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The Home-Bias-in-Trade Puzzle - The Case of China

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Abstract

The aim of this paper is to investigate empirically the effects of decreasing trade costs on China's home bias in trade. For this purpose, we use the data on import values for a set of 49 countries, 30 OECD member and 19 non-OECD member countries from Asia, for the years 1994 and 2002 to estimate the home bias in trade for China. A simple standard gravity model is used that accounts for income, distance and remoteness. There are three main results. First, the estimations show a significant decrease in China's home bias over time that suggests a higher level of integration. The result is in line with the literature. Second, the WTO dummy shows a high negative effect on Chinese imports in 1994 that leads to a lower level of the home bias variable. Third, the distance elasticity is greater than one and increases over time.

Keywords: home bias, gravity model, economic integration
JEL classification: F02, F14, F15,

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I. Introduction

The home bias in trade describes the instance that a consumer differentiates between imported goods and domestic products and tends to purchase the domestic variety. The first empirical study that emphasises consumption asymmetry affected by national borders is the paper of McCallum (1995). He finds out that the 1988 intranational merchandise trade flows among Canadian provinces is 22 times higher than the trade between Canada and the US, after controlling for the effects of economic size and distance. Trefler (1995) shows that the home bias helps to explain the "mystery of the missing trade". He uses the Heckscher-Ohlin framework as a benchmark and finds out that countries trade with each other less than would be predicted by the benchmark model. In consequence of these findings and because of the importance of trade costs[1] for economic geography and international macroeconomics, a vast number of international trade literature highlighting the "border effect" followed. This trade-diminishing effect was adopted to evaluate the degree of integration between and within sovereign countries. The empirical analyses of trade within Canada (Helliwell, 1997), within the US (Wolf, 1997), between OECD countries (Wei, 1996) and between EU member countries (Head and Mayer, 2000) all find rather large border effects that decline over time. Increasing trade liberalisation is posed to be an explanation for that. Despite the great effort in measuring and understanding trade border effects, the origin remains cloudy.

Following Evans (2001), two basic sources of the home bias exist. On the one hand, the consumer may have a preference for domestic products. On the other hand, the imported goods could face a variety of barriers in the course of transit between the location of production in one country and the purchase of the good in another country. These barriers can be seen as transaction costs or trade costs in the broad sense. Anderson and van Wincoop (2004) divide trade costs in transportation costs (both freight and time costs), policy barriers (tariffs and non-tariff barriers), information costs, contract costs, contract enforcement costs, costs associated with the use of different currencies[2], legal and regulatory costs, and local distribution costs (wholesale and retail). In this context, deep integration describes the economic integration that concentrates not only on reducing formal barriers to trade but also on easing the international burden of diverse national regulations, such as mutual recognition and harmonisation. Obstfeld and Rogoff (2000) find in trade costs a common solution for different puzzles in international macroeconomics which include the home bias in trade

[1] See Anderson and van Wincoop (2004) for a discussion of the measurement of trade costs.
[2] Rose (2000) finds out that the existence of a currency union will increase the bilateral trade between the member countries by a factor of 2.35.

puzzle. Being in line with the importance of trade costs, this paper emphasises the effects on the home bias.

Due to the lack of direct measures of trade costs we focus on the change in the home bias by a country's accession to the World Trade Organisation (WTO) that is expected to go along with a significant decrease in tariffs and non-tariff barriers. Thus, an accession to the WTO is likely to reduce the home bias by reducing the trade costs. The increasing economic importance of China for the world economy and its entry in the WTO by the end of 2001 let China become a prominent candidate for empirical investigation.

China's formal application for an accession to the precursor of the WTO, the General Agreement on Tariffs and Trade (GATT), was submitted in 1986. During the 1990s, China's trade policy undergoes a change towards liberalisation of its tariffs and non-tariff barriers, e.g. import quotas and foreign exchange control. Shown in Table 1, the "Freedom to Trade Internationally" index, a subsection of the index "Economic Freedom of the World", demonstrates a significant increase in China's international economic integration. The index has increased from 4.9 in 1990 to 7.5 in 2002, where 10.0 is the maximum level. Symmetrically, the mean tariff rate has decreased from 40.3 percent in 1990 to 10.0 percent in 2002.[3] On a comparative basis, the international integration of China seems to be more intensive than across the OECD members – China's average tariff rate lays below the average level of 15.4 percent of the OECD countries in 2002[4].

