School of Economics and Management

TECHNICAL UNIVERSITY OF LISBON

Department of Economics

Wang Jing, Nuno Carlos Leitão & Horácio Faustino

Intra-Industry Trade in Agricultural Products: The Case of China

WP 06/2010/DE/SOCIUS

WORKING PAPERS

ISSN Nº 0874-4548

Intra-Industry Trade in Agricultural Products: The Case of China

Wang Jing - School of Economics and Management, Northeast Agricultural University, Harbin, P.R. China
Nuno Carlos Leitão – ESGTS, Polytechnic Institute of Santarém, Santarém, Portugal

Horácio C. Faustino – ISEG-Technical University of Lisbon, Portugal

Abstract: This paper studies the extent and determinants of intra-industry trade (IIT) in agricultural products of China for the period 1997-2006. The IIT index shows that the level of IIT in agricultural products between China and its thirteen main trading partners is not high. Using a panel data analysis, the empirical results of determinants of IIT indicate that differences in per-capita income and geographical distance have a negative effect on Chinese IIT in agricultural products. Free trade agreements between China and some trading partners weaken the negative effect of per-capita income differences on IIT. The results also suggest that cultural similarity between China and some countries has a positive influence on this type of trade.
Key words: agricultural products; intra-industry trade; China
JEL Classification: F14,

Author Addresses:

Wang Jing (*corresponding author*)
School of Economics and Management, Northeast Agricultural University, Harbin, P.R. China 150030 Tel: (+86)45153956315; E-mail: wj2005guomao@yahoo.com.cn

Nuno Carlos Leitão
Escola Superior de Gestão e Tecnologia de Santarém, Complexo Andaluz 295 2001-904 Santarém, Portugal. Tel: (+351) 243303200 ;E-mail: nuno.leitao@esg.ip.santarem.
Home Page: http://leitaocarlosnuno.webnode.com/

Horácio C. Faustino ISEG- Instituto Superior de Economia e Gestão, Rua Miguel Lúpi, 20. 1249-078 Lisboa, Portugal Tel: (+351) 213925902 Email: faustino@iseg.utl.pt.
Home Page: www.iseg.utl.pt/~faustino

I. Introduction

Intra-industry trade (IIT) has attracted much attention from scholars since Verdoon first discovered this phenomenon in 1960. Traditional trade theories based on comparative advantage could not explain this type of trade pattern, therefore, a new trade theory was called for. Few of the empirical studies based on the new international trade theory – as proposed by Krugman (1979, 1980, 1981) and Lancaster (1980) – have considered the agricultural sector. In 1991, McCorriston and Sheldon first took the United States and the European Union as an example to analyse the intra-industry trade (IIT) in processing agricultural products. They found that in this type of products, the United States is typical of an inter-industry trading country. In contrast, in the EU, the IIT is predominantly in agricultural products.

The liberalisation of the Chinese economy and its impressive GDP growth rate has attracted the attention of the academic world. China has become a global powerhouse in terms of international trade. World Trade Organisation (WTO) statistics show that China is currently the second-largest trading country in the world. According to the WTO, China's trade-to-GDP ratio is 74.3. Therefore, we can conclude that most of its economic growth has stemmed from the growth of trade.

At the same time, when conducting research into the Chinese economy, its present situation should not be overlooked. More specifically, China is still largely an agricultural country, in which farmers and land workers account for the largest proportion of the national population. Hence, the development of agricultural trade would contribute to improving the incomes and standards of living of the Chinese rural population. The identification of the determinants and the level of IIT in agricultural products would provide valuable insights into the trading patterns and the status of Chinese agricultural products in the world market. In turn, this would enable policymakers to plan and take measures to expand agricultural exports.

The present paper is motivated by the fact that there is little existing research into IIT in the agricultural sector and that the study of the Chinese trade pattern in agricultural products is of value to an understanding of the Chinese economic liberalisation. In order to introduce liberal economic policies in the agricultural sector, we should first establish whether trade in processed agricultural products is essentially of the intra-industry type or not. Secondly, there is a need to know what country-specific factors influence Chinese bilateral IIT in these products. The remainder of the article is organised as follows. Section II briefly reviews the theoretical background of intra-industry trade. Section III presents the recent development and characteristics of Chinese agricultural trade. Section IV describes the level of IIT in agricultural products between China and its major trading partners. Section V presents the econometric model and analyses the results. The final section concludes.

