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Trade between China and the Netherlands; A Case Study of Globalization

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Trade between China and the Netherlands: a case study of globalization

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Abstract

During the last decades, the growth of trade between China and the Netherlands has been larger than the increase in bilateral trade flows between China and most other countries. Using a time series based gravity model, this paper investigates the main determinants of this increase. The empirical analysis indicates that, apart from GDP growth, Dutch in-house offshoring to China is a major determinant of Dutch import growth from China. Dutch firms tend to offshore production in-house when the asset specificity of the traded inputs is high and offshore via the market when this asset specificity is low. Controlling for these product types also reveals that transport costs are more important for trade in homogeneous and reference priced goods than for trade in differentiated goods.

Keywords: international trade, transaction costs, offshoring, foreign direct investments, asset specificity, gravity model

JEL-codes: F14, L16, L23

Trade between China and the Netherlands: a case study of globalization

1. Introduction

Trade between China and the Netherlands provides a topical example of the recent trend of globalization. China's economy has been growing prodigiously with about 10% per year in the last decades. Its growth has benefited much from the world wide fragmentation of production where parts of the production chain have been moved to low cost countries. The Netherlands, as medium sized open economy, has a long tradition as trading nation and, in that respect, acts as a gateway to Europe. Dutch trade with China has been growing even faster than the Chinese economy for the past 10 years. Nowadays, China is the Netherlands' fifth biggest trading partner, with 8% of total Dutch imports coming from China (CPB, 2006). This fast growth, and the negative trade balance with China, has, like in most western economies, evoked a discussion about the effects of moving production abroad for the domestic economy, especially with respect to employment and economic growth. From that perspective, Suyker and De Groot (2006) and CPB (2006) conclude that Chinese export products are more complements than substitutes for Dutch export products and that China's growth has had relatively little impact on Dutch employment. More in general, these studies indicate that China's growth has mainly had a positive effect on the Dutch economy, for example through lower inflation. Similarly, Gorter, Tang and Toet (2005) state that massive reallocation of Dutch economic activities abroad is not likely and that it will not bring about a rise in Dutch unemployment.

However, up to now no much empirical evidence is available on the specific determinants of this growth of trade between China and the Netherlands. The biggest controversy here regards the amount of offshoring in the Netherlands or its effects on the Dutch economy. On the one hand, evidence suggests that quite some activities are or soon will be outsourced to countries like China (e.g., Deloitte & Touche, 2002 and Ernst & Young, 2004), while the other view is that this type of outsourcing is present but marginal (e.g., Gorter *et al*., 2005; Suyker and De Groot, 2006) and has little effect on employment. This paper contributes to this core debate on the effects of globalization by analyzing the determinants of China-Dutch trade by means of a gravity model. The focus of the analysis is on whether *offshoring from the Netherlands to China has had a significant effect on the trade growth between these two countries over the past ten years.*

More specifically the question is whether this offshoring has occurred through the market (outsourced offshoring) or through hierarchy (in-house offshoring) and whether this decision has been influenced by the asset specificity of the traded goods. This "make or buy" decision and its relation with asset specificity and transaction costs is a prominent subject in contemporary economic literature (e.g. Spencer, 2005 and Grossman and Helpman, 2003). Additionally the empirical analysis provides evidence on the usual determinants of bilateral trade flows, like GDP growth, tariff reduction and declining transport costs (e.g., Baier and

Bergstrand, 2001). A large part of Dutch imports are re-exports – imported goods which are legal property of the importer and which are exported with no, or only a very small modification. For that reason the importance of this function of the Netherlands as distributor- the gateway to Europe - in explaining the trade growth between the Netherlands and China is analyzed. This paper focuses on trade in goods as opposed to services. The latter have different dynamics and are only a small part of total Dutch trade.

The contents of this paper are as follows. Section 2 explains the major aspects of trade between China and the Netherlands, and shows that trade growth between these countries has been relatively fast in this era of globalization. Section 3 discusses the recent theory on trade flows, transaction costs and the make or buy and location decisions in offshoring. This section also provides a review of the relevant empirical literature. Section 4 discusses the data and modelling methodology. Section 5 presents and discusses the results of the empirical analysis. Finally section 6 concludes and discusses policy implications and suggestions for further research.

2. Trade between China and the Netherlands

Key statistics
Table 1 illustrates the main differences between China and the Netherlands. The Netherlands is a medium sized highly developed open economy, whereas China has, in spite of its rapid growth of the last decades, a per capita income of about one third of that of the Netherlands. Whereas the Netherlands is mainly a service economy, in China agriculture and industry are still dominant. Although the Chinese regard themselves as excellent traders (and indeed all over the world they are), trade and foreign direct investments are relatively much more important in the Netherlands. The same applies for the use of internet. Mortality rates are substantially lower in the Netherlands than in China, which is another indication of the difference that still exists between the nations in their stages of development.

Table 1: Key statistics about China and the Netherlands (2005)

	China	Netherlands
Population (mln)	1300	16
Life expectancy at birth (years)	72	79
Mortality rate under-5 (per 1000)	27	5
Internet users (per 1000 people)	85	739
Improved sanitation facilities (% of urban population with access)	69	100
GDP (current €, bln)	2125	493
GDP per capita, (in $ at PPPs)	7204	30861
Agriculture, value added (% of GDP)	13	2
Industry, value added (% of GDP)	48	24
Services, value added (% of GDP)	40	74
Average Inflation (1990-2006, %)	5.08	2.43
Average real GDP growth (1990-2006, %)	6.41	4.05
Trade (€, bln)	1422	531
Trade as % of GDP	67	122
FDI stock (inward)	318	463
FDI stock (inward) as % of GDP	14	94

Sources: World Development Indicators Database 2007, Suyker and De Groot (2006), IMF

Size and composition of bilateral trade

Notwithstanding the large differences and distance between China and the Netherlands, their bilateral trade has grown remarkably fast over the past 10 years. Table 2 reports t-ratio tests on the difference between China's trade growth with its main partners and China's trade growth with the Netherlands. It shows that trade growth between the Netherlands and China has been significantly (t ratio 2.98, significant at 1%) greater than trade growth between China and the rest of the world for the past ten years. The second column of the table indicates that this growth was also important from an economic perspective, since on average trade between China and the Netherlands has grown 5.43 percentage points more than trade between China and the rest of the world.

Table 2 also shows that trade between the Netherlands and China has grown significantly faster than China's trade with seven out of eleven of its main partners. Only trade between China and India and between China and the Philippines has grown faster than Dutch China trade. A reason can be that India and the Philippines both have export baskets that are very compatible with China's needs. India for example is naturally well endowed with iron ore, which China needs for its production sector (53% of Indian exports to China comprised iron ore in 2000). The Philippines on the other hand is skilled in the production of several high tech components, which China uses to assemble other high tech goods (Lall and Albaladejo, 2004). The relative fast growth of Dutch China trade makes it an interesting case study for the analysis of bilateral trade flows in the era of globalization.

Table 2: The relative fast growth of Dutch China trade

Table 2 contains the output of 12 t-ratio tests on the difference between monthly trade growth between China and the Netherlands and China and its main partners. Trade growth between China and each of its main partners is calculated as $TRG_{it}= LN(TR_{it}/TR_{it-12})*100$. Here TRG_{it} is the trade growth (continuously compounded) between China and its partner i at time t, LN represents the natural logarithm, TR_{it} is the value of trade (import+export) between China and country i at time t, while TR_{it-12} is the same twelve months before. Growth rates thus compare the same month in two successive years. This mitigates any seasonal and monthly effects that might be present in the data. For each partner TRG_{it} is subtracted from TRG_{nt}, which is the trade growth between China and the Netherlands at time t, formally: $\Delta TRG_{it}= TRG_{nt}-TRG_{it}$. The T-ratio test (displayed in the second column) on ΔTRG_{it} for each country is performed in the usual manner by dividing this variable's average by its standard error (see Brooks, 2002 for a textbook explanation of the standard error and the use of t-ratio tests). Formally, for each country H_0: $\Delta TRG_{it} = 0$ is tested against the alternative hypothesis H_1: $\Delta TRG_{it} \neq 0$. The third column represents the (arithmetic) average of ΔTRG_{it} for each country ($\overline{\Delta TRG_{it}}$) in percentage points. The source of the data is CEIC, extracted through UBS Investment Bank, it is on a monthly base ranging from Jan 1996 – May 2006 (the choice of this period was based on availability) and thus has 113 data points for each country. Data for China's trade with the Netherlands was taken from CBS Statline. *, ** and *** represent significance at the 10%, 5% and 1% respectively.

