driving distance in miles between the largest city in each state, taken from the Rand-McNally Road Atlas and the Rand-McNally Tripmaker CD. The choice of distance differs from the previous literature which, largely studying noncontiguous groups of countries, has more commonly used minimum straight-line distance measures. Because the majority of shipments between U.S. states are transported either by road or by a road-rail combination,[13] minimum driving distance appears preferable, although by and large the difference is of second order.

Full compatibility of the gravity model with theoretical models of trade determination requires the inclusion of controls for the location of states i and j relative to all other states, or their ''remoteness'' (Anderson, 1979; Deardorff, 1995). Intuitively, the farther two states are located away from other states, the larger will be their volume of bilateral trade for a given bilateral distance. Remoteness for state i for exports from state i to state j is measured as the GDP weighted average distance between state i and all states except j (Helliwell, 1998), and is expected to enter with positive sign:

$$Remote_{ij} = \sum_{k=1, k<>j}^{48} \frac{D_{ik}}{\text{GDP}_k}. \quad (2)$$

Figure 1 plots the remoteness measure (as deviation from the mean) for intrastate trade (the GDP weighted average distance to all other states). The West Coast states and the northeastern states are among the most remote, while central and mountain states are least remote.

Adding intra-unit trade to the gravity equation requires two modifications. First, a ($No - Border$) dummy is added, defined as equal to 1 for intrastate shipments. The significance and the size of the anti-log of the coefficient on the

[5] Rail, for-hire truck, private truck, air, inland water, deep-sea water, pipeline, U.S. Postal Service, and courier transportation.

[6] Mining (except mining services), food and kindred products, tobacco products, textile mill products, apparel, lumber and wood products, furniture, paper and allied products, printing and publishing (except services), chemicals, petroleum refining, rubber and miscellaneous plastics products, leather and leather products, stone, clay, glass and concrete products, primary metals industries, fabricated metals products, industrial and commercial machinery, computer equipment, electronic and other electrical equipment, transportation equipment, instruments, wholesale trade, catalog and mail order houses, motion pictures and video tape distribution, covered under SIC codes 10 (except 108), 12 (except 124), 14 (except 148), 20–26, 27 (except 279), 28–39, 41, 50, 596 and 782.

[7] Surveyed firms were, however, not instructed to exclude imported products from their report; in consequence, distribution shipments of imported goods may be recorded. Controlling for this potential problem by adding as additional determinants ocean-dummies and the value of total trade going through all major customs locations in either of the two trading partners did not significantly affect results, however.

[8] The exclusions primarily reflect limitations of the survey coverage, which was mainly concerned with trade movements affecting the national transportation grid. For agriculture, forestry, and fisheries, only the initial shipment to a distributor is excluded.

[9] Ravenstein (1885, 1889), Zipf (1949), and Linnemann (1959).

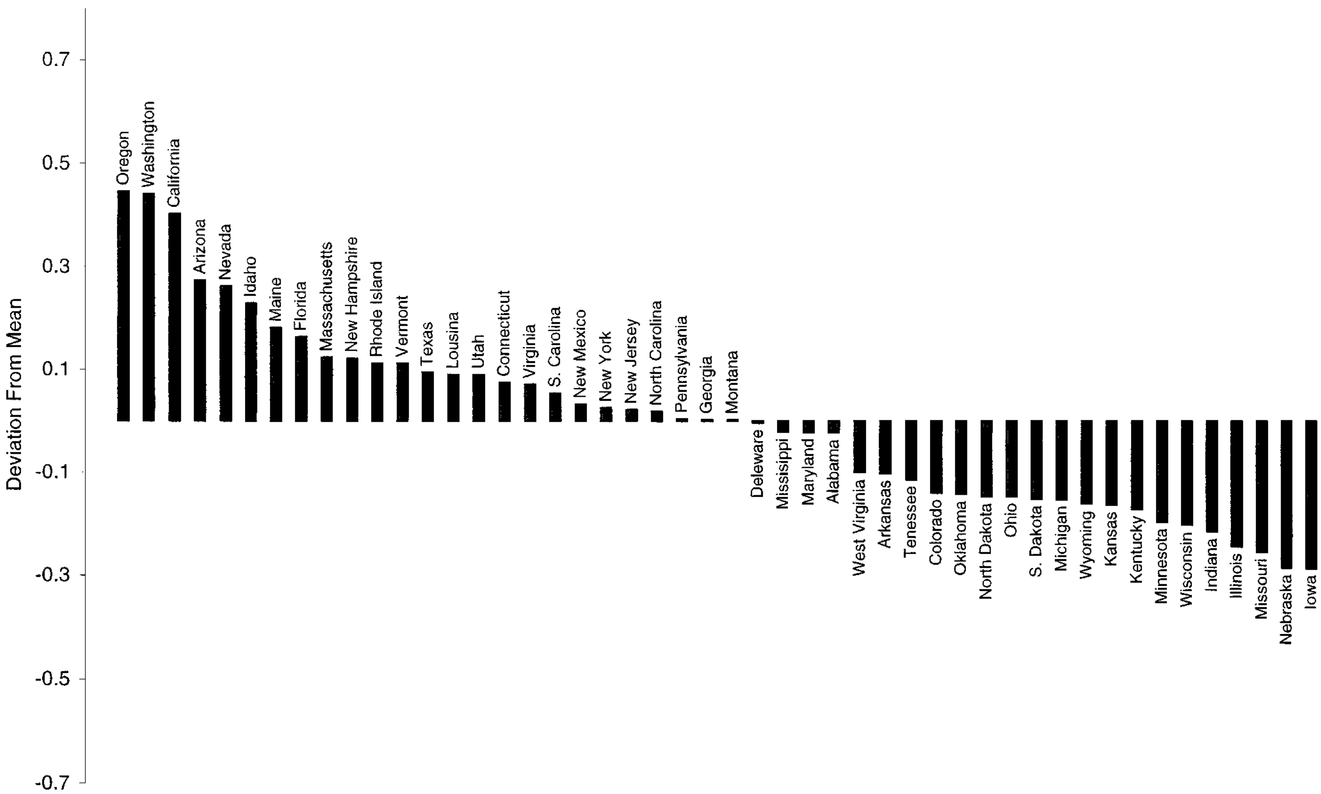
[10] See Anderson (1979), Davis (1996), Davis and Weinstein (1996), Deardorff (1995), Evenett and Keller (1998), and Harrigan (1994).