II. The theory of intra-industry trade

The first theoretical models of IIT were made by Krugman (1979, 1980, 1981), Lancaster (1980) and Helpman (1981). This work was synthesized in Helpman and Krugman's (1985) model. This is a model that combines monopolistic competition with the Heckscher-Ohlin (HO) theory, incorporating factor endowments differences, horizontal product differentiation and increasing returns to scale. The model generates both intra- and inter-industry trade and gives support to the following country-specific hypothesis: the more different are the factor endowments, the smaller is IIT. As horizontal product differentiation considers that different varieties are of the same quality, but have different characteristics, they may be produced with similar factor intensity. Linder's theory can also be used to explain IIT. Linder (1961) considered that consumers' tastes are conditioned by their income levels. These tastes yield demands for products and this demand structure generates a production response. Hence, countries with similar per-capita incomes will have similar demand structures and will export similar goods. The Linder theory of overlapping demands suggests that goods must first be produced for home markets and then exported to similar countries. According to Linder's (1961) hypothesis, a negative relationship between income differences and IIT is to be expected.

In the theoretical models, the distinction between the two types of IIT is very important. As was stressed by Greenaway et al. (1994, 1995), there are theoretical reasons – different determinants – and empirical evidence that justify separating the horizontal IIT (HIIT) from the vertical IIT (VIIT). In this paper we only consider the determinants of IIT.

In the empirical studies of bilateral trade the gravity equation has been employed. The gravity equation describes very well the bilateral trade flows as a function of the respective economic dimensions and distance between trading partners, working successfully in the empirical studies on developed and developing countries.

The core explanatory variables to explain bilateral trade in the gravity model are measures of the economic size of trading partners (positive or gravitational effects) and the distance between them (a negative effect or counter-force).

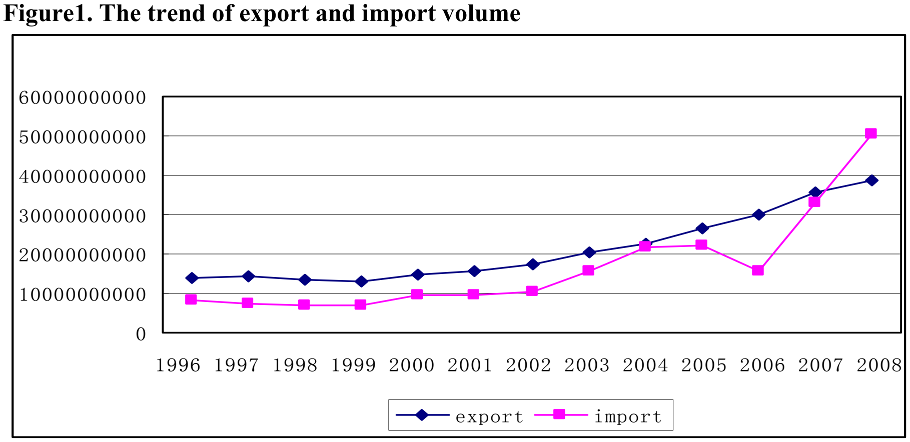
As Feenstra, Markusen and Rose (2001) proved that a wide range of theories are consistent with a gravity-type equation, we have decided to introduce in this paper the variables: distance and economic size, which are typical variables of the gravity models.

Trade barriers restrict international trade. Hence, it can be hypothesised that IIT will be greater, the lower the levels of trade barriers or the higher the level of economic integration. In addition, we can hypothesise that the IIT will be greater if the countries share a language or culture.

III. Recent development and characteristics of Chinese agricultural trade

Chinese agricultural imports and exports grew during the period from 1996 to 2008, with the exception of 2006. The total volume of exports of agricultural products increased from 13.72 billion U.S. dollars in 1996 to 338.83 billion U.S. dollars in 2008, while total imports by 2008 were six times larger than in 1996, rising from 8.46 billion USD to 50.41 billion USD. Figure1 below indicates that the import growth of agricultural products was significantly higher than export growth after China's accession to the WTO. Imports and exports volumes were nearest to parity in 2004. From 2004, import growth of agricultural products slowed down. The gap between exports and imports was at its widest in 2006. Exports maintained their rhythm of growth, whereas imports declined from 2005 to 2006. However, imports then experienced a sharp increase over the next 2 years, so that by the end of 2008, they exceeded exports by more than 10 billion USD.