China's Trade Partners	T-ratio	Average of Difference ($\overline{\Delta TRG_{it}}$)
Australia	2.25**	5.15
India	-2.26**	-4.69
Indonesia	3.14***	7.50
Japan	6.19***	11.25
Korea	2.30**	4.54
Malaysia	0.06	0.13
Philippines	-1.80	-4.53
Singapore	3.11***	6.56
Taiwan	3.03***	6.02
Thailand	1.28	2.31
USA	3.08***	5.66
World (excl. Netherlands)	2.98***	5.43

A closer look at time series data of the bilateral trade flows reveals that most of the trade growth between the Netherlands and China has been through imports from China. This could partially be related to the function of distributor that the Netherlands plays between Asia and Europe. Evidence provided in personal communication by the Netherlands Bureau of Statistics (CBS) suggests that, apart from the afore mentioned re-exports (Suyker and De Groot, 2006), a considerable amount of import from China is used as intermediate inputs for production in the Netherlands. It therefore represents offshoring of Dutch production to China. Trade growth between China and the Netherlands is furthermore likely to have been affected by China's accession to the WTO in 2001. Next to a direct affect via tariff and quota reductions, there might be an indirect affect via institutional quality and trust. The latter two are however beyond the scope of this research and will not be further investigated.

According to data on SITC code level, the bulk (69%) of Dutch imports from China nowadays are goods classified as "Machinery and Transport Equipment" (MTE, SITC 7). A large part of these imported MTE goods are computers, telecommunication devices and components and parts of computers and office machinery. The composition of imports of the Netherlands from China has become more high-tech over the past ten years±, since MTE has become a larger part of goods import from China than in the mid 1990's. Within the MTE category, computers and telecommunication devices have gained share at the cost of *inter alia* electrical machinery and apparatus. This is consistent with studies by e.g. Yue and Hua (2002), Rodrik (2006) and Schott (2006) who point out that China's export basket is getting increasingly more high tech. At first sight it may be puzzling since China is (given its natural resources) expected to have a comparative advantage in low skilled labour intensive products. The reason can be the assembly in China of high-tech goods with the use of production from other Asian countries, which in this field dominates "home made" production (e.g., Gaulier *et. al.*, 2006; Suyker and De Groot, 2006; Chen, 2005). Besides MTE, Miscellaneous Manufacture Articles (MMA, SITC 8) and Manufactured Goods Chiefly by Materials (MG, SITC 6) are important import categories of the Netherlands from China.. These two categories include footwear, clothes, handbags (MMA) and rubber tires, wood manufactures and household equipment of base metals (MG).

Imports of China from the Netherlands are of a different kind. The type of traded products is also quite different. Data from 2006 reveal that the Dutch mainly exported MTE, non-food Crude Materials (CM, SITC 2) and Chemical and Related Products (CRP, SITC 5) to China. The MTE goods imported from the Netherlands are however not quite the same as the ones exported to the Netherlands. The former include (among others) machinery and equipment specialized for particular industries, valves and industrial cooling and heating equipment. CM exports to China currently include non-ferrous base metal waste, and crude vegetable materials, while CRP exports include for example hydrocarbons, alcohols and phenols. Apart from the difference in composition there is also a difference in size between exports and imports of China and the Netherlands: in 2006 Dutch exports to China were only around 12% of total Dutch China trade.

All in all this overview of Dutch China trade suggests that differences in comparative advantages based on natural factor endowments are an unsatisfactory explanation for the Dutch China trade composition and evolution. China also seems to posses a comparative advantage in assembly, while the Netherlands exploits its traditional position as trading nation and distributor to Europe. That is why we, in section 4 include the Dutch distribution function, outsourced and in-house offshoring and several trade barriers to explain the evolution of Dutch China trade. The next section provides a short introduction to the recent literature in this field.

3. Trade, transaction costs and product types

A major feature of modern trade theory is that it challenges the paradigm of frictionless trade of classical trade theory. Instead of the notion that trade is for free, contemporary trade theory takes into account that trade involves considerable transaction costs (or trade costs) which set a limit to the amount of trade otherwise explained by comparative advantages (Trefler, 1995). Reduction of transaction costs evokes more trade and makes existing trade less expensive. The hypothesis is that a trading country like the Netherlands, with a major function of distributor and organizing production, will have a comparative advantage in keeping transaction costs low (see WRR, 2003). In a similar way globalization and the increased fragmentation of production can be regarded as an effect of the reduction of transaction costs. This modern trade theory combines elements from the theory of the firm and (new) institutional economics. The latter theory proposes the view that production is also an organizational problem rather than just a technical one. It sees a firm as an organizational structure rather than just as a production function (Williamson, 1998).

Theory of the Firm

In his seminal contribution Coase (1937) pointed out that if the market mechanism freely coordinated the efficient allocation of production factors, firms would not exist. However, coordination costs, which Coase labelled "marketing costs", do urge firms to make a decision whether to coordinate through their hierarchy or through the market. This decision determines optimal firm size where the marginal costs of allocation through the market are equal to the marginal costs of allocation within the hierarchy. In essence, Coase describes what is today known as the "make or buy" decision in the perspective of globalization. The term "transaction costs" was first used by Arrow (1969), who agreed with Coase by stating that the existence of vertical integration implies that there are costs involved in operating competitive markets. Therefore Arrow defined transaction costs as "costs of running the economic system" (Arrow, 1969).

Types and Sources of Transaction Costs

Here we specify transaction costs as all costs market participants make in exchanging goods, services and ideas. This definition encompasses direct costs like tariffs and transportation costs as well as indirect costs like search, contracting and monitoring costs. Transaction costs can be categorised in various ways. Williamson (1985) distinguishes between *ex-post* and *ex-ante* transaction costs, while Den Butter and Mosch (2003) elaborate this by distinguishing three stages in every transaction, namely the *contact*, *contract* and *control* stage. Linders (2006) categorizes transaction costs into costs arising from tangible and intangible barriers to trade. Tangible barriers to trade (e.g. transport and trade policy barriers) lead for example to transportation costs and tariffs. Intangible barriers (e.g. informational, cultural and institutional barriers) lead to more indirect costs, like the ones discussed by Williamson (1985, 1998). According to Linders, intangible barriers are more important for trade than tangible barriers. Therefore WRR (2003) poses that a trading country like the Netherlands should focus on reducing these intangible barriers, because they become relatively more important now that tangible barriers have continued to fall.

Transaction costs are linked with incomplete information and relationship specificity, which can lead to uncertainty and opportunistic behaviour. In this respect Nunn (2006) mentions the well-established insight from the theory of the firm that underinvestment will occur when investments are relationship specific and contracts cannot be enforced. Investments are considered to be relationship-specific when their value outside of a buyer-seller relationship is significantly lower than within it. The underinvestment will occur because the trading partners want to prevent a "hold-up". This underinvestment then leads to sub optimal level of trade. Consequently, firms invest time, effort and money in: finding a partner that is trustworthy (*contact*), establishing sound contracts (*contract*) and implement monitoring (*control*). All these investments are bound to reduce the probability and extent of opportunistic behaviour by a potential partner. Obviously the costs made to avoid such hold-ups are exacerbated in an international context. Seeking and gathering information about potential partners in another country is for example more difficult because of geographical distance, differences in (business) culture, language and the way information is distributed. These differences also make contracting, monitoring and enforcing more difficult.