[11] A sample of recent trade applications and surveys includes Geraci and Prewo (1977), Deardorff (1984), Frankel, Stein, and Wei (1995), Helpman (1987), Hummels and Levinsohn (1995), Rauch (1996), Sanso, Cuairan, and Sanz (1993), and Wei (1996), among others.

[12] Reflecting the vagueness of ''gravity foundations,'' little can be said ex ante about the optimal functional form. Specification studies by Gaudry, Blum, and McCallum (1996) and by Sanso, Cuairan, and Sanz (1993), however, suggest few benefits of selecting a more general specification over the log format.

[13] In the sample year, the modal distribution, in terms of ton-miles of freight, was as follows—rail: 33.0%; truck: 25.3%; water: 23.5%; pipeline: 17.6%; and air: 0.3%. In terms of value, transportation by truck accounts for two-thirds of the total value (National Transportation Statistics Yearbook, 1996).

FIGURE 1.—REMOTENESS (DEVIATION FROM MEAN)



dummy determines the statistical and economic importance of subnational home bias. Second, a measure of intrastate distance is required. The most appropriate definition of internal distance remains unsettled in the literature. Previous papers in the literature have generally used one-half of the minimum distance to the next external neighbor. To achieve better comparability, the same measure—one-half the minimum distance to the nearest neighboring state—is used in the first set of regressions reported below. This definition of internal distance is, however, potentially subject to serious measurement errors, a point to which we later return.

IV. Baseline Results

Figure 2 provides a first glimpse at the location-trade nexus, plotting the log of exports (scaled by the product of state GDP) against the log of distance, revealing a strong negative relation, with a simple correlation coefficient of −0.75. Figure 3 plots the share of shipments within a state to its total shipments. The intrastate shipment ratio generally increases in state size and varies from less than 20% for Delaware to more than 60% for Texas, California, Washington, and Florida.

The regression results for the basic specification are reported in table 1. Column (1) reports the results for the baseline regression on scale, distance, and the home-bias dummy. The explanatory power for the intra-U.S. data set, at 0.83, is high and closely matches the R2 for the OECD (0.87) and the U.S.-Canada (0.81) dataset.[14] Both scale variables enter highly significant, with coefficients near unity, bracketed by the 0.8 elasticity found for the OECD dataset and the 1.1–1.2 elasticity found for the Canada-U.S. dataset. Distance deters trade, with a unit coefficient, which is again bracketed by the elasticities found for the OECD (−0.870) and the Canada-U.S. (−1.38) datasets. The home-bias dummy enters positively and highly significant. The implied home bias of 4.39 is substantially lower than either the OECD home bias (8.58) or the Canada-U.S. home bias (21.11). It is, however, highly significant, both statistically and economically.

Column (2) adds the two remoteness measures to the regression. While both are statistically significant (although the home measure is signed negatively rather than, as expected, positively), they add little to the overall explanatory power of the regression (0.841 versus 0.836) and do not significantly affect the other coefficients.

Figure 4 reports the estimated home bias by state, obtained by first estimating the basic gravity regression (exports on scale, distance, and remoteness) for a subsample excluding the intrastate observations, then using the coefficients to predict intrastate exports. The figure plots these predicted exports against actual exports. For the vast majority of states, actual intrastate trade significantly exceeds

[14] The comparison elasticities are taken from Helliwell (1997), table 1, columns (1) and (2).