Figure1. The trend of export and import volume



Source: authors' calculations from the data of the UN COMTRADE

Table1. Main export and import share by products

product	Average share of export from 2007 to 2008	product	Average share of import from 2007 to 2008
HS16	16.0%	HS12	41.5%
HS20	15.2%	HS15	22.1%
HS03	13.4%	HS03	8.8%
HS07	11.1%	HS02	4.6%
HS12	5.0%	HS23	3.8%
HS08	4.9%	HS08	2.6%
HS10	3.6%	HS04	2.0%
HS05	3.3%	HS10	1.5%
HS09	3.2%	HS24	1.9%
HS02	2.1%	HS17	1.2%
Total	77.8%	Total	89.9%

Source: authors' calculations from the data of the UN COMTRADE

The trade products of China are concentrated, several products accounting for the major share of the exports and imports. Four types of products: HS03, HS12, HS02 and HS08, represented a great proportion of both exports and imports. The remaining agricultural products had much less significance. For example, the total average share of agricultural exports of products HS03, HS16, HS20 and HS07 was 55.7%, while the total average import share of HS12, HS15 and HS03 was 72.4%. We can thus conclude that a small number of agricultural products played a significant role in agricultural trade in China.

Table 2. Main export and import markets by country

Country	Share on export	Country	Share on import
Japan	32.4%	USA	22.7%
Korea	9.6%	Brazil	11.6%
USA	8.7%	Malaysia	11.0%
Argentina	8.0%	Russia	8.3%
Germany	3.6%	Indonesia	8.0%
Total	62.2%	Total	61.6%

Source: authors' calculations from the data of the UN COMTRADE

With regard to the trading partners, the agricultural trade also appears to be concentrated. Japan is the largest export market, taking 32.4% of the agricultural products exported. The five largest partners combined represent 62.2% of China's agricultural exports. The USA is the most important source of imports, with 22.7% of the imported agricultural products coming from this market. This is due to the fact that the USA has great competition in bulk in agricultural products. The five largest markets supplying China with its imported agricultural products account jointly for 61.6% of the total imports.

IV. The analysis of intra-industry trade

IV.1. Method and data

At present, the most commonly-used measurement of the level of intra-industry trade is the Grubel-Lloyd index, which is calculated as:

$$GLI_{ijt} = 1 - \frac{\left| X_{ijt} - M_{ijt} \right|}{X_{ijt} + M_{ijt}} \quad (1)$$

Where GLI_{ijt} is the intra-industry trade index for agricultural product i between China and country j at time t, much closer to 1 indicates intra-industry trade is more important and much closer to 0 indicates that inter-industry trade is more important. We use X_{ijt} and M_{ijt} separately to represent the exports and imports of i product with trading partner j.

In order to measure the entire industry, we can use the following formula:

$$GLI_{u} = \frac{1}{n}\sum_{i=1}^{n} GLI_{ijt} \quad (2)$$

Where n is the number of agricultural products and GLI_u is the average IIT index of n products. We call GLI_u the un-weighted GL index in this paper.

Different types of products play different roles in a country's foreign trade, so some scholars argue that the foreign trade position of various products in the industry should be taken as the weight to calculate the weighted average to measure the level of intra-industry trade of the whole industry. Thus, it is more appropriate if the trade value weighted average GL is:

$$GLI_{w} = \sum_{i=1}^{n} \left(\frac{X_{ij} + M_{ij}}{X_{j} + M_{j}}\right) GLI_{ijt} \quad (3)$$

Where $\frac{X_{ij} + M_{ij}}{X_j + M_j}$ is the weight of product i, and X_j and M_j express the total agricultural exports and imports between China and trade partner j.

Total IIT can be divided into horizontal IIT and vertical IIT. Horizontal IIT is originated from different characteristics of products to attract the preference of consumers. Vertical IIT arises from the different qualifications of products. There are many methods to tell horizontal IIT from vertical IIT. The most commonly used method is to measure the relative unit value of exports to the unit value of imports of product. If the result is within a specific range, it is horizontal IIT. When the result is beyond the range, it is vertical IIT. The formulae can be expressed as follows:

Horizontal IIT: $$1-\alpha \leq \frac{UV_{ijt}^{X}}{UV_{ijt}^{M}} \leq 1+\alpha \tag{4}$$