Transaction Costs and the Governance Structure of Firms

Grossman and Helpman (2003) consider the afore mentioned "make or buy" decision in an international context. They argue that the classical dichotomy to make or buy is too simplistic to explain current patterns in international trade. Helpman (2006) shows that this decision has two dimensions. These two dimensions are geographical location and ownership structure. Firms must simultaneously choose whether to outsource (the ownership dimension) and whether to offshore (the geographical dimension). This leads to four possibilities; in-house production in the home country (insourcing), subcontracting input production to an external party in the home country (outsourcing), producing the inputs in-house through a subsidiary in a foreign country (in-house offshoring) or subcontracting input production to an external party in a foreign country (outsourced offshoring). Since the modelling of these simultaneous choices is quite complex and beyond the scope of this research, our analysis focuses on the latter two possibilities.

Assume that a firm decides to move production (or parts thereof) to a foreign country. It then has to decide whether to keep this production in-house or to outsource to an external party. From a transaction costs perspective, this decision depends vitally on the asset specificity of the traded inputs. As assets become more relationship specific, the risk of opportunistic behaviour increases, which means that the costs of contracting increase more than the costs of vertical integration (Klein, Crawford and Alchian, 1978). In such a situation one should, *ceteris paribus,* expect vertical integration to occur as opposed to outsourcing.

In a network/search view of trade Rauch (1999) provides an operational way to distinguish between goods that require relatively large relationship specific investments and goods that do not. The argument is that an essential difference exists between homogeneous goods and differentiated goods. This leads to a practical distinction of three types of goods, namely goods that are sold on an organised exchange, goods that are reference priced (meaning that their prices are quoted regularly in trade publications) and goods that are neither of these. Rauch calls the latter type of goods differentiated goods. He states that these goods are too heterogeneous to be compared on price alone since their price has to be adjusted to multidimensional differences in characteristics. Consequently, trade in these goods entails a lot more (relationship specific) search costs than goods sold on an organised exchange. Trade in differentiated goods is thus more prone to opportunistic behaviour.

Similarly, Nunn (2006) argues that trade in differentiated products is more exposed to opportunistic behaviour than trade in homogeneous goods. That is because in the case of homogeneous goods less relationship specific search costs have to be made to match buyers and sellers. Homogeneous goods furthermore have values that do not differ much within or outside a trade relationship because their market is thick (i.e. has many buyers and sellers). In the case of differentiated goods exposure to opportunistic behaviour is also increased because they are more prone to the verifiability problem. Their quality cannot be perfectly assessed by third parties because of their heterogeneity. This has an impeding effect on monitoring and enforcement. In addition, contracts for differentiated goods are more incomplete since more factors than price alone have to be considered. All in all, differentiated goods are more prone to the hold up problem because of asset specificity and incomplete contracts and thus transaction costs are higher for this type of goods.

Empirics

Following the complaint of e.g. Trefler (1995) and Davis *et.al.* (1997) that traditional trade models are unable to explain today's international trade, much research has emerged explaining trade patterns and volumes from a transaction cost perspective. Many of these studies find that distance negatively affects trade (e.g., Frankel and Rose, 2002 and Linders *et.al*., 2005). Here, distance is often viewed to be a proxy for intangible barriers to trade like for example cultural unfamiliarity and incomplete information, rather than just transport costs (Linders, 2006). However, in a meta analysis Linders (2006) shows that the effect of distance on trade does vary quite a bit across the empirical literature. Indeed it is not clear what type of barriers distance is a proxy for.

Baier and Bergstrand (2001) find that direct trade costs cost explain a significant part of trade growth. More specifically, they find that declining tariffs and transportation costs explain 25% and 8% respectively of trade growth in several OECD countries between 1950 and 1980. However, their model only explains 40% of the variation in trade flow growth in their sample and their results cover a period in which tariffs and transportation costs are likely to have declined more than in recent years. From that perspective, Anderson (1999) states that current tariffs and transportation costs cannot sufficiently explain the resistance to trade.

Trade has recently also been related to increased vertical specialization (outsourcing). Hummels, Ishii and Yi (2001) find that increased vertical specialization can account for a third of growth in trade between 1970 and 1990 of the countries in their analysis. A study by Yi (2003) shows that vertical specialization increases the sensitivity of trade to tariff reductions, since goods that are produced in several countries, pass multiple borders and are thus subject to multiple tariffs. This is in contrast to the view expressed by Anderson (1999) since it implies that, although tariffs have not gone down as much in recent years as for example 20 years ago, the effect of tariff changes on trade would still be strong.

A number of studies investigate the afore mentioned "make or buy" decision, i.e. the choice firms face to offshore via hierarchy or via the market. Grossman and Helpman (2003) show that this choice depends *inter alia* on the thickness of the market and on the verifiability of investment tasks. An increase of these variables reduce relationship specificity and thus are likely to induce outsourced offshoring as opposed to in-house offshoring. Lieberman (1991) uses a logit model to test whether asset specificity increases chances of US chemical producers to vertically integrate backwards. He finds that both his measures of asset specificity have a positively significant effect on firms' decision to integrate backwards in his sample. Lieberman's research, however, is only confined to the chemical industry. Maltz (1994) extends this analysis to other industries. His estimates of a logit model for the outsourcing of logistical activities confirm that asset specificity negatively affects the likelihood of outsourcing. On the other hand, Kvaloy (2003) poses a model in which the inefficiency resulting from a hierarchical structure (due to weaker incentives) is positively related to asset specificity. Hence, in Kvaloy's model, firms would not have the incentive to internalize production even when the transaction is characterised by relationship specific investments. The reason is that the gain in transaction costs would be offset by the loss in efficiency of a hierarchical structure. However, this model has not been empirically tested.

More recently, Nunn (2006) proposes that a country's contracting environment might be an important determinant of its comparative advantage because of asset specificity. He finds that countries with good contracting environment specialize in industries that require large relationship specific investments. Moreover, empirical studies have found that institutional quality (Dixit, 2004; Linders, 2006), trust (Den Butter and Mosch, 2003) and cultural differences (Guo, 2004) are important determinants of trade flows. Therefore, this survey of the literature shows that, although there is no consensus regarding which type of transaction costs is most prominent to affect trade, the notion that transaction costs matter is widely supported. Furthermore asset specificity can be regarded an important determinant of firms' decision to make or buy.

4. Data and methodology; the gravity model

The Gravity Model

The empirical analysis of this paper explains bilateral trade between China and the Netherlands form the perspective of transaction costs and globalization by means of the gravity model. This model, already mentioned by Tinbergen (1962), is commonly used for quantitative analysis of trade in contemporary economic research (Guo, 2004). The functional form of the gravity model is based on Newton's gravity equation in physics. The economic gravity model expresses bilateral trade between countries as a function of their economic sizes and the physical distance between them. More specifically, it relates trade proportionally to economic size and inversely to distance in the absence of frictions. The frictions and facilitators of trade are then often added to this benchmark version of the gravity model. This paper follows the same procedure, where we use time-series data to estimate developments in Dutch China bilateral trade flows.

The gravity model has often been criticized to lack a solid theoretical foundation, since its classic form is only based on an intuitive analogy between spatial interaction in physics and economics (Linders, 2006). However, literature has found the model to work well empirically, producing sensible parameter estimates (Rose, 2005). In addition, nowadays the gravity model has obtained a rigorous theoretical underpinning by deriving it from models of imperfect competition and product differentiation (e.g., Helpman and Krugman, 1985; Anderson and Van Wincoop, 2004). Deardorff (1998) shows that the gravity equation is also consistent with Heckscher Ohlin theory under perfect competition. Consequently, the gravity equation can be derived from both neo-classical and new trade models as a reduced form equation that explains bilateral trade patterns (Linders, 2006) The simple version of the model, assuming frictionless trade, and identical and homothetic preferences across countries, can be written as:

$$T_{ij} = Y_i \frac{Y_j}{Y_w} \qquad (1),$$

where T_{ij} is export from country i to j, Y_i, Y_j and Y_w are the economic size of country i, j and the world respectively.