FIGURE 2.—DISTANCE VERSUS TRADE

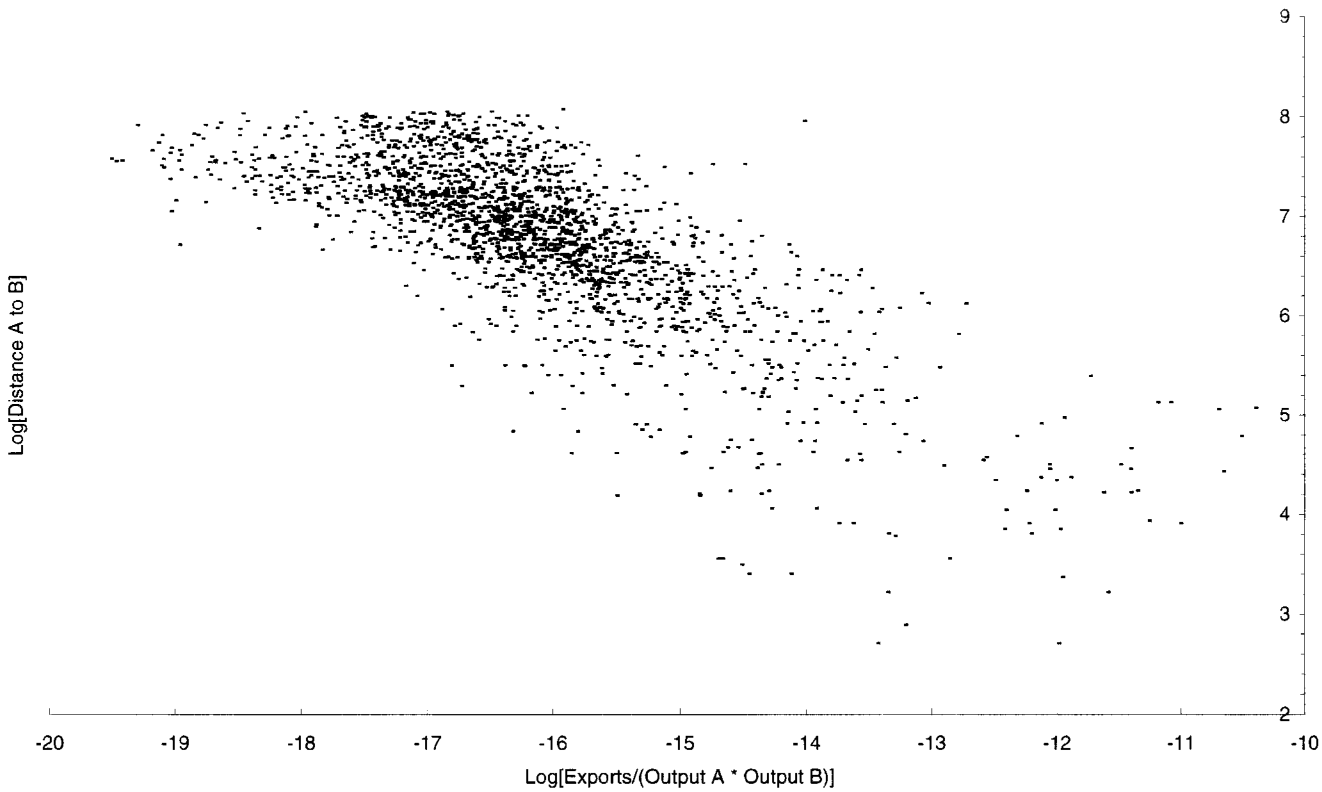


FIGURE 3.—INTRASTATE EXPORT SHARE, PERCENT OF TOTAL STATE EXPORTS

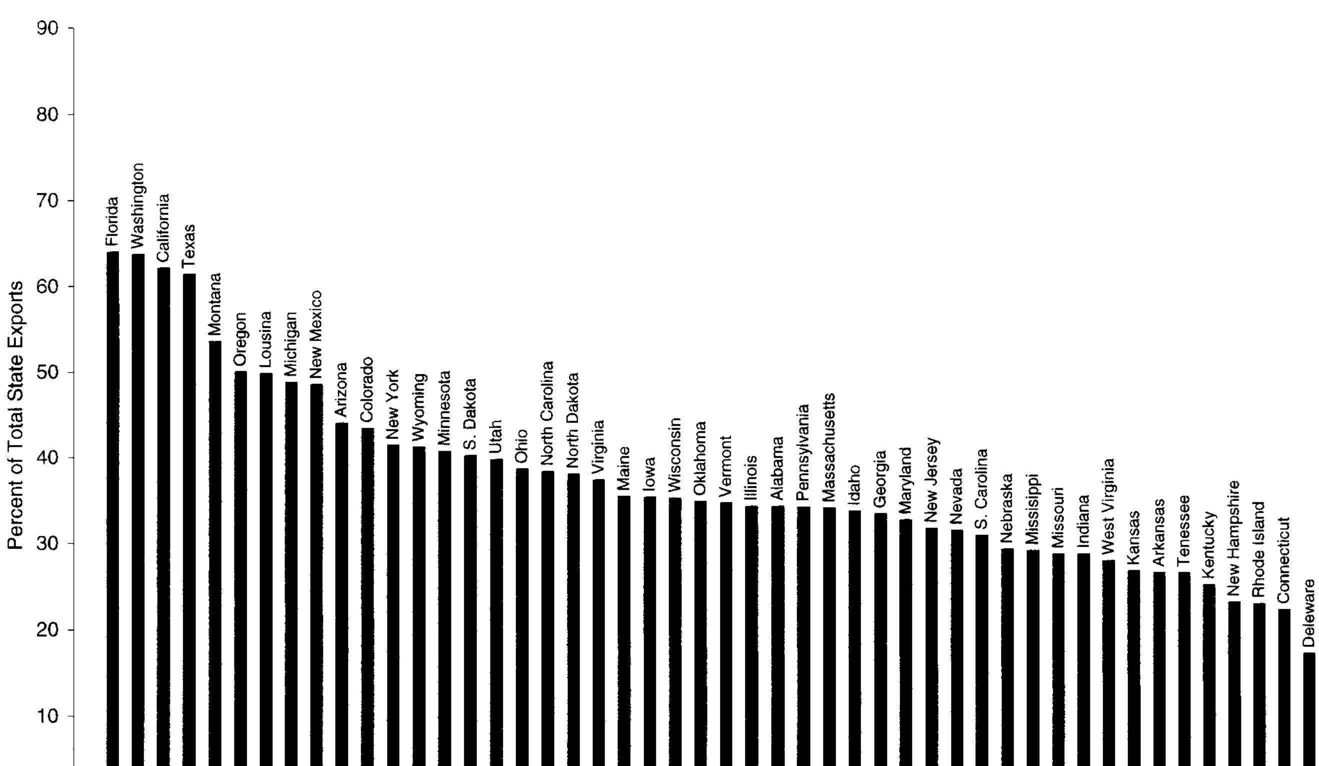


TABLE 1.—GRAVITY EQUATION: BASELINE RESULTS

	1	2	3
Constant	−9.51 (29.87)	−9.36 (−29.32)	−11.43 (34.37)
ln (Y^1)	1.02 (62.04)	1.01 (61.61)	1.03 (65.83)
ln (Y^2)	0.98 (59.33)	0.98 (59.33)	1.00 (63.43)
ln (*Distance*)	−1.00 (43.32)	−1.02 (42.78)	−0.77 (28.01)
*Remote*1		−0.33 (3.54)	−0.50 (5.51)
*Remote*2		0.65 (6.94)	0.48 (5.34)
Adjacent			0.98 (15.17)
No − Border	1.48 (11.53)	1.43 (11.13)	1.19 (9.64)
R^2	0.836	0.841	0.856
Nobs	2137	2137	2137
Border effect	4.39	4.17	3.28

predicted intrastate trade, with the notable exception of New York, Pennsylvania, New Jersey, and Massachusetts (and about zero home bias for Delaware, Connecticut, Maryland, Illinois, and California). The largest home bias is observed for Montana, the Dakotas, Idaho, and Utah; for all five states, actual trade exceeds predicted trade by a factor of twenty or above.

Column 3 adds a dummy defined to be equal to 1 for adjacent states, with states classified to be adjacent to themselves. The adjacency dummy enters highly significantly: controlling for other factors, states adjacent to each other trade 2.6 times more with each other. Controlling for adjacency also affects the coefficient on the two other spatial variables. The distance elasticity declines by 0.25, while the home bias declines from 4.17 to 3.28, suggesting that a good 20% of the home bias can be attributed to the adjacency of trading areas within a state. For this baseline equation, removal of the home-bias effect is equivalent to increasing the intrastate distance from the sample average of 84 miles to 394 miles.

The positive adjacency effect is familiar from previous studies examining trade across national borders. In those studies, the effect has typically been attributed to higher shipping costs for shipments crossing a third country, an explanation not applicable to the United States. One possible explanation for the positive effect is that adjacency proxies for an absence of "intervening opportunities" between two trading partners. As Stouffer (1940) notes, for given distance and other spatial determinants, trade between two locations depends upon the location of alternative trading partners. In particular, trade between two locations is likely to be lower, ceteris paribus, if a large alternative supplier is located between them. (Trade between Philadelphia and New Haven would likely be greater in the absence of New York City.)