Table 1: China's Freedom to Trade Internationally

Year	1985	1990	1995	2000	2002
Index	5.5	4.9	6.4	7.2	7.5
Mean Tariff Rate	39.5	40.3	37.5	16.3	10.0

Source: Gwartney and Lawson (2004)

Although the index indicates China's success in international integration, trade barriers between China's provinces still exist on a high level. Poncet (2004) analyses inter-provincial trade flows on industry-level based on an input-output matrix for the years 1992 and 1997 in order to investigate the effects of China's trade liberalisation in the 1990s. The

[3] Shunguang, Yansheng and Zhongxin (1998) provide a detailed survey on China's protection for 1994 on microdata for several industries.
[4] See OECD (2003)

author finds out that the average border effect has increased over time. Across industries, it rose from 24 in 1992 to 31 in 1997. These findings contrast the results of previous analyses on the effect of trade liberalisation on integration. Poncet emphasises the role of provinces' trade protection that pursue a dual objective of socio-economic stability preservation and tax revenue maximisation.

The aim of this paper is to provide additional empirical evidence of China's international integration. For this purpose, we follow the approach of trade cost affected home bias and estimate the home bias on an international level for the years 1994 and 2002 comparing the degree of integration before the accession to the WTO and afterwards. Therefore section II presents the methodology of the gravity approach, while section III contains the estimation results. Afterwards, a short summery and conclusions are given in section IV.

II. Methodology

The magnitude of home bias cannot be observed directly, because it is only defined relative to a baseline case of "normal" trade. Accounting for this, we specify the benchmark level of Chinese imports by using a gravity model. The gravity framework is widely used in the empirical literature because of its good fit to the data and its easy handling. Typically specified in a log-linear form, this model assumes that the volume of bilateral trade depends positively on the economic size (income) of the trading countries and negatively on their geographical distance. Other interesting features that characterise the economic surrounding, e.g. the membership in a free trade area, can easily be added.

Following the approach of Hillberry and Hummels (2002) and assuming CES preferences, the value of bilateral trade T, between origin i and destination country j, is given by:

$$T_{ij} = Y_i Y_j \left(\frac{p_i}{P_j} \right)^{1-\sigma} t_{ij}^{-\sigma} \tag{1}$$

where Y is the GDP, p_i / P_j the price of output in region i relative to the consumer price index in region j, t_{ij} the ad valorem iceberg transport cost of trade between regions, and σ the elasticity of substitution among varieties of output.

We use the import value $M_{CHN;j}$ instead of total trade and use the definition of Wei (1996) for the calculation of China's imports from itself. This is the difference between its total production and its total exports. Taking logs, introducing the dummy variable for trade within China, *OWNSTATE*, and ignoring relative prices yield to the regression equation (2).

$$\ln M_{CHN;j} = \alpha + \beta_1 \ln\left(Y_{CHN} Y_j\right) + \beta_2 \ln\left(DIST_{CHN;j}\right) + \beta_3 OWNSTATE + \varepsilon_{CHN;j} \tag{2}$$

We extend this equation by including an atheoretical remoteness variable. The variable captures the fact that bilateral trade between countries is more likely when the average distance to all other trading partners is relatively high. We use the definition of remoteness shown in equation (3) that has been introduced by Helliwell (1997) and is commonly used in the gravity literature[5].

$$REM_i = \sum_{k \neq j} D_{ik} / GDP_k \tag{3}$$

The remoteness of China in relation to country j is the weighted average distance of importing country China to all other trading partners k except country j. The weights are given by the GDP of the exporting country. Thus, the sign of the variable is unknown because it is only expected to be positive for the case that the remoteness between China and the exporting country j is lower than the average distance of China to all other exporting countries.[6]

In order to distinguish changes in the home bias that are associated with the accession to the WTO and others due to overall internationally integration, we introduce a dummy for the membership in the WTO. This dummy will capture trade creation effects and therefore, it is expected to be positive at least in 2002 when China is a member of the WTO. The dummy equals one for member countries and zero for non-members.