Vertical IIT: $$\frac{UV_{ijt}^{X}}{UV_{ijt}^{M}} \leq 1-\alpha \text{ or } \frac{UV_{ijt}^{X}}{UV_{ijt}^{M}} \geq 1+\alpha \tag{5}$$

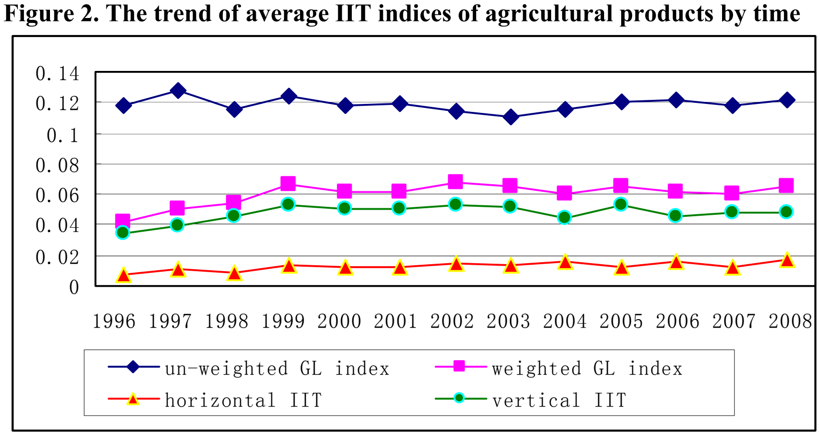
In studies, $\alpha = 0.25$ is widely used, so we choose $\alpha = 0.25$ in this study.

The export and import volume data calculated to measure the level of intra-industry trade in agricultural products come from UN COMTRADE database.

IV.2. Results

In order to calculate the IIT index of agricultural products in China from 1996 to 2008, a large amount of data requires processing. Every HS 4 product acts as an industry and 13 trading partners are selected. These 13 trading partners comprise 80% of the total agricultural trade of China, so they are representative. The trend of the annual average of the IIT indexes between China and its 13 trading partners is expressed in Figure 2. From 1996 to 2008, the value of all of the four kinds of IIT indexes has been stable. The un-weighted GL index is from the highest degree of 0.128 in 1997 to the lowest degree of 0.110 in 2003.

Figure 2. The trend of average IIT indices of agricultural products by time



Source: authors' calculations from the data of the UN COMTRADE

Over the 13 years for all the 13 trading partners, the annual average of un-weighted GL index is largest in 1997. The value is 0.128, so we can conclude that the level of intra-industry trade in the agricultural products of China is very low. The average of the trade weighted GL index was greater than the un-weighted GL during the period studied. Compared with the value of vertical intra-industry trade, the value of horizontal intra-industry trade is quite small. Compared to the horizontal IIT, vertical IIT had a large share in the total IIT between China and its 13 trading partners.

The difference in the IIT levels between China and its 13 trading partners are summarised in Table 3. As the most important trading partner, the USA enjoys the highest level of IIT, as reported in Table 3. The average GL index during the 13 years studied was 0.211.The IIT indices greater than 0.10 were Australia, Canada, France, Indonesia, Japan, Korea, Malaysia, Philippines and Thailand. The trade value weighted IIT indices were all lower than the un-weighted IIT indices of all the 13 trading partners. The USA was also the highest among all the trading partners. Korea had the highest horizontal IIT (0.032) and the USA had the highest vertical IIT (0.098).

Table 3. Average IIT indices of agricultural products from 1996 to 2008 by country

	Un-weighted GL	Weighted GL	HIIT	VIIT
Argentina	0.037	6E-04	7E-05	6E-04
Australia	0.122	0.054	0.015	0.038
Brazil	0.077	0.006	5E-04	0.006
Canada	0.112	0.058	0.012	0.047
France	0.127	0.079	0.010	0.069
India	0.089	0.087	0.003	0.084
Indonesia	0.109	0.033	0.011	0.022
Japan	0.134	0.064	0.012	0.052
Korea	0.127	0.107	0.032	0.076
Malaysia	0.121	0.032	0.010	0.021
Philippines	0.108	0.046	0.012	0.034
Thailand	0.170	0.090	0.023	0.067
USA	0.211	0.124	0.025	0.098