Following the gravity model's assumption that trade between two countries is proportional to their economic size, this paper uses the Gross Domestic Product (GDP) of China and the Netherlands as an explanatory variable for Dutch China trade growth. The variables for economic size are denoted as GDP_{ct} and GDP_{nt}, where the subscript t stands for time and c and n stand for China and the Netherlands respectively. The variable of world economic size is not explicitly included in the regression model, but is assumed to be captured by the constant term of the regression. Note that since world GDP appears in equation (1) as a denominator, after logarithmic transformation it becomes negative (thus the constant of the regression model is assumed to be negative). Furthermore, since causality runs both ways between trade and GDP, these variables are lagged one period to mitigate simultaneous equation bias.

Other explanatory variables: FDI, Outsourced Offshoring and Dutch Re-Exports
In order to investigate the effects of globalization on Dutch China trade, additional explanatory variables, which represent the effects described in the previous section, are added to the basic specification (1). In-house offshoring to China is measured by the stock of Foreign Direct Investment (FDI) done by the Netherlands in China. This variable is denoted by FDI_t, where the subscript t stands for time. The FDI variable comprises "capital provided by a foreign direct investor (the parent company) to an affiliate enterprise, to obtain a lasting interest and influence in that enterprise" (Suyker and de Groot, 2006: 41). Actually, FDI flows are more commonly used than stocks in economic research. Most of these papers however use cross sectional data. In the time series data of this paper the growth in FDI stocks is equal to FDI flows.

FDI can have either a vertical or horizontal nature. This dichotomy is based on two different views on the multinational activities of firms. The proximity concentration hypothesis states that multinational activity of firms is led by the trade off between being close to customers and suppliers and the loss of scale economies at the plant level. The factor proportion hypothesis on the other hand states that multinational activity is mainly motivated by production efficiency reasons (Markusen and Maskus, 2001). This implies that vertical FDI takes place when firms internationally fragmentise production via subsidiaries (i.e. in-house), while horizontal FDI occurs when firms undertake the same activities in multiple countries. Consequently, when FDI is found to have a positive affect on trade it can be assumed to have a vertical nature (since the FDI leads to import of intermediate goods), while a negative relationship implies a horizontal nature (since exports are substituted by sales through foreign branches). The question whether FDI is horizontal or vertical has been heavily debated in economic literature (e.g, Markusen and Maskus, 2001). Although consensus has not been reached yet, evidence seems to suggest that FDI between economically similar countries is horizontal while FDI between very dissimilar countries is vertical (e.g., Gorter, Tang and Toet, 2005).

Several studies have rejected the vertical model in favour of the horizontal model (e.g, Blonigen *et.al.*, 2003). However, these studies may be biased because they all use data on FDI originating in and going to developed countries. This makes it more likely to find results conforming that most FDI is horizontal. When data on substantially dissimilar economies are used in the analyses, the results indicate that vertical FDI dominates horizontal FDI (Waldkirch, 2003). Suyker and De Groot (2006) on the other hand suggest that FDI flows from the Netherlands to China have a horizontal rather than a vertical character, but their analysis is based on reviewing a few Dutch company annual reports and interpreting FDI data without statistical analysis.

Reverse causality might also exist between trade and FDI. Vernon’s (1966) product cycle hypothesis suggests that trade can cause FDI because multinational firms trading with foreign markets get to know the foreign country’s economic, political and social situation better and become less uncertain to invest in it. For that reason we included the FDI variable with a one period lag in our regressions.

In order to estimate the effects of outsourced offshoring, we constructed a measure based on the imports of intermediate goods. Here we follow Hummels *et.al.* (2001) and Yi (2003). According to Hummels *et.al.*, vertical specialization requires the export of the goods that are partly produced in foreign countries. Therefore their measure of vertical specialisation is based on the proportion of goods that require foreign inputs and after finishing are exported. So this measure of vertical specialization (*VS*) in a certain country is defined as the ratio of imported intermediates to output multiplied by exports:

$$VS_t = \left(\frac{IIG_t}{OP_t} \right) * TEX_t \qquad (2),$$

where OP_{kt} is defined as:

$$OP_t = VA_t + I_t \quad (3)$$

Here, VS_t stands for Dutch vertical specialization, IIG_t is the total Dutch import of intermediate goods, OP_t represents Dutch output (which is defined as the sum of intermediate input (I_t) and valued added (VA_t)) and TEX_t represents total Dutch exports, excluding re-exports. This measure is an indicator for the value of imported input content in the exports of the Netherlands at time t. We acknowledge that this proxy represents overall vertical specialization in the Netherlands and not specifically relates to vertical specialisation to China. However, information from the CBS suggests that a substantial part of Dutch imports of intermediate goods are from China.

The use of intermediate goods to measure international outsourcing is common in economic literature (e.g., Feenstra and Hanson, 1996 and Hummels *et. al.*, 2001). There are several caveats of using this measure. A first caveat is that the classification of goods as “intermediate” is rather arbitrary (Hummels *et.al.* 2001). Tyres for example could be classified as intermediate goods (since they are used as inputs in the production of a final good, namely automobiles) as well as final goods (since they are also bought by households). Another vexation is that import of intermediate goods represents in-house offshoring as well as outsourced offshoring. The assumption of the indicator *VS* made here is that the effect of outsourced offshoring is big enough to give different results than the effect of FDI, which solely measures in-house offshoring. In addition, imported intermediates that are used as inputs for final goods that are not exported are not counted by this proxy as part of vertical specialization.

As mentioned before, the Netherlands traditionally has been an important distribution hub for Europe. Therefore, the importance of the Dutch function of distributor is also likely to have an effect on Dutch China trade. Dutch re-exports are a good measure for this function. It must be noted, however, that re-export is not only a distributive process – transit trade is. In re-exports value is also added to products in various ways, ranging from, storage and bulk breaking to slight modification (for example the mixing/thinning of certain chemicals). In our regression we represent the Dutch function as distributor, D_t by the ratio of Dutch re-exports to total Dutch trade:

$$D_t = \frac{RE_t}{TR_t} \quad (4),$$

where TR_t is defined as:

$$TR_t = TIM_t + TEX_t \quad (5)$$

RE_t represents total Dutch re-exports and TR_t is total Dutch trade (which is defined as the sum of total Dutch import and export, represented by TIM_t and TEX_t respectively). Hence, this variable is a measure of the importance of the Dutch distribution function to its trade. Dividing re-exports by total trade furthermore mitigates the effect of inflation and relieves the endogeneity problem that would occur if just re-exports were used as an explanatory variable

Transport Costs and Tariffs

As proxy for transport costs as determinant we use the Cost Insurance and Freight to Free On Board ratio (CIF/FOB) of the trade between the Netherlands and China. This ratio is the usual indicator of transport costs (*TC*) in empirical studies (e.g., Hummels, 1999 and Baier and Bergstrand, 2001). It is defined as:

$$TC_t = \left[\left(\frac{IM_t}{EX_{ct}} \right) - 1 \right] \quad (6)$$

Here IM_t represents the value of Dutch imports from China (which are registered including insurance and freight costs, i.e. CIF), EX_{ct} represents Chinese exports to the Netherlands (which are registered excluding cost, insurance and freight, i.e. FOB) and the subscript c indicates that the exports are from China. The basic idea behind the proxy is that without transport costs, the value of exports from China to the Netherlands should be the same as the value of Dutch imports from China. Since customs register exports on an FOB base (i.e. excluding insurance and freight costs) while imports are registered CIF (i.e. including insurance and freight costs), there is a difference, which is a measure of transport costs. TC_t thus expresses these transport costs in *ad-valorem* equivalent terms.