FIGURE 4.—ACTUAL VERSUS PREDICTED EXPORTS

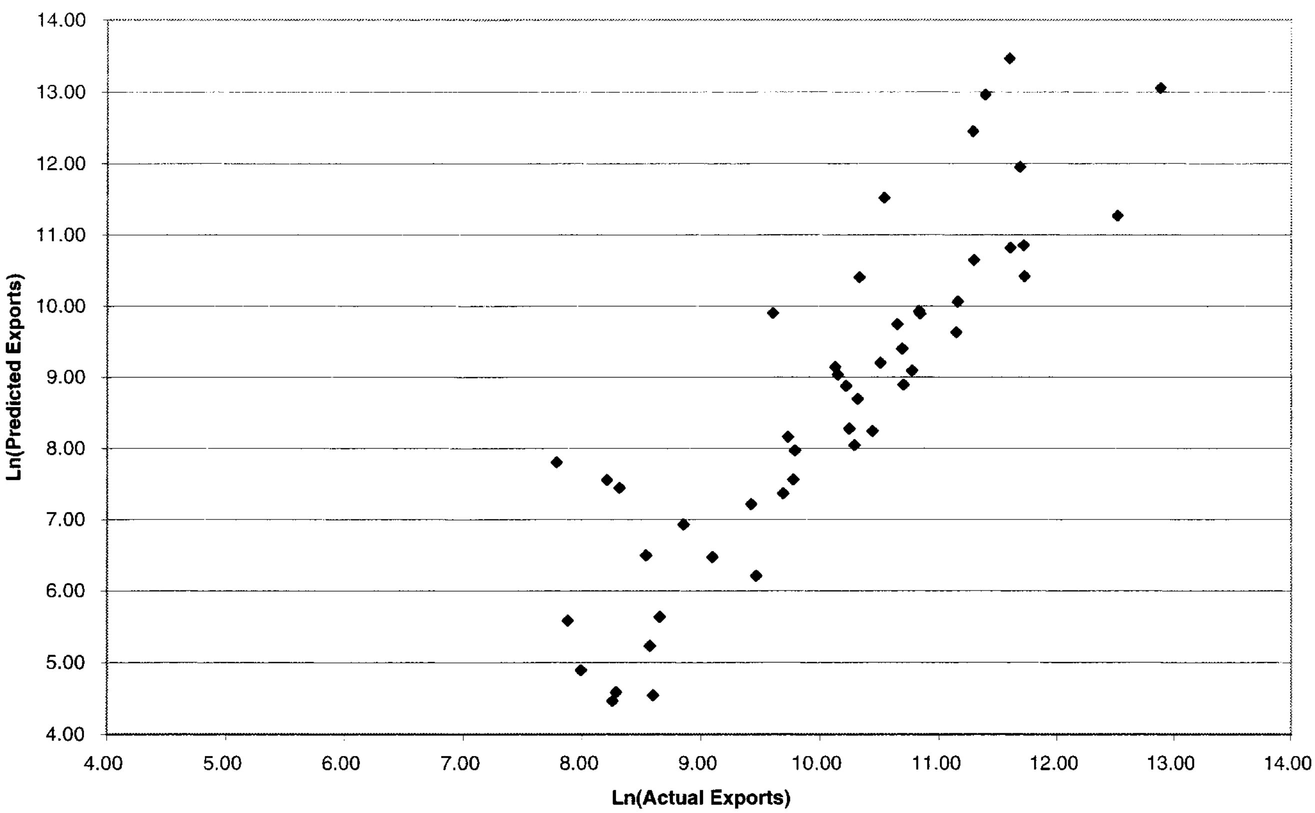


TABLE 2.—HOME BIAS: ROBUSTNESS TESTS I

	1 Baseline	2 Alternative Distance	3 Export/Y1 * Y2 as LHS	4 Population
Constant	−11.43	−11.76	−10.97	−20.64
	(34.37)	(36.06)	(59.45)	(50.26)
ln (Y^1)	1.03	1.04		
	(65.83)	(66.29)		
ln (Y^2)	1.00	1.00		
	(63.43)	(63.88)		
ln ($Popu^1$)				1.08
				(67.63)
ln ($Popu^2$)				1.05
				(65.26)
ln (*Distance*)	−0.77	−0.75	−0.78	−0.81
	(28.01)	(27.85)	(28.64)	(29.90)
*Remote*1	−0.50	−0.55	−0.48	−0.39
	(5.51)	(6.13)	(5.35)	(4.42)
*Remote*2	0.48	0.42	0.51	0.58
	(5.34)	(4.75)	(5.74)	(6.71)
Adjacent	0.98	1.02	0.97	0.94
	(15.17)	(15.92)	(15.07)	(14.78)
No − Border	1.19	1.14	1.17	1.15
	(9.64)	(9.17)	(9.54)	(9.56)
R^2	0.856	0.856	0.649	0.863
Nobs	2137	2137	2137	2137
Border effect	3.28	3.12	3.22	3.15

The distance and remoteness variables presumably capture this effect to a degree, however, as state size and concentration of activity within states differ quite significantly across states, the adjacency variable may well pick up part of the effect.[15]

Table 2 examines the robustness of these results. The first column replicates the baseline regression from table 1, column (3). Column (2) returns to the definition of intrastate distance. The traditional measure in this literature (one-half the minimum bilateral distance to the next entity) implicitly assumes an even spatial distribution of activity within a state. If, instead, a state is dominated by a single city, the correct intrastate distance is closer to zero. More generally, the higher the share of the largest production/consumption cluster in a state relative to state size, the lower the effective intrastate distance. To the degree that these effective distances are systematically less than the imputed distances (of one-half the smallest bilateral distance to an adjacent state), using the traditional measure will yield smaller predicted exports. The shortfall would be picked up by the *No − Border* dummy. In consequence, the apparent home bias could simply reflect a measurement error in intrastate distances. To allow for this possibility, we conduct a robustness check with an alternative distance metric that takes account of intrastate concentration of economic activity. Denoting the population of the largest and the second-largest city within the state by $P_{i,1}$ and $P_{i,2}$, respectively, and their distance by $D_{i,12}$, the intrastate distance is defined as

$$D_{ii,t} = 2 * \left[1 - \frac{P_{i,1}}{P_{i,1} + P_{i,2}}\right] * D_{i,12}. \qquad (3)$$

For the extreme case in which activity within a state is located in a single location ($P_{i,2} = 0$), intrastate distance under this alternative metric is zero. For the opposite extreme case of two equally large cities, the intrastate distance equals the distance between the two cities. In general, the larger the largest relative to the second-largest city, the smaller the intrastate distance. Figure 5 provides an *xy* plot of the two series. While the correlation is positive (0.67) and the means are comparable (95 miles for the alternative versus 84 for the traditional measure), significant deviations occur. For Pennsylvania, the traditional metric yields a distance of 15 miles (half the distance between Philadelphia and Wilmington), while the weighted distance between the largest and the second-largest city (Pittsburgh) is 200 miles. Utah provides the opposite extreme: while the traditional measure yields a distance of 168 miles (one-half the distance to Boise), the population-weighted distance between Salt Lake City and Provo comes to 19 miles. Despite these differences, using the alternative distance metric generates no significant deviations from the baseline specification: both the distance elasticity and the home-bias coefficient remains largely unchanged.