Source: authors' calculations from the data of the UN COMTRADE

Table 4. **IIT indices of selected countries**

	USA				Japan			
	GL	Trade value Weighted GL	HIIT	VIIT	GL	Trade value Weighted GL	HIIT	VIIT
1996	0.214	0.117	0.018	0.099	0.143	0.051	0.013	0.038
1997	0.208	0.127	0.020	0.107	0.134	0.055	0.018	0.037
1998	0.201	0.132	0.014	0.118	0.128	0.063	0.005	0.058
1999	0.213	0.177	0.024	0.154	0.152	0.083	0.007	0.076
2000	0.236	0.140	0.040	0.100	0.150	0.073	0.013	0.060
2001	0.216	0.137	0.013	0.124	0.131	0.061	0.004	0.057
2002	0.207	0.149	0.029	0.120	0.123	0.057	0.002	0.055
2003	0.207	0.112	0.024	0.089	0.127	0.065	0.035	0.029
2004	0.190	0.093	0.022	0.071	0.124	0.056	0.002	0.053
2005	0.193	0.114	0.033	0.081	0.105	0.063	0.004	0.059
2006	0.229	0.123	0.043	0.080	0.134	0.060	0.007	0.054
2007	0.224	0.106	0.025	0.081	0.140	0.066	0.011	0.055
2008	0.213	0.079	0.025	0.054	0.147	0.084	0.039	0.045

Source: authors' calculations from the data of the UN COMTRADE

The IIT indices of representative countries are reported. The USA and Japan are China's most important trading partners in agricultural products. The IIT index between China and the USA has changed over time. The trade value weighted IIT index was lower than the simple average IIT. Horizontal IIT index was more stable than vertical IIT. Vertical IIT was always higher than horizontal IIT. For Japan, the GL index changed more strongly and the trade value weighted GL was lower than the simple average GL index. The vertical IIT was higher than horizontal IIT, except in 2003.

V. Econometrical Model

The dependent variable used is the IIT Grubel and Lloyd (1975) index. The explanatory variables are country–specific characteristics. The data sources for the explanatory variables are the World Bank Development Indicators (2008). The source used for the dependent variable was data from the UN COMTRADE[1].

V.1. Explanatory variables and the testing of hypotheses

Hypothesis 1: There is a negative relationship between differences in per-capita income and IIT

LogDGDP is the logarithm of absolute difference in per-capita GDP (PPP, in current international dollars) between China and the trading partner. Loertscher and Wolter (1980)

[1] This database is recognised as being the most complete and authoritative database in the world.

suggested a negative sign for the IIT model. Loertscher and Wolter (1980) and Balassa and Bauwens (1986) estimated a negative coefficient. The study of Ferto and Soós (2008) also found a negative sign. In addition, we considered the following multiplicative dummy variable: $FTA \times DGDP$, where FTA means free trade agreement. The dummy variable FTA equals 1 if the Chinese trading partner is Thailand or Philippines and 0 otherwise.

Hypothesis 2: IIT occurs more frequently among countries that are similar in terms of factor endowments

LogEP is a proxy for the differences in physical capital endowments. It is the logarithm of the absolute difference in electric power consumption (Kwh per capita) between China and its partners. Based on Helpman and Krugman (1985) and Hummles and Levinshon (1995), we expect a negative sign for the coefficient of this explanatory variable. The study of Zhan et al. (2005), applied to Chinese intra-industry trade, found a negative sign.

Hypothesis 3: The economic dimension influences the volume of trade positively

LogDIM is the logarithm of average GDP of the two trading partners. Usually the studies utilized this proxy to evaluate the potential economies of scales and the variety of differentiated product. A positive sign is expected for the coefficient of this variable (see, for example, Greenaway et al., 1994).

Hypothesis 4: Cultural similarity influences the volume of trade

Following the study of Zhan et al. (2005), applied to Chinese intra-industry trade, we decided to consider the following proxy: *CULTURE* is a dummy variable that equals 1 if the country is Japan or Korea and 0 otherwise. The expected sign is positive.

Hypothesis 5: Trade increases when partners are geographically close

LogDIST is the logarithm of geographical distance between China and the partner country. Following the most empirical studies, we use kilometres between the capital cities of the trading partners. According to the literature, we expect a negative sign (Badinger and

Breuss, 2008, Blanes 2006, and Cieslik, 2005).

$FTA \times DIST$ is a multiplicative dummy variable and FTA equals 1 if there is a free trade agreement (FTA) between China and the trading partner and 0 otherwise. We expect a weakness of the negative effect of distance.