Thus, the modified equation is then given by

$$\begin{aligned} \ln M_{CHN;j} = {} & \alpha + \beta_1 \ln\left(Y_{CHN} Y_j\right) + \beta_2 \ln\left(DIST_{CHN;j}\right) + \beta_3 OWNSTATE \\ & + \beta_4 \ln(REM_{CHN}) + \beta_5 WTO + \varepsilon_{CHN;j} \end{aligned} \tag{4}$$

[5] For example, see Wei (1996).

[6] The remoteness measure is not computed for the exporting country due to multicollinearity problems associated with China's remoteness variable.

The economic variables in the gravity model (incomes, distance and remoteness) define the "normal" level of China's imports. Assuming that the model is well specified, the ownstate dummy captures structural deviations from the baseline import level and represents the magnitude of the home bias.

We estimate the gravity equation for a group of 48 countries and China shown in the appendix. The group contains 30 OECD members and 19 Asian non-OECD countries including China. The Chinese imports are estimated for the years 1994 and 2002 in order to account for the accession to the WTO, as mentioned before. The 48 countries have a share on China's total imports of 73 percent in 1994 and 70 percent in 2002.[7] Table 2 shows the total import value by region and the raising importance of imports from Asia. The Asian import share has increased by 5.5 points while China's imports have increased by 155 percent in current prices. China's import structure is shown in Table 3. The major imports are manufactured goods and machinery and transport equipment that have a total share of at most 60 percent of all imports. Interestingly, the relative import demand of manufactured goods has decreased (the share decreased from 24.3 to 16.4 percent) while mineral fuels became more important (the import share rose from 3.5 to 6.5 percent).

Table 2: China's Imports by Region (1994 and 2002 in USD 100 Mio)

Region	**1994**		**2002**	
	Import Value	**Share in %**	**Import Value**	**Share in %**
Asia	687.68	59.5	1,917.27	65.0
Africa	8.94	0.8	54.27	1.8
Europe	250.17	21.6	519.68	17.6
Latin America	22.47	1.9	83.36	2.8
North America	157.42	13.6	308.77	10.5
Oceanic and Pacific Islands	29.16	2.5	68.34	2.3
TOTAL	**1,156.14**	**100.0**	**2,951.70**	**100.0**

Source: China Statistical Yearbook, various issues

Table 3: China's Imports by Category of Commodities
(SITC; 1994 and 2002 in USD 100 Mio)

Commodity	1994		2002	
	Import Value	**Share in %**	**Import Value**	**Share in %**
Food and Live Animals	31.37	2.7	52.38	1.8
Beverages and Tobacco	0.68	0.1	3.87	0.1
Crude materials , inedible, except fuels	74.37	6.4	227.36	7.7
Mineral fuels	40.35	3.5	192.85	6.5
Animal and vegetable oils, fats and waxes	18.09	1.6	16.25	0.6
Chemicals and related products	121.30	10.5	390.36	13.2
Manufactured goods	280.84	24.3	484.89	16.4
Machinery and transport equipment	514.67	44.5	1,370.10	46.4
Miscellaneous products	67.68	5.9	198.01	6.7
Products n.e.s.	6.79	0.6	15.64	0.5
TOTAL	**1,156.14**	**100.0**	**2,951.71**	**100.0**

Source: China Statistical Yearbook, various issues

[7] We exclude Hong Kong, Macao and Taiwan from our country group due to expected biased estimates because of political interdependences. Hence, the group seems to cover the large majority of China's international imports.

III. Data and Estimation Results

The OLS estimation results of equations (2) and (4) are presented in Table 4. Columns (1) to (4) display the results for 1994 with 47 observations[8] and (5) to (8) show results for 2002 with 49 observations.