We acknowledge that also this measure has several shortcomings. First, it is a relatively aggregated measure: it is not informative about which transport costs matter most, nor does it reveal which goods are most sensitive to transport costs. Second, when using CIF/FOB ratios, the effect of transport costs is contaminated with the effect of insurance costs. Third and more importantly, the use of CIF/FOB ratios in this case is troubled by the fact that the registration of transit trade from China to other countries can be flawed. That is because transit trade is reported as going to the Netherlands, while it only passes through Netherlands on its way to another country. Since these goods never become legal property of a Dutch citizen, Dutch customs do not register these goods in transit. It implies that more goods are registered to have left China to go the Netherlands than the goods which are registered to have arrived in the Netherlands. This brings about the inconsistency that the value of goods exported to the Netherlands from China is consistently higher than the Dutch import value of Chinese goods.

Fortunately, Eurostat and the China Statistical Yearbook report data on the quantities (in 100 kg) of goods traded between the Netherlands and China. The data reveals that not only the value but also the quantity of goods exported from China to the Netherlands is higher than the quantity of goods arriving in the Netherlands from China. It seems to confirm that goods that are shipped from China *through* the Netherlands are registered in China as going *to* the Netherlands. In case this notion is true, the difference can be used to extract the flow of goods between the Netherlands and China that are merely in transit from goods that are actually traded and become property of Dutch citizens In order to separate transit trade from “real” trade, the following procedure is used. The euro value of exports from China to the Netherlands is divided by their quantity in kg.

This gives a Euro value per 100 kg of Chinese goods exported to the Netherlands. The ratio is then multiplied by the difference between the quantities of Chinese exports to the Netherlands and the quantities of Dutch imports from China. This gives the value of the goods that are shipped *through* but not *to* the Netherlands but are registered as such. Subtracting this value from the total value of Chinese goods exported to the Netherlands according to the registration in China, (EX_{ct}), gives the transit corrected value of Chinese goods exported to the Netherlands (CEX_{ct}).

Consequently, the corrected measure for transport costs, CTC_t, becomes:

$$CTC_t = \left[\left(\frac{IM_t}{CEX_{ct}}\right) - 1\right] \quad (7)$$

where CEX_{ct} is defined as:

$$CEX_{ct} = EX_{ct} - \left[\left(\frac{EX_{ct}}{Q_{ct}}\right) * \left(Q_{ct} - Q_{nt}\right)\right] \quad (8)$$

Here, Q_{ct} is the quantity (in 100 kg) of Chinese goods exported the Netherlands, Q_{nt} is the quantity (in 100 kg) of Dutch goods imported from China and IM_t and EX_{ct} are as defined in (6). This transit trade corrected measure for transport costs is an improvement of the standard CIF/FOB ratio and has, to our knowledge, not been used before in empirical studies of the gravity model.

The effect of tariffs on trade is quite difficult to measure since there is a large variation in tariffs imposed between different goods. Countries also discriminate between trading partners by applying different tariffs on the same type of good. Nevertheless, we tried to measure the effect of tariffs on Dutch China trade with the use of "average applied import tariff rates on non- agricultural and non-fuel products" in China and the European Union (Data are taken from UNCTAD) This variable is denoted by TA_{eut} and TA_{ct}, where n and c denote the Netherlands and China respectively. Of course agricultural and fuel products are excluded from this measure but this problem is not likely to be very large as agricultural and food products are not a large part of Dutch China trade.

In the empirical analysis of the next section all data has been converted to a common currency, corrected for inflation and for seasonal effects, and converted into growth rates. The analysis uses quarterly time series data with observation period 1996:I-2006:IV. In order to exclude seasonal variation from the data, growth rates are yearly averages.

5. Empirical analysis for various product types

As benchmark regression we first estimated the frictionless specification of the gravity model for Dutch imports from and exports to China. These equations read as:

$$I\dot{M}_t = \beta_0 + \beta_1 G\dot{D}P_{ct-1} + \beta_2 G\dot{D}P_{nt-1} + \varepsilon_t \quad (9)$$

$$E\dot{X}_t = \beta_0 + \beta_1 G\dot{D}P_{ct-1} + \beta_2 G\dot{D}P_{nt-1} + \varepsilon_t \quad (10)$$

Here, the dot above the variables indicates growth rates, IM_t and EX_t are the Dutch imports from and exports to China respectively, β_0 represents the intercept of the model, ε_t is the error term and GDP_{ct-1} and GDP_{nt-1} are the lagged GDPs of China and the Netherlands respectively. Since logs appear on both sides of the equation the coefficients of these models can be interpreted as elasticities.

The arguments and data construction of the previous section give rise to the full model specifications where the explanatory variables representing various aspects of globalization are added to the benchmark gravity equations (9) and (10):

$$I\dot{M}_t = \beta_0 + \beta_1 G\dot{D}P_{ct-1} + \beta_2 G\dot{D}P_{nt-1} + \beta_3 F\dot{D}I_{t-1} + \beta_4 V\dot{S}_t + \beta_5 \dot{D}_t + \beta_6 C\dot{T}C_t + \beta_7 T\dot{A}_{eut} + \varepsilon_t \quad (11)$$

$$E\dot{X}_t = \beta_0 + \beta_1 G\dot{D}P_{ct-1} + \beta_2 G\dot{D}P_{nt-1} + \beta_3 F\dot{D}I_{t-1} + \beta_4 \dot{D}_t + \beta_5 C\dot{T}C_t + \beta_6 T\dot{A}_{ct} + \varepsilon_t \quad (12)$$

Again the dot indicates growth rates, β_0 represents the intercept of the model, ε_t is the error term and IM_t, EX_t, GDP_{ct-1} and GDP_{nt-1} are as in (9) and (10). FDI_{t-1} is the lagged value of Dutch FDI stocks in China, VS_t is a measure of Dutch outsourced offshoring, D_t is the importance of the Dutch function as distributor, CTC_t is a measure for transportation costs and TA_{eut} and TA_{ct} are the average tariff rates in the European Union and China respectively. We note that the variable VS is not included in (12). The reason is that there is no *a priori* justification for Dutch offshore outsourcing to affect exports to China. The coefficients of the equations can again be interpreted as elasticities.

The next step in our empirical analysis is to see whether the effects of the (additional) determinants differ along with the type of product that are traded. For that reason detailed trade data (3 digit SITC) between the Netherlands and China is extracted from CBS Statline and sorted in three groups, namely differentiated goods, reference priced goods and homogeneous goods. The sorting procedure is based on the classification of Rauch (1999). In fact, Rauch specifies two versions of his classification, namely a “liberal” one and a “conservative” one. The conservative classification is stricter than the liberal classification in defining goods as homogeneous or reference priced. This paper makes use of the conservative classification. The 3 digit SITC codes belonging to the three types of goods are downloaded from John Haveman’s website.[1] Using these data, the models (9)-(12) are estimated with trades of each of the three types of goods as

[1] www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html#classification

dependent variable: i.e. for $I\dot{M}_{dt}$, $E\dot{X}_{dt}$, $I\dot{M}_{rt}$, $E\dot{X}_{rt}$, $I\dot{M}_{ht}$ and $E\dot{X}_{ht}$. Here the subscripts d, r, and h indicate differentiated, reference priced and homogeneous goods respectively. These models are numbered (9a)-(12a), (9b-12b) and (9c-12c), with a, b and c representing that the dependent variable consists of differentiated, reference priced and homogeneous goods respectively.

All regressions are checked on robustness: the residuals are tested for serial correlation and heteroscadasticity and the models are tested for parameter stability using Chow tests.