V.2. Model Specification

$$IIT_{it} = \beta_0 + \beta_1 X_{it} + \delta t + \eta_i + \varepsilon_{it} \qquad (4)$$

Where IIT_{it} is the Chinese IIT index and X is a set of explanatory variables. All variables are in the logarithm form; η_i is the unobserved time-invariant specific effects; δt captures a common deterministic trend; ε_{it} is a random disturbance assumed to be normal, and identically distributed with E (ε_{it})=0; Var (ε_{it})$=\sigma^2 \succ 0$.

Following the empirical work of Hummles and Levinsohn (1995), we apply a logistic transformation to IIT, because IIT is an index varying between zero and one:

$$IIT_{it}= Ln\ [IIT_{it}/(1-IIT)] \qquad (5)$$

V.3. Estimation Results

In this section, we present the results with country characteristics as explanatory variables. We include in this estimation the following trading partners of China: Argentina, Brazil, France, India, Indonesia, Japan, Korean, Malaysia, Philippines, Thailand, and the USA.

As Table 6 shows, the general performance of the model is satisfactory. The explanatory power of this regression is very high (Adjusted R^2=0.784).

The model presents six significant variables ($LogDGDP$, $LogDIM$, $LogDIST$, $CULTURE$, $FTA \times DGDP$, and $FTA \times DIST$).

Table 6. The determinants of intra-industry trade: OLS with time dummies

Variables	OLS	*t*-statistics	Significance	Expected Sign
$LogDGDP$	-1.369	(-1.87)	*	(-)
$LogEP$	-0.594	(-1.07)		(-)
$LogDIM$	2.504	(1.84)	*	(+)
$LogDIST$	-7.439	(-6.35)	***	(-)
$CULTURE$	6.456	(6.83)	***	(+)
$FTA \times DGDP$	-3.416	(-1.97)	**	(-)
$FTA \times DIST$	1.023	(2.02)	**	
C	12.583	(4.58)	***	
N	108			
$\overline{R}^2$	0.784			

T- Statistics (heteroskedasticity corrected) are in round brackets.
***/**/*- statistically significant at the 1%, 5% and 10% levels.

The variable $LogDGDP$ presents a negative sign and is significant at the 10% level. The Linder (1961) hypothesis is confirmed. This result is also in accordance with Loerstscher and Wolter (1980) and Greenaway et al. (1994). Zhang et al. (2005) also found a negative sign to Chinese IIT.

The variable, $LogDIM$ (average of GDP), used also by Greenaway et al. (1994), has a significant and predicted positive effect on IIT. Hellvin (1996) analysed the case of China and also found a positive sign for market size or economic dimension. Ferto and Soós (2008) and Turkcan (2005) similarly estimated a positive coefficient for this variable.

The proxy geographic distance ($LogDIST$) is typically used as a proxy for transport costs. We find a negative sign and confirm the theoretical hypothesis.

As expected, the dummy variable $CULTURE$ is positive, with a high level of significance, which validates our hypothesis, i.e. the importance of the cultural dimension on trade.

We expected that the effect of differences in per-capita GDP (DGDP) would be weakened when the trading partner has a free trade agreement with China (FTA) and the results confirm this hypothesis, since the variable $FTA \times DGDP$ has a negative coefficient.

The variable difference in GDP per capita (*LogDGDP*) is not statistically significant.

VI. Conclusions

The results of the GL index show that the level of intra-industry trade between China and its trading partners is not high, also indicating that traditional factor endowment plays a significant role in the division of labour in the agricultural trade of China. The agricultural products with large volumes of trade experience low levels of intra-industry trade, while those with small volumes of trade enjoy high levels of intra-industry trade. In relation to the determinants of intra-industry trade, the empirical results indicate that difference in demand, geographical distance between China and its trading partners and economic size have negative correlations with IIT. The integration process between China and some country partners, namely Thailand and Philipines, weakens the negative effect of differences of per-capita GDP on IIT. On the other hand, the similiarity of cultures increases the IIT. In general, we can affirm that the econometric results support the hypotheses formulated. In a future research project, we will calculate both the vertical intra-industry trade (VIIT) and horizontal IIT (HIIT), in order to estimate the determinants of these two types of IIT.

References

Abel-el-Rahaman, K.(1991), 'Firms Competitive and National Comparative Advantages as Joint Determinants of Trade Composition', *Weltwritschaftliches Archiv*, 127(1), 83-97.