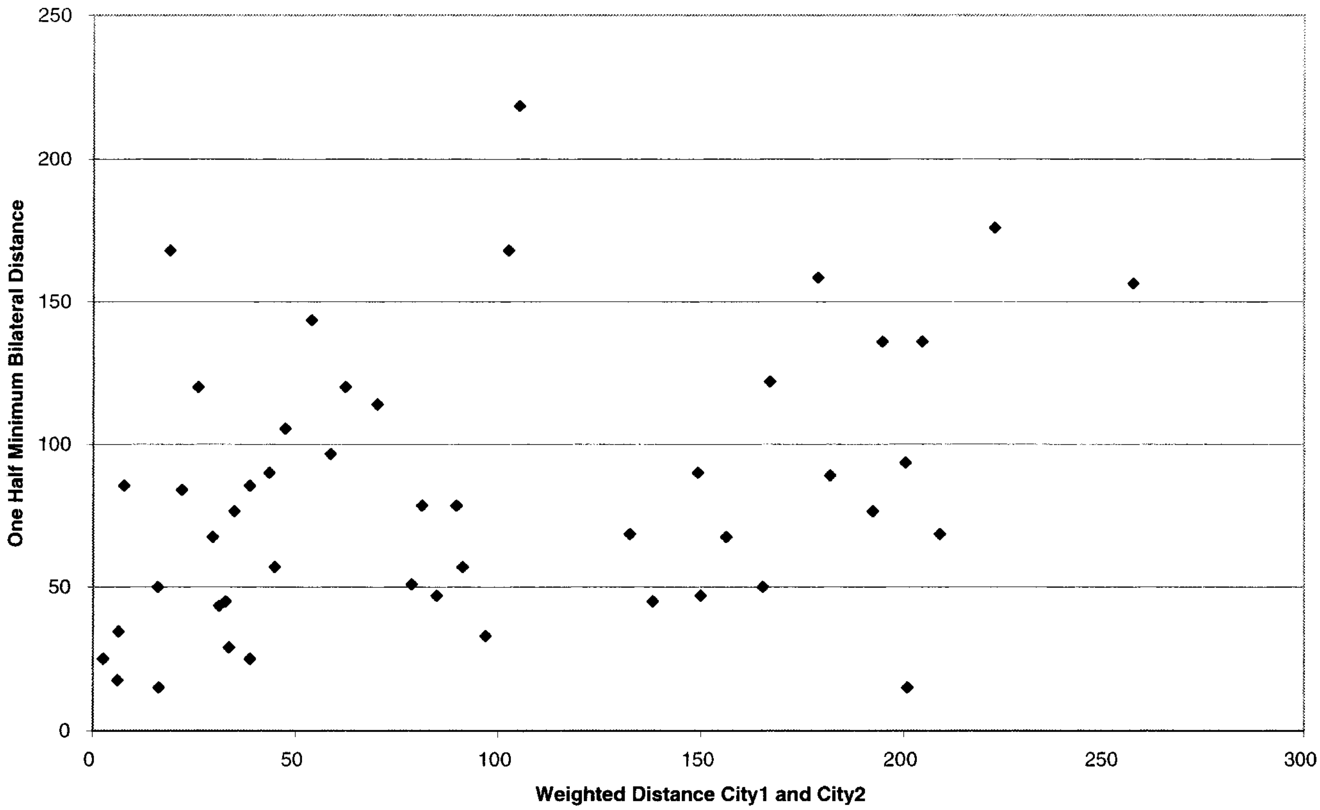
Column (3) reestimates the equation using the log of the ratio of exports to the product of state GDPs as the dependent variable. While the R2 declines to 0.65, the distance elasticity and the home-bias coefficient are again largely unchanged from the baseline equation. Column (4) controls for the potential endogeneity of state output to exports by using population as the scale variable. Again, the results on home bias and the distance elasticity are quite unaffected.

Table 3 reports a number of additional robustness tests. For each test, a potential additional determinant was added to the gravity specification. The table reports the coefficient and the *t*-statistic on the home-bias dummy. Customs receipts in the exporting state allow for a potential effect of imports that are shipped from the port of arrival. The year of settlement allows for the length of trade linkages to play a role. The share of international trade in state GDP allows for a link between external and internal trade activity. The percentage of population born in other U.S. states and abroad allows for effects of networks on trade, matching recent work by Egan and Mody (1992), Gould (1994), Head and Ries (1998) and Helliwell (1997). Finally, dummies for the ten largest and the ten smallest states control for a possible size effect. None of these variables alters the home bias appreciably.

The lower half of the table reports the home-bias coefficient for samples restricted to observations below specified distance thresholds, ranging from 1,000 miles (with, in brackets, 1,025 observations) to 250 miles (with 166 observations). If the home-bias coefficient reflected a nonlinearity

[15] A second explanation for a subset of observations is the presence of production clusters straddling state borders (such as the St. Louis/East St. Louis cluster straddling Missouri and Illinois and the Washington/Baltimore cluster straddling the District of Columbia and Maryland). To the degree that intracluster trade is quite heavy, the adjacency dummy may pick up the effect.

FIGURE 5.—INTRASTATE DISTANCE METRICS



in the distance-trade relationship, the coefficient would become insignificant as the sample is limited to short-term trade. That is not the case, even for the smallest subsample of less than 250 miles; intrastate trade remains significantly larger than interstate trade.

Taken together with the earlier results, home bias on the state level thus appears to be quite sturdy. This robustness matches findings in previous studies, which generally found results to be fairly unaffected by controls for heteroskedasticity, functional form, and endogeneity of GDP to exports.

