Master thesis for Industrial Strategy and Dynamics

‘A Quantitative Investigation in the Determinants of Location Decisions in Global Production Networks’

Abstract

Global Production Networks (GPN’s) have received a lot of attention in theoretical papers, especially in the field of economic geography. The complexity of this concept, due to the dynamic character and the embeddedness in different social and cultural regions, seems to be a barrier for quantitative research on the topic. This paper analyses the three main determinants of GPN’s as provided by the literature, speed, costs and flexibility, by testing the importance of these determinants for the location decisions of firms in different parts of the value chain in different industries. Analysing the location decisions by using these determinants could give an empirical foundation to the mainly theoretical approach of this topic. This evidence is relevant for both academic and policy reasons. If there are certain determinants that drive the location decisions of firms for a particular part of the value chain, then governments could focus their policies in order to attract more FDI investments. Based on the main findings it is questionable whether value chains are globally distributed. Next to that, the findings in this study suggest that the determinants speed and costs seems relevant for location decisions. The relevance of flexibility as a determinant is questionable, though the proxies used in this study may not be optimal measures for flexibility.

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1 – Introduction

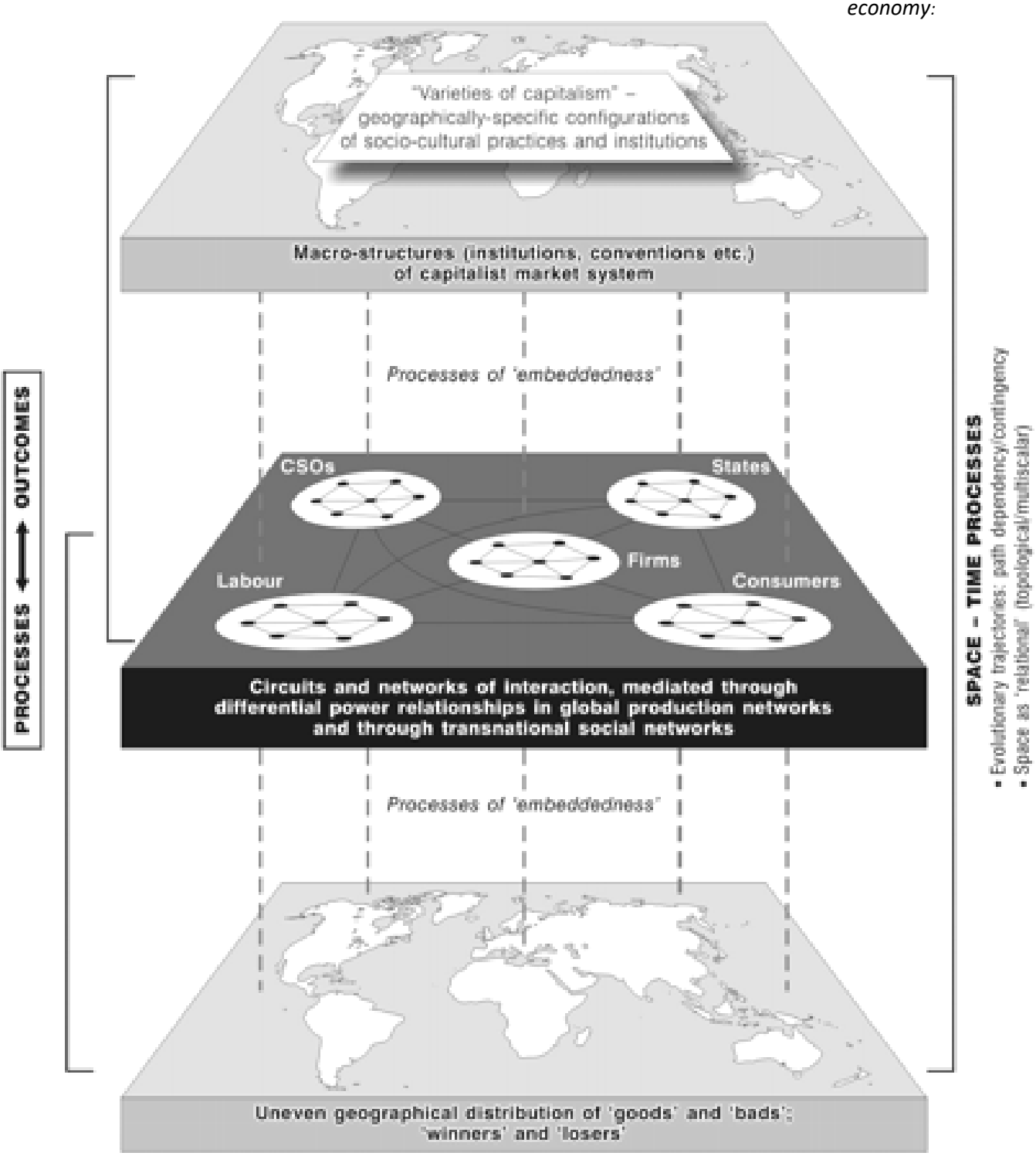
1.1 Defining a GPN

The new 'global economy' is a hot topic and of interest for many policymakers, researchers and managers (Gilpin, 2002). The word *new* points towards the change started in the '80s, where this new era began to develop into what it is nowadays: a global production network (GPN) economy. Defining a GPN is not that easy. First of all a distinction should be made between the GPN approach (which is a way of looking at economic structures) and a GPN in itself. Describing a GPN starts with mentioning that there are multiple GPN's, which could be divided per industry, sector or even parts of both of these. A GPN is seen as network of global value chains (GVCs), but then with some extra dimensions and insides. So a good definition of a GPN starts with defining a GVC, which 'is defined by fragmented supply chains, with internationally dispersed tasks and activities coordinated by a lead firm (UNCTAD, 2013). A GPN is by definition made up of actors from a wide variety of national (and local) environments (Coe, Dicken, & Hess, 2008), and that are socially embedded in those different environments (Coe & Yeung, 2015). The interaction between those separated parts of the value chain and the economic and social context is an essential object for the GPN approach (Figure 1). Figure 1 gives an impression of a GPN and the different layers that are embedded in the concept: the location decision of every part of the value chain, how this effects the region, and how this dynamic process can chance the future location choices.