Badinger, H., and Breuss, F. (2008), 'Trade and Productivity: An Industry Perspective', *Empírica*, 35 ,213-231.

Balassa, B. and Bauwens, L.(1986), 'Intra-Industry Specialization in Multi-Country and Multi-Industry Framework', *The Economic Journal* , 97, 923-999.

Cies´lik, A. (2005), 'Intra-industry Trade and Relative Factor Endowments', *Review of International Economics* 13, 904-926.

Eaton, J, and Kierzkowski, H. (1884), Oligopolistic competition, product variety and international trade. In H.Kierzkowki (Eds), *Monopolistic Competition and International Trade*, Oxford USA: Oxford University Press, 69-83.

Egger, H, Egger, P, and Greenaway, D. (2008), 'Intra-industry trade with multinational firms', *European Economic Review*, 72, 383-405.

Falvey, R. E. (1981), ‘Commercial policy and intra-industry trade’*, Journal of International Economics*, 11 (4), 495–511.

Feenstra, R., Markusen, J. and Rose, A. (2001), ‘Using the gravity equation to differentiate among alternative theories of trade’, *The Canadian Journal of Economics*, 34, pp.430-447.

Greenaway, D., R. Hine and C. Milner (1994), ‘Country-Specific Factors and the Pattern of Horizontal and Vertical Intra-Industry Trade in the UK’, *Weltwirtschaftliches Archiv*, 130, 77-100.

Greenaway, D., R. Hine, and C. Milner (1995), ‘Vertical and Horizontal Intra-Industry Trade: A Cross Industry Analysis for the United Kingdom’, *The Economic Journal*, 105, 1505-1518.

Grubel, H. and P. Lloyd (1975), *Intra-industry Trade. The Theory and Measurement of International Trade in Differentiation Products*, London: The Mcmillan Press.

Helpman, E. (1981), ‘International Trade in the Presence of Product Differentiation, Economies of Scale and Monopolistic Competition’, *Journal of International Economics*, 11,305-40.

Helpman, E. and Krugman, P. (1985), *Market Structure and Foreign Trade*, Brighton, United Kingdom: Harvester Wheatsheaf.

Helpman, E. (1987), ‘Imperfect Competition and International Trade: Evidence from Fourteen Industrial Countries’, *Journal of the Japanese and International Economics*, 1, 62-81.

Hummels, D. and J. Levinsohn (1995), ‘Monopolistic Competition and International Trade: Reconsidering the Evidence’, *Quarterly Journal of Economics*, 110, 799-36.

Krugman, P. (1979), ‘Increasing Returns, Monopolistic Competition, and International Trade’, *Journal of International Economics* 9, 469-480.

Krugman, P. (1980), ‘Scale Economies, Product Differentiation, and the Pattern of Trade’, *American Economic Review* 70, 950-959.

Krugman, P.(1981), ‘Intra-industry Specialization and the Gains from Trade’, *Journal of Political Economy*, 89, 959-973.

Lancaster, K. (1980), ‘Intra-Industry Trade under Perfect Monopolistic Competition’’, *Journal of International Economics*, 10 , 151-170.

Linder, S. (1961), *An Essay on Trade and Transformation*, New York: Wiley.

Loertscher, R.and F. Wolter (1980), ‘Determinants of Intra-Industry Trade: Among Countries and across Industries’, *Weltwirtschaftliches Archiv* 116, 289-293.

Michael Thorpe and Zhaoyang Zhang(2005), ‘Study of the Measurement and Determinants of Intra-industry Trade in East Asia’, *Asian Economic Journal*, 19, 231-247.

Shaked, A, and Sutton, J.(1984), Natural oligopolies and international trade. In H. Kierzkowski (Ed), *Monopolistic Competition and International Trade*, (Oxford, USA: Oxford University Press), 34-50.

Steve McCorriston and Ian M. Sheldon (1991), ‘Intra-Industry Trade and Specialization in Processed Agricultural Products: The Case of the US and the EC’, *Review of Agricultural Economics*, 13(2), 173-184.

Xiaoling Hu and Yue Ma(1999), ‘International Intra-industry Trade of China’, *Weltwirtschaftliches Archiv*, 135(1), 82-101.

Zhang, J., A. Witteloostuijn, and C. Zhou (2005), ‘Chinese Bilateral Intra-Industry Trade: A Panel data Study for 50 Countries in the 1992-2001 Period’, *Weltwirtschaftliches Archiv*, 141, 510-40.