Results for the models for total imports and exports
Table 3 gives the estimation results for the gravity models for total product trade between China and the Netherlands. The results for specification (1) relate to the benchmark gravity models (9) and (10) discussed in the previous section. The results in the columns under specification (2) are the estimates for the full models (11) and (12) where all explanatory variables with respect to the effects of globalization are added. The adjusted R^2 for the benchmark models is 0.67 and 0.66 for imports and exports respectively. This indicates that more than half of the growth in trade between the Netherlands and China can be explained by the growth of their economies. This explanatory power of the benchmark models is in line with most estimations of the standard frictionless gravity model equation. In the full model the explanatory power as compared to the benchmark model rises substantially after the trade barriers and trade facilitators are added as explanatory variables. The models now explain 77% of Dutch import growth from China and 71% of Dutch export growth to China. Similar values and differences between benchmark and full models are also found for the explanatory power of the model for various types of goods in the following tables 5-7.

The results of table 3 indicate that imports from China are a little more sensitive to (Dutch) demand growth while the exports growth to China are more sensitive to (Dutch) supply growth. The difference between these demand and supply elasticities is small though, for imports as well as exports. The intercept, of models model (9) and (10) are positive, while the intercept is found to be negative in most gravity models. Still, this result is intuitive since the significantly positive intercept implies that even if the growth of Dutch and Chinese GDP is zero, there is still trade growth between these two countries. It seems that there is some decay in friction (i.e. reduction in transaction costs) over time causing trade between China and the Netherlands to grow above their GDP growth. The intercepts of the full models are negative and significant, congruent with the theoretical expectations of the gravity model. The intercepts of the models can be interpreted as the average quarterly growth rates of world GDP over the sample period. These intercepts are indeed quite close to the real quarterly growth of world output, which was a little below 1% during the sample period.

Table 3: Trade between the Netherlands and China: growth of total imports and exports, 1996:I – 2006: IV

Independent Variables	Specification 1: Dependent Variable: $\dot{IM}_t$	Specification 1: Dependent Variable: $\dot{EX}_t$	Specification 2: Dependent Variable: $\dot{IM}_t$	Specification 2: Dependent Variable: $\dot{EX}_t$
Constant	1.58*** (3.39)	0.26*** (3.72)	-0.77** (-2.15)	-0.92** (-2.27)
$\dot{GDP}_{ct-1}$	0.91*** (4.99)	0.91*** (5.03)	0.71*** (4.11)	0.88*** (3.96)
$\dot{GDP}_{nt-1}$	0.98*** (6.94)	0.99*** (6.25)	0.81*** (2.99)	0.91*** (4.08)
$\dot{FDI}_{t-1}$			0.60*** (3.77)	0.23 (0.77)
$\dot{VS}_t$			0.33 (1.44)	
$\dot{D}_t$			1.78*** (6.12)	0.28 (1.05)
$\dot{CTC}_t$			-0.14 (-1.05)	-0.24** (-2.09)
$\dot{TA}_{eut}$			-0.33* (-1.76)	
$\dot{TA}_{ct}$				-0.29*** (-3.31)
Observations	38	38	38	38
Adjusted R^2	0.67	0.66	0.77	0.71
F-statistic	40.55	39.16	29.02	31.27

Notes: t-statistics in parentheses; * significant at 10%, ** significant at 5%, *** significant at 1%.

An interesting result is that growth of Dutch FDI stocks in China has a positive influence on Dutch imports from China. This effect is significant at the 1% level, while the influence of FDI on Dutch exports to China is insignificant (although positive). According to the model, a 1% increase in Dutch FDI stocks in China, leads to an increase in Dutch imports from China of 0.60%. This seems to corroborate the idea that FDI flows are complements instead of substitutes for trade, which is in accordance with the factor proportion hypothesis. Thus FDIs from the Netherlands to China seem to be of a vertical character, rather than a horizontal character as suggested by Suyker and De Groot (2006). If the latter was true, the model should have indicated a significantly negative relationship between the FDI variable and Dutch exports to China.

The fact that the FDI variable is significantly positive implies, that Dutch China trade growth has indeed been affected by Dutch offshoring to China. This offshoring is likely to be in-house since the FDI variable is significant, while the outsourced offshoring variable (VS) remains insignificant. These results are somewhat congruent with Liu *et.al.*(2001) who also find a positive relationship between lagged growth of FDI and import growth. Liu *et.al.*(2001) however find larger coefficients for FDI and also find that the relationship between FDI and import grows stronger when FDI is lagged more periods. A reason for such longer delay can be that it takes some time to set up a plant in a foreign country or to integrate two firms after an acquisition. It might thus take some time before the foreign subsidiary is ready to supply intermediate goods to the "home" country. This notion seems to be supported by an estimation result not reported here, namely when model (11) is estimated without lagging FDI. In that case the coefficient on FDI is lower, although still significant and positive. Alternatively, the stronger effect of lagged FDI growth on import growth could also be the cause of increased trust between the trading parties.

The increasing importance of the Dutch function as distributor has had an important positive effect on Dutch imports from China over the past ten years. In fact, the coefficient on this variable ($\dot{D}_t$,1.78) is the highest among all coefficients of model (12). This suggests that Dutch imports from China are most sensitive to the growth in the function as distributor of the Netherlands compared to the other variables. The effect of the Netherlands as distributor on export to China is, however, insignificant. Dutch export growth to China seems to be mainly sensitive to the GDP growth of China and the Netherlands. This accords with the notion that Dutch re-exports mainly are distributed to the rest of Europe instead of Asia.

The interpretation of the estimated effects of the transportation cost variable $C\dot{T}C_t$ is somewhat less straightforward. Although the signs of the coefficients on this variable are both as expected (i.e. negative), the coefficient, with a t-value of just over 1.0, is not significant for import, while it is significant for export. A reason for this low effect of transportation costs for import can be that the composition of imports between the Netherlands and China has become more high-tech. As Baier and Bergstrand (2001) note, one of the assumptions when using CIF/FOB ratios to proxy transportation costs is that the composition of trade doesn't change much. Since CIF/FOB ratios also include insurance costs, the changing composition of Dutch trade with China could have offset the effect of declining transportation costs. The reason behind this is that, as trade becomes more high tech, the insurance costs of these goods go up, which tempers the effect of decline in actual transportation costs. Another reason that transportation costs seem to have significantly affected Dutch exports to China but not imports from China can be related to differences in volume between import and export goods. Exports to China might have a lower value to weight ratio (i.e. they are bigger in size) than imports from China, which means that they are more sensitive to transportation cost changes. A large part of exports to China comprise reference priced and homogeneous goods, while the bulk of imports from China consists of differentiated goods. The latter are more likely to have a high value to weight ratio and are thus likely to be less sensitive to transportation cost changes.

The change in average tariff rates has (as expected) a significantly negative impact on imports as well as exports between the Netherlands and China. Furthermore, imports from China seem to be more sensitive of tariff declines than exports to China. The difference between the two sensitivities is rather small though. The sensitivities of trade to tariff rates are much smaller than found by Yi (2003). But the variation in Yi's findings is quite large. Yi's estimates of the effect of tariff reductions of 1% lead to an increase in export growth from 1.7% to 42%, depending on the specification of the model.

Table 4 gives the total growth of the variables of models (11) and (12) over the observation period 1996-2006. Using the methodology of Baier and Bergstrand, 2001) and given these growth rates, the contribution of each of the explanatory variables to the growth of imports and exports can be calculated.

Table 4: Growth of selected variables between 1996-2006

Variable	$\dot{IM}$	$\dot{EX}$	$\dot{GDP}_c$	$\dot{GDP}_n$	$\dot{FDI}$
Growth	249.95	150.74	116.45	23.83	158.19
Variable	$\dot{VS}$	$\dot{D}$	$\dot{CTC}$	$\dot{TA}_{eu}$	$\dot{TA}_c$
Growth	72.10	35.46	-7.00	-25.08	-109.46

Note: Growth rates are corrected for inflation, on a logarithmic base and are calculated as $LN(X_{2006}/X_{1996})*100$.