Each GPN has a range of actors, starting with the *lead firm*, who works with strategic partners (responsible for parts of the value chain) who are working with specialized suppliers for their conglomerates and intermediate goods, but also multi-industrial services as logistics and distribution. Under these specialised suppliers are the general suppliers of raw materials, or essential parts of services. Each GPN has also their own bunch of customers (Coe & Yeung, 2015). A primarily definition of a GPN will be that it is a dynamics network of economic actors that is spread globally, where each part is specialised in a certain part of the value chain, and where all these parts are embedded in and interacting with different social and cultural structures.

In this study a more concise definition is used, due to the measurability of the concept. The theoretical conceptualisation as giving above is intentionally holistic, but difficult to capture entirely in a quantitative model. Therefor the concept as used in this study is narrowed down the location decisions of firms' parts of the different parts of the value chain. So a working definition that is used focusses on where the different parts of the value chain are located, and if speed, costs and flexibility are main determinants in that decision.

***Figure 1**: Graphical representation of a GPN: A heuristic framework for analysing the global economy:*



Source: Adapted form Dicken, 2004

1.2 GPN literature and the problem of quantification

In the academic literature GPNs is a popular subject across various disciplines. Researchers from each discipline take different perspectives in analysing the GPN's. Within the economic geography literature, which is focusing the most on this topic, wants to analyse the determinants in a certain region attractable for FDI. While economics looks into what this global organizational change of economy means for developing countries (Hess & Yeung, 2006; Ernst, 2002). Development economics tries to analyses the influence and opportunities of GPN's for - in particular developing - countries, more in line with the interest of the politician mentioned earlier. The approach of business (economics) researcher - most often in strategy and management and organisations - focusses on how organisations change and what it means for global firms to have their production, or value chain in many separate places, and what the impact is for (the strategy of) the firm (Pietrobelli & Saliola, 2008).