TABLE 3.—HOME BIAS: ROBUSTNESS TESTS II

Additional Variable	Home Bias Coef.	T-statistic
Baseline	1.43	(11.13)
Customs receipts	1.42	(11.07)
Age of state	1.42	(11.07)
International trade (% of GDP)	1.42	(11.13)
Intra-U.S. migration	1.46	(11.47)
International migration	1.46	(11.74)
Dummy: among 10 largest states	1.43	(11.27)
Dummy: among 10 smallest states	1.42	(11.12)
Sample		
Full sample (2137)	1.43	11.13
Distance less than 1000m (1025)	1.04	8.32
Distance less than 750m (704)	1.22	8.91
Distance less than 500m (387)	1.76	8.85
Distance less than 250m (166)	1.38	51.06

Number of observations in brackets.

V. Conclusion

A number of prior studies have established strong home bias in trade for OECD countries and for Canadian provinces relative to U.S. states. The evidence presented above suggests that a similar home bias is present for traded goods within versus across U.S. states, although the magnitude, at about three, is substantially lower than the home bias of about ten found for Canada versus the United States and for intra- versus international trade of OECD countries.

The next research challenge is to further explore the causes of home bias. On the national level, trade barriers—both formal and informal—provide an appealing candidate. Adding explicit measures of trade barriers to the gravity specification provides one promising avenue to explore the importance of alternative barriers. Further insight on the importance of information costs can be obtained by examining the importance of home bias for different type of goods, notably between homogenous goods traded on exchanges and ''network'' goods.[16]

On the subnational level, given the strong constitutional protections for interstate commerce, trade barriers appear prima facie less appealing, posing a puzzle. One possible solution deserving further inquiry is the presence of two separate trade relations: long-distance trade, mostly in

[16] See Rauch (1996), Helliwell (1998), Evans (1998), and, related, Hilgert (1942), and Gould (1975).

finished goods, and high volume short-distance intermediate goods trade within production clusters located in particular states, reflecting the familiar localization and urbanization effects (Ellison & Glaeser, 1994).

Learning more about the causes of home bias is also needed before an assessment of welfare consequences can be undertaken. By itself, the mere presence of quantity home bias is insufficient to derive welfare implications. For instance, in the canonical taste for variety models with trade occurring across similar countries, even a small border cost coupled with small taste differentials can lead to a specialization pattern generating a substantial quantity home bias which, however, would have very little welfare costs.

REFERENCES

Anderson, James, ''A Theoretical Foundation For The Gravity Equation,'' *American Economic Review* 69 (1979), 106–116.

Anderson, Michael, and Stephen Smith, ''Canadian Provinces in World Trade,'' Mimeo, Washington and Lee University, Lexington (1997).

Armington, Paul, ''A Theory of Demand For Products Distinguished By Place Of Production,'' *IMF Staff Papers,* March: 16:1: (1969), 159–78.

Beckerman, W., ''Distance and the Pattern of Intra-European Trade,'' *Review of Economics and Statistics,* vol. 38, (1956).

Bergstrand, Jeffrey, ''The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence'' this REVIEW 67 (1985), 474–481.

——— ''Generalized Gravity Equation, Monopolistic Competition, And The Factor-Proportions Theory In International Trade,'' this REVIEW 71 (1989), 143–153.

Bureau of Transportation Statistics, *National Transportation Statistics Yearbook,* Department of Commerce, Washington, D.C. (1996).

Carrothers, Gerald, ''A Historical Review of the Gravity and Potential Concepts of Human Interaction,'' *Journal of the American Institute of Planners,* Vol. 22, Spring (1956).

Cavanaugh, Joseph, ''Formulation, Analysis and Testing Of The Interactance Hypothesis,'' *American Sociological Review,* XV (1950), 763–66.

Davis, Donald, ''Intraindustry Trade,'' *Journal of International Economics* 39 (November 1996), 3–4.

Davis, Donald, and David Weinstein, ''Does Economic Geography Matter For International Specialization?'' NBER Working Paper No. 5706 (1996).

Deardorff, Alan, ''Testing Trade Theories and Predicting Trade Flows,'' in R. Jones and P. Kenen (Eds.), *Handbook of International Economics,* vol. 1 (Amsterdam: Elsevier, 1984).

——— ''Determinants Of Bilateral Trade: Does Gravity Work In A Neoclassical World?'' in Jeffrey Frankel (Ed.), *Regionalization of the World Economy* (Chicago: University of Chicago, 1995).

Dodd, Stuart, ''The Interactance Hypothesis,'' *American Sociological Review,* XV (1950), 245–56.

Egan, Mary Lou, and Ashoka Mody, ''Buyer-Seller Links in Export Development,'' *World Development* 20 (March 1992), 321–334.

Eichengreen, Barry, and Douglas Irwin, ''The Role Of History In Bilateral Trade Flows,'' NBER Working Paper No. 1996 (1996).

Ellison, Glenn, and Edward Glaeser, ''Geographic Concentration in U.S. Manufacturing Industries,'' NBER Working Paper No. 4840 (1994).

Engels, Charles, and John Rogers, ''How Wide Is The Border?,'' *American Economic Review,* December: 86 (1996), 1112–25.