Model (11) can account for 237 percentage points of the 250% growth of Dutch imports, which is approximately 95% of that growth. This is built up as follows: the growth of Dutch and China GDP led to 102 percentage points of Dutch import growth from China, FDI accounts for 95 points, the Dutch function as distributor accounts for 63 points, European tariff declines account for 8 points and the coefficient on world GDP implies a negative effect of 31 points. This result is interesting since it implies that only a third (28%) of the growth in Dutch imports from China over the past ten years can be attributed to overall GDP growth (including the negative affect of world GDP growth), the other half is mainly explained by in-house offshoring to China (38%), the increased distribution activities of the Netherlands (25%) and only 3% by declining EU tariff rates. Thus, in-house offshoring of Dutch production activities to China is calculated to have contributed more to Dutch China import growth than overall GDP growth or increased Dutch distribution activities, even though imports are more sensitive to changes in the latter two variables. Furthermore the contribution of tariff declines is statistically significant, but the calculated effect is small.

For Dutch exports to China, the result is somewhat different. Again, the model can explain a large part of the 151% growth of Dutch exports to China, namely 122 points (approximately 81%). But the main part of this increase stems from GDP growth, namely 88 points (approximately 58%). The remainder is mainly explained by declines in Chinese tariff rates (32 points, 21%). Reduced transport costs only explain only 1.7 points (approximately 1%). It implies that the contribution of declining tariff rates is larger for exports to China than for imports from China, even though the sensitivity of the latter is higher. The reason is of course that China has declined its tariff rates more rigorously than Europe, which already had quite low average tariff rates. The finding that tariff rates have a larger effect on trade than transport costs is in line with previous findings in economic literature (e.g., Baier and Bergstrand, 2001).

All in all, the estimation results suggest that, apart from GDP growth, Dutch offshoring to China has positively and significantly affected the trade growth between the Netherlands and China.

Estimation results for three different types of products

This section investigates whether the governance structure of offshoring to China by Dutch firms depends on the asset specificity of the traded inputs. In order to answer this question, goods are sorted into three levels of asset specificity, namely (i) differentiated products (high level of asset specificity), (ii) reference priced goods (medium/low level of asset specificity) and (iii) homogeneous goods (low level of asset specificity). Table 5 gives the estimation results of the full models (11) and (12) (specification 2) for each of these three types of goods separately. As the estimates of the benchmark models, with GDP growth elasticities just below 1.0, do not differ much from each other, we omit these results and focus the discussion on the effects of the additional variables in the full models.

Ad (i) Differentiated Goods

The estimation results in the first two columns of table 5 show that the effect of Dutch FDI in China is stronger for differentiated goods than for total imports from China. Here, an increase in Dutch FDI stocks in China of 1% is estimated to increase Dutch imports from China by 0.65%. The coefficient of the outsourced offshoring proxy though is still insignificant. Also, Dutch FDI stock in China does not affect Dutch exports to China significantly. As yet, the coefficient of this variable is positive, suggesting that Dutch FDIs to China mainly have a vertical character.

The already sizeable effect of the Dutch function of distributor on imports from China also becomes somewhat stronger in case of differentiated goods as compared to total goods. An increase in the Dutch re-export to total trade ratio of 1% leads to an estimated growth of imports from China of 1.81%. This is in accordance with the findings of Mellens *et. al.* (2007) that a large part of Dutch re-exports are computers and other electronic devices (which are classified by Rauch (1999) as differentiated goods).

The coefficient on the proxy for transportation costs has the expected sign, but is not significant at the conventional levels. Thus transportation costs do not seem to have significantly affected Dutch China trade of differentiated goods. The effect of tariff changes is similar to the results found in table 3. Declines in the tariff rates of China and the EU have a significantly negative effect on trade between the Netherlands and China. The effect of tariff rate declines is again greater for imports from China, than for exports to China.

Table 5: Trade between the Netherlands and China sorted by product type

	Specification 2					
	Differentiated goods		Reference priced goods		Homogeneous goods	
Independent Variables	Dependent Variable: $\dot{IM}_{dt}$	Dependent Variable: $\dot{EX}_{dt}$	Dependent Variable: $\dot{IM}_{rt}$	Dependent Variable: $\dot{EX}_{rt}$	Dependent Variable: $\dot{IM}_{ht}$	Dependent Variable: $\dot{EX}_{ht}$
Constant	-0.76**	-0.88**	-0.88*	-0.79**	-0.95*	-0.91**
	(-2.21)	(-2.44)	(-1.91)	(-2.33)	(-1.83)	(-2.21)
$\dot{GDP}_{ct-1}$	0.74***	0.84***	0.80***	0.92***	0.71***	0.80***
	(3.07)	(3.46)	(3.54)	(4.22)	(3.60)	(4.92)
$\dot{GDP}_{nt-1}$	0.83***	0.90***	0.87***	0.97***	0.76***	0.88***
	(4.51)	(3.71)	(3.97)	(5.19)	(4.64)	(6.01)
$\dot{FDI}_{t-1}$	0.65***	0.37	0.42	0.53	0.22	0.31
	(6.67)	(0.49)	(1.07)	(1.17)	(0.76)	(0.86)
$\dot{VS}_{t}$	0.25		0.43**		0.51***	
	(0.98)		(2.09)		(3.04)	
$\dot{D}_{t}$	1.81***	0.32	1.03***	0.48	0.38**	0.42
	(7.58)	(1.05)	(4.08)	(0.52)	(2.17)	(0.62)
$\dot{CTC}_{t}$	-0.13	-0.14	-0.61**	-0.63*	-0.70***	-0.72***
	(-1.35)	(-1.05)	(2.24)	(-1.80)	(3.24)	(-2.97)
$\dot{TA}_{eut}$	-0.35*		-0.38*		-0.29*	
	(-1.84)		(-1.92)		(-1.97)	
$\dot{TA}_{ct}$		-0.32***		-0.35***		-0.23***
		(-3.72)		(-4.72)		(-3.88)
Observations	38	38	38	38	38	38
Adjusted R^2	0.78	0.73	0.71	0.68	0.73	0.68
F-statistic	33.15	34.16	30.24	28.95	37.25	35.56

Notes: t-statistics in parentheses; * significant at 10%, ** significant at 5%, *** significant at 1%.

The fact that the results of columns 1 and 2 of table 5 are much similar to the results in table 3 implies that the trade between China and the Netherlands is dominated by trade in differentiated products. In fact the trade between the Netherlands and China has mainly comprised differentiated products and the importance of differentiated goods in this trade relation has increased over the past ten years. Namely, the share of differentiated goods in Dutch China trade has increased from 77% in 1996 to 89% in 2006. This is congruent with Nunn's (2006) proposition that countries with good contract environment specialize in industries that rely heavily on relationship specific investments. Nunn shows that the Netherlands has a top 10 position in the world based on the quality of contractual environment. Given this rating it can be expected that the Dutch specialize in goods characterized with high asset specificity.

Ad (ii) Reference Priced Goods

Columns 3 and 4 of table 5 give the estimation results for reference priced goods. The positive effect of the Dutch function of distributor on imports is still positive and significant, although the effect is smaller than displayed in table 3 and columns 1 and 2 of table 5. This indicates that Dutch import of differentiated goods is more sensitive to Dutch distribution activities than import of reference priced goods.

The most interesting changes as compared to the types of goods analysed previously relate to the effects of *FDI* and *VS*. FDI is no longer found to significantly affect Dutch imports from China. Instead it appears that outsourced offshoring has a significant positive effect on these imports. It corroborates the view that the decision of firms to internationally fragmentise production via the hierarchy of via the market depends on the transaction costs resulting from the asset specificity of the traded inputs. The estimation results suggest that Dutch firms tended to offshore production to China via subsidiaries when the traded inputs had a high level of asset specificity, while this offshoring has been via the market in case the products had a medium/low level of asset specificity.