Table 4: OLS Estimates of China's Total Imports

Dependent Variable: $\log(M_{CHN;\,j})$								
	1994				**2002**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Constant	-2.96	-2.66	-6.44**	-5.50*	-3.65	-0.56	-4.05	-1.22
	(-0.90)	(-0.82)	(-2.09)	(-1.76)	(-0.97)	(-0.14)	(-1.02)	(-0.29)
$\log(GDP_{CHN}*GDP_j)$	1.05***	1.04***	1.18***	1.13***	1.13***	1.01***	1.14***	1.03***
	(11.97)	(9.60)	(14.41)	(12.34)	(10.70)	(9.19)	(10.84)	(8.74)
$\log(DIST_{CHN;\,j})$	-1.22***	-1.25***	-1.07***	-1.22***	-1.39***	-1.63***	-1.36***	-1.61***
	(-3.99)	(-4.34)	(-3.68)	(-4.33)	(-4.33)	(-4.59)	(-3.94)	(-4.48)
OWNSTATE	3.62***	3.60***	2.58***	2.13***	2.42***	2.30***	2.45***	2.37***
Dummy	(6.99)	(7.06)	(4.98)	(3.89)	(3.89)	(3.52)	(3.70)	(3.53)
$\log(REM_{CHN})$		-0.12		0.77		-0.86*		-1.02**
		(-0.24)		(1.51)		(-1.92)		(-2.43)
WTO Dummy			-1.33***	-1.69***			-0.19	-0.60
			(-3.53)	(-3.97)			(-0.23)	(-0.71)
Adjusted R-squared	0.78	0.77	0.81	0.81	0.73	0.74	0.73	0.74
S.E. of regression	1.16	1.18	1.08	1.06	1.34	1.31	1.35	1.31
F-statistic	53.95	39.60	49.09	41.52	44.53	35.57	32.75	28.55
Observations	47	47	47	47	49	49	49	49

OLS estimates show White heteroskedasticity-consistent standard errors and covariances; t-statistics in parentheses; significant at the 1 per cent level: ***, at the 5 per cent level: **, at the 10 per cent level: *.

Source: Own calculations

As indicated by the adjusted R^2, about 70 percent of the variation of the dependent variable can be satisfactorily explained by the regression. The coefficients for income, distance and the ownstate dummy are statistically significant at the 1 percent level for all estimations and have the expected sign. The combined GDP coefficients range from 1.01 to 1.18. Interestingly, the distance elasticity is lower in 1994 than in 2002 but it is above 1 for all

[8] There was no trade data available for the year 1994 for the countries Belgium and Luxembourg. Therefore, both countries were excluded for the regressions.

regressions. On average, a 1 percent increase in distance reduces the Chinese imports by a range between 1.07 to 1.25 percent in 1994 and between 1.36 to 1.63 percent in 2002. The remoteness variable is significant at least at the 10 percent level for the year 2002 only and negative. An interesting point to note is that the results are sensitive to the introduction of the remoteness variable. The GDP coefficients as well as the ownstate dummy variables become smaller and the value of the distance coefficients increase.

In columns (3) and (4) for 1994 as well as in columns (7) and (8) for 2002 a dummy for the WTO membership is added to the standard gravity equation. It is highly statistically significant only for the year 1994 and negative. China imports less from WTO members by a factor of 3.78 (=exp (1.33)) to 5.42 (=exp (1.69)) than it would be expected by the baseline case of "normal" trade. A possible explanation might be strong preferences in favour of intra-WTO trade due to lower trade barriers. Beside lower direct barriers to trade there exist lower indirect trade barriers such as trade security. Anderson and Marcouiller (1999) differentiate between insecurity due to predation (theft, corruption, extortion) and insecurity that arises from imperfect contract enforcement. Thus, both sources of insecurity affect trade by implying a price mark-up analogous to a hidden tax on trade. China's level of trade security still lies below the WTO average. The index "legal structure and security of property rights" of China is 5.5 in 1994 (WTO average: 7.3) and 5.2 (WTO average: 6.9), where 10.0 is the maximum level of security.[9] The lack of significance for the WTO dummy for 2002 is only a very weak support for the expected positive effect of the WTO membership on Chinese imports.

The most interesting question concerning the estimation is the magnitude of the home bias. Table 5 shows the magnitude that is easily calculated by taking the exponential value of the ownstate dummy.