Estin, Lars, and Borje Johansson, ''Affinities and Frictions Of Trade Networks,'' *Annals of Regional Science* 28: 3 (1994), 243–61.

Evans, Carolyn, ''Do National Border Effects Matter?'' Mimeograph, Harvard University (1998).

Evenett, Simon, and Wolfgang Keller, ''On Theories Explaining the Success of the Gravity Equation,'' NBER Working Paper No. 6529 (1998).

Frankel, Jeffrey, Ernesto Stein, and Shang-Jin Wei, ''Trading Blocs and the Americas,'' *Journal of Development Economics* 47 (1) (June 1995), 61–96.

Gaudry, M., U. Blum, and John McCallum, ''A First Gross Measure of Unexploited Single Market Potential,'' in S. Urban (Ed.), *Europe's Challenges* (Wiesbaden: Gabler, 1996).

Geraci, Vincent, and Wilfried Prewo, ''Bilateral Trade Flows and Transport Costs,'' this REVIEW 59 (1977), 67–74.

Gould, David, ''Immigrant Links to the Home Country,'' this REVIEW 76 (2) (May 1994), 302–316.

Gould, P., ''People in Information Space,'' Lund Studies in Geography, Ser B. No. 72 (1975).

Harrigan, James, ''Scale Economies and the Volume of Trade,'' this REVIEW 76 (2) (May 1994), 321–328.

Harris, Seymour, International and Interregional Economics, New York: McGraw Hill, (1957).

Head, Keith, John Ries, and Deborah Swenson, ''Agglomeration Benefits and Location Choice,'' *Journal of International Economics,* 38 (1995), 223–47.

Head, Keith, and John Ries, ''Immigration and Trade Creation,'' *Canadian Journal of Economics* (31) (February 1998), 47–62.

Helliwell, John, ''Convergence and Migration Among Canadian Provinces,'' *Canadian Journal of Economics* 29 (April 1996a), S324–S330.

——— ''Do National Borders Matter For Quebec's Trade?'' *Canadian Journal of Economics* 29 (3) (August 1996), 507–522.

——— ''National Borders, Trade and Migration,'' NBER Working Paper No. 6027, (March 1997).

——— ''How Much Do Borders Matter?'' (Washington: Brookings Institute, August 1998).

——— ''National Borders Still Matter For Trade,'' (with John McCallum) *Policy Options/Options Politiques* 16 (5) (Special Issue July/August 1995), 44–48.

Helpman, Elhanan, ''Imperfect Competition and International Trade,'' *Journal of the Japanese and International Economies* 1 (1987), 62–81.

Hilgert, Folke, *The Network of World Trade,* (Geneva: League of Nations, 1942).

Hummels, David, and James Levinsohn, ''Monopolistic Competition and International Trade,'' *Quarterly Journal of Economics* 110 (3) (1995), 799–836.

Isard, Walter, and M. Peck, ''Location Theory and International and Interregional Trade Theory,'' *Quarterly Journal of Economics* 68 (1954).

Linnemann, Hans, ''Trade Flows and Geographical Distance, or the Importance of Being Neighbors,'' in H. C. Bos (ed.), Towards Balanced International Growth, Amsterdam: North Holland, (1969), 111–28.

McCallum, John, ''National Borders Matter: Canada-U.S. Regional Trade Patterns,'' *American Economic Review* 85 (June 1995), 615–623.

Melvin, James, ''The Regional Economic Consequences of Tariffs And Domestic Transport Costs,'' *Canadian Journal of Economics,* 18 (May 1985a), 237–57.

Melvin, James, ''Domestic Taste Differences, Transportation Costs, and International Trade,'' *Journal of International Economics* 18 (February 1985b), 65–82.

Messinger, Hans, ''Interprovincial Trade Flows of Goods and Services,'' *Canadian Economic Observer,* (October 1993), 3.8–3.14.

Nitsch, Volker, ''National Borders and International Trade,'' mimeograph Bankgesellschaft Berlin (1997).

Ohlin, Bertil, *Interregional and International Trade,* (Cambridge, MA: Harvard University Press, 1933).

——— ''Some Aspects of the Relations between International Movements of Commodities, Factors of Production, and Technology,'' in Bertil Ohlin (Ed.), *The International Allocation Of Economic Activity* (New York: Holmes and Meier, 1976).

Rauch, James E., ''Does History Matter Only When It Matters Little? The Case of City-Industry Location,'' *Quarterly Journal of Economics* 108 (August 1993), 843–867.

——— ''Networks versus Markets in International Trade,'' NBER Working Paper No. 5617 (1996).

Ravenstein, E. G., ''The Laws of Migration,'' *Journal of the Royal Statistical Society* 48 and 52 (June 1885, 1989).

Sanso, Marcos, Rogelio Cuairan, and Fernando Sanz, ''Bilateral Trade Flows, The Gravity Equation, and Functional Form,'' this REVIEW 75 (May 1993), 266–275.

Stouffer, Samuel, ''Intervening Opportunities: A Theory Relating Mobility To Distances,'' *American Sociological Review* V (1940), 845–867.
Ullmann, Edward, *American Commodity Flow*, (Seattle, Washington: University of Washington Press, 1957).
Wei, Shang-Jin, ''Intra-National versus International Trade,'' NBER Working Paper No. 5531 (1996).
Zipf, George, *Human Behavior and the Principle of Least Effort* (Reading, Massachusetts: Addison-Wesley Press, 1949).