The estimated coefficients for transport costs are substantially higher than those found in table 3 and columns 1 and 2 of table 5. It is consistent with Rauch's (1999) findings that transportation costs matter most for reference priced and homogeneous goods as opposed to differentiated goods.

Ad (iii) Homogeneous Goods

The most salient result of the last two columns of table 5 with estimation results for homogeneous goods is that the coefficient on VS is significant and positive for imports while the coefficient on FDI is not significant. The effect of outsourced offshoring even becomes larger (from 0.43 to 0.51) than in case of reference priced goods. In fact, this variable accounts for 28% of the growth in Dutch imports from China of homogeneous goods during the past ten years, which is similar to Yi's (2003) findings that vertical specialization has accounted for around a third of world trade growth. So it seems that Dutch outsourced offshoring has led to growth in imports from China of homogeneous goods, while the growth of Dutch FDI stocks in China does not seem to have had a significant impact on either imports or exports of this type of goods. The sensitivity of imports with respect to Dutch distribution activities is lower than for the other types of goods. It indicates that the Dutch function as distributor mainly matters for differentiated goods and less for homogeneous goods.

It is also noticeable that the effects of tariffs and transportation costs consistently keep the correct (negative) sign implicating that these variables indeed have an impeding effect on Dutch China trade. It is also interesting to see that the coefficient on the transportation cost variable is larger in the last two columns of table 5, than in its first two columns. It again shows that transportation costs matter most for homogeneous and reference priced goods and less for differentiated goods.

The overall conclusion of this section is that Dutch offshoring to China has indeed significantly and positively affected trade growth between these two countries, namely through imports. The estimation results suggest that Dutch firms have offshored in-house in case of asset specific goods and have offshored via the market in case of homogeneous goods (i.e. not asset specific goods). Dutch FDIs to China seem to have a vertical as opposed to horizontal character and thus have been motivated mainly by production efficiency reasons rather than market proximity reasons. Tariffs appear to have been significant impediments to Dutch exports to China as well as to imports from China, although their contribution to the latter is modest. Moreover, the increased importance of Dutch re-exports has been found to have a significantly positive effect on growth of Dutch imports from China but not for Dutch exports to China.

The effect of declining transportation costs is statistically significant for reference priced and homogeneous goods, but not for differentiated goods. Since transport costs have only declined 7% over the past ten years, the overall economic effect, however, is negligible. Obviously the most sizeable effects, however, stem from Dutch and Chinese GDP growth. The elasticity between Dutch and Chinese GDP growth to import and export growth is close to unity, as theory would suggest. Finally, we have performed a number of robustness tests on our estimation results, which are not presented here. The tests show that the parameters of the model estimates are stable over time and that there is no evidence of heteroscedasticity and autocorrelation.

6 Conclusions

Trade between China and the Netherlands on average has grown 5 percentage points faster (annually) than China's trade with the rest of the world and 4 percentage points faster than China's trade with its main partners in the last decade. Currently, China is Netherlands' fifth largest trading partner and accounts for approximately 8% of total Dutch imports. These imports mainly comprise goods like computers, telecommunication devices and parts and components of computers and office machinery. The export to China looks different and comprises valves, industrial cooling and heating equipment, non-ferrous base metal waste, and chemicals like hydrocarbons, alcohols and phenols.

Outsourcing and offshoring as part of the world wide process of globalization have been major determinants of this strong Dutch China trade growth. From that perspective this paper empirically investigates the determinants of bilateral trade flows between China and the Netherlands. A major finding is that Dutch offshoring to China has indeed had a significant effect on Dutch China trade growth. The effect of FDI on exports is also positive (although not significant), which indicates that the FDI from the Netherlands to China has had a vertical rather than a horizontal character and is thus mainly motivated by cost advantages rather than market proximity. So Dutch firms have moved parts of their production to China and have subsequently been importing intermediate inputs from China. The analysis suggest that Dutch offshoring to China has been mainly in-house rather than via the market. The results are similar to the findings Liu *et.al.*(2001) who also find a positive influence of FDI on trade, but are in contrast with Suyker and De Groot (2006) who state that most Dutch FDIs to China have a horizontal character. The decision of Dutch firms to offshore to China in-house or via the market has been significantly influenced by the asset specificity (and thus by the transaction costs resulting from it) of the traded inputs. More specifically, the results show that FDI (representing in-house offshoring) has a positive and significant influence on the imports of differentiated goods while outsourced offshoring has a positive and significant influence on the imports of reference priced and homogeneous goods. The results indicate that differentiated goods are more sensitive to increases in Dutch re-export activities than homogeneous and reference priced goods. It reflects the fact that most re-exports of the Netherlands comprise differentiated goods.

Obviously the results of this paper can not easily be generalised to other time periods or to different countries. The trade relation of the Netherlands and China is one between two economically and politically dissimilar countries. This relation is likely to have different dynamics than trade between countries that are similar in these dimensions. Also, the comparative advantages of China and the Netherlands are different than conventional advantages in for example high or low skilled labour intensive goods. China for example is (next to low skilled labour intensive goods) adept in assembly while the Netherlands seems to be strong in reducing transaction costs through trade and orchestrating production. Nonetheless, the results strongly indicate that transaction costs matter (especially for trading nations). Knowledge of how transaction costs influence the working of the economy is therefore indispensable in understanding trade growth and the governance structures of multinational firms.

Policy Implications

This knowledge is also useful for policies which aim to foster trade and, through trade, prosperity. Moving abroad parts of actual production, while keeping the coordination and trade function at home can be a good productivity and welfare enhancing strategy for a trading country like the Netherlands. The relative efficiency of the Dutch to reduce transaction costs is an important source of Dutch comparative advantage. It is essential to exploit and maintain such comparative advantages. Therefore policy should stimulate investments in innovations that reduce these transaction costs. Part of these investments, e.g. in knowledge and infrastructure, have the characteristics of a public good (since it is non-rival and non-excludable). In this respect, the relative quality of Dutch institutions is particularly important. The Dutch institutional quality (although quite high) has deteriorated over the past 10 years compared to its main competitors. The Netherlands is having difficulty maintaining this part of its comparative advantage in reducing transaction costs. So institutions which facilitate trade in a globalizing world, should get special attention in government policy.

Further Research

The research of this paper can be extended in several directions. A first direction is to investigate the influence of globalization on bilateral trade flows between several industrialized countries and (other) BRICs (Brazil, Russia, India, China). Here it is of interest to see which comparative advantages these countries have with respect to each other and how these comparative advantages are related to factor endowments, institutional differences and cultural differences. Such analysis should also pay attention to trust and social capital, features which were outside the scope of this study.

From the more narrow perspective of Dutch China trade also some improvements can be made. The effect of transportation costs could be more accurately measured by specifying different transportation costs per product group since they are likely to differ substantially. The same holds for tariff rates. The proxy measuring outsourced offshoring could be improved if it would be possible to extract the part of this proxy that represents in-house offshoring. This would give a more accurate estimate of the affect of outsourced offshoring on trade. More detailed data should be obtained on the trade of intermediate inputs between the Netherlands and China to give a more precise description of Dutch offshoring and outsourcing to and from China. Finally, more research on Dutch re-exports is needed. To adequately assess the added value of re-exports to the Dutch economy, additional data is needed on the costs of the Dutch function as distributor. These costs are crucial in understanding if Dutch focus on re-exports should be increased or resources should be allocated to activities with better cost benefit ratios. However, the costs of re-exports are often neglected in literature, leading to wrong inferences about the economic attractiveness of the Dutch distribution function. Suyker and De Groot (2006) for example note that de margin on re-export is quite low (10%) compared to the margin on domestically produced goods (60%). But the resources used for re-export activities are likely to be modest compared to the resources used for domestic production. Thus the cost benefit ratio of re-exports might be higher than that of domestically produced goods.

The latter suggestions for further research look at Dutch China trade from the perspective of welfare in the Netherlands. Similar further research would be needed to look at Dutch China trade from the perspective of the Chinese economy.

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