Table 5: Calculation of the Home Bias for China's Total Imports

Home Bias (= exp (OWNSTATE))

	1994				2002			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Imports	37.34	36.60	13.20	8.41	11.25	9.97	11.59	10.70

Source: Own calculations

[9] Own calculation based on Gwartney and Lawson (2004).

There are three main findings. First, comparing the home bias in 1994 and 2002, its magnitude is falling over time except for column (4). However, the main results are in line with previous studies focusing the effects of trade liberalisation. Second, the columns (1) to (4) show different results for the magnitude of the home bias for 1994 depending on the inclusion of the WTO dummy. Excluding the WTO dummy the home bias is higher (37.34 and 36.60, respectively) than in the final case (13.20 and 8.41, respectively). Third, including remoteness variables does not change the home bias.

IV. Summary and Conclusions

China's application for the accession to the GATT/WTO in 1986 follows a significant liberalisation of its trade policy in the 1990s. This change in trade policy towards a more open market access for foreign countries leads to an increase of imports in current prices by 155 percent from 1994 to 2002. Following recent studies on border effects, the reduction in trade costs is likely to reduce the home bias. In contrast to this, Poncet (2004) finds an increasing home bias in inter-provincial trade between 1992 and 1997.

The aim of this paper was to investigate empirically the effects of decreasing trade costs on China's home bias in trade. For this purpose, we use the data on import values for a set of 49 countries, 30 OECD member and 19 non-OECD member countries from Asia, for the years 1994 and 2002 to estimate the home bias in trade for China. A standard gravity model is used that accounts for income, distance and remoteness. There are three main results. First, the estimations show a significant decrease in China's home bias over time that suggests a higher level of integration. The result is in line with the literature. Second, the WTO dummy shows a high negative effect on Chinese imports in 1994 that leads to a lower level of the home bias variable. Third, the distance elasticity is greater than one and increases over time.

The difference to Poncets' (2004) results may have three sources. We estimate the home bias in international trade while inter-provincial trade is focussed in Poncet (2004). Also, the author uses trade data for the period 1992 to 1997 while we focus on Chinese import flows in the period 1997 to 2002. This recent period goes along with a strengthening in the cut of trade barriers due to China's forthcoming accession to the WTO. The third difference is the use of aggregated data while Poncet (2004) results are based on industry level data.

The importance of international trade with China is still growing. For further research it seems to be interesting to have a closer look on more detailed measurements of trade costs to investigate its effects more precisely. Also, it will be important to estimate the home bias incorporating trade costs as well as differences in preferences. Recent developments in the microfoundation of the gravity approach, such as Anderson and van Wincoop (2001), could improve the results of trade asymmetries.

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Appendix

Data and Data Sources

Countries in the Sample: (49)

OECD member countries (30):
Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States;

Asian Countries without OECD member countries (19):
Bangladesh, Indonesia, India, Kazakstan, Kyrgyzstan, Sri Lanka, Myanmar, Malaysia, Pakistan, People's Republic of China, Philippines, Russian Federation, Singapore, Thailand, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Vietnam.

Trade Data: The data on import and exports by commodity between China and its partner countries are taken from the OECD International Trade by Commodity Database (ITCD). The different products are classified according to the Standard International Trade Classification system (SITC) (Rev. 3). Following Wei's (1996) definition in order to obtain Chinas imports from itself, we calculate the difference between its total production and its total exports to the rest of the world. Therefore, the data is taken from various issues of the China Statistical Yearbook.

Income Data: The data on real income (GDP) in current prices are taken from the World Development Indicators (WDI) on CD-ROM, Version 2004, edited by the World Bank.

Distance to China: The data on distance to China are taken from the database on bilateral distances held at the Centre d'etudes prospectives et d'information internationale (CEPII) (www.cepii.fr/anglaisgraph/bdd/distances.htm) (free access). We use the simple bilateral distance between the official capitals and the proxy on intranational distance developed by Head and Mayer (2002). They use an area based measure that leads to the following distance formula: $d_{ii} = 0.67\sqrt{area/\pi}$.