Although GPN's are a popular topic in different research areas, there is in all of these fields a problem. Business strategist (Alcácer, Cantwell, & Piscitello, 2016) are starting with the empirical foundations (mapping locations, ownership structures, international advantages of their eclectic paradigm) of the GPN's, but in the other areas, the empirical evidence is lagging behind. Development economists, such as Gavin Bridge (2008), Barrientos, Gereffi and Rossi (2012), and Milberg and Winkler (2012), are theorizing the implications of GPN's for developing countries, and try to predict the outcomes for their cultural and social environments, but without any empirical evidence. Economic geography, which publishes most about this topic, with researchers as Martin Hess (2006), Peter Dicken (2004), and even the writers of the book about GPN's (Coe & Yeung, 2015) are not able to present an empirical foundation of their claims about the global existence of GPN's. This paper fills this gap in the literature about GPN's, by contributing to this quantitative part of the story. Empirics can help us with answering some of the most vital questions about GPN's. What does the data reveal about the geographical distribution of GPN activity worldwide? And more in depth: what are the main determinants of this new economic structure?

The reason that quantitative papers are scarce has to do with the availability of the data (most of it is disaggregated data) and the holistic concept of GPNs that are used in the literature. Picturing one GPN, in all its versatility, over the whole world is already an enormous job. Be than aware of the fact that one of the main characteristics of GPN's was that it is constantly dynamic, so that it is by definition impossible to capture a GPN in a picture. Not even speaking of the problem of multiple GPN's, so it is possible that there are relation between (parts of) GPN's, which makes it even more complex.

To overcome these problems a particular aspect of GPN's is chosen as topic of interest for this study. This paper looks into the location decisions of MNE's for all the different parts of the value chain, in multiple industries. Therefor the dynamic character and the social interaction are kept out of the analyses. By showing where all the parts of these different industries go (by analysing the FDI investments), and more important, why they go where go (so which country variables are important in the location decision), the main drivers of the GPN's are shown. To do this a global value chain (GVC) perspective is needed (only the location decision is analysed, not the interaction between the socio-cultural environment), which means that it will not show how GPN operates, but how all the separated parts of the value are distributed and what the main determinants of this specific location choice is.

1.3 Content of the paper

The original and unique part of this paper exist in the choice of the determinants of this location choice, which are founded in the more theoretical literature on global production networks. The GPN literature emphasises three main variables that drive the dynamic and global structure of this economic network: speed, costs and flexibility (Coe & Yeung, 2015). Combine these with dynamic determinants as cost-capability ratios (e.g. labour, technological, capital), market development (e.g. reach, access, dominance) and financial discipline (e.g. shareholder pressure, access to finance) and you get a glimpse of the holistic concept of the GPN's. So this combination of the geographical approach (with the empirical focus on location decisions as parts of GVC's) and the theoretical foundation in the GPN literature, makes this thesis a relevant academic addition to the GPN research. Alongside the fact that quantitative research of GPN is scarce, and that this study tills in (a part of) this gap in the academic literature.

Often the scope of the empirical literature is one specific industry or a particular country or region (Yeung, 2009; Sturgeon, Biesebroeck & Gereffi, 2008). This has the advantage of showing all the remarkable details in this the region, industry or these countries. Also, adding more countries or regions to the model, will lead to more heterogeneity to control for, so lesser countries increases the homogeneity of the sample. The disadvantages of this approach is that a broad and descriptive part of GPN's is missing. The literature gives us examples of the automobile industry, the East Asian electronics sector, or cases about China, Taiwan and India (Saxenian, 2010), but these are (only) examples. This paper tries to have a much broader scope: it analyses all the FDI investments from 45 industries, in the recent period (2003-2016). Analysing with such a perspective enables global and descriptive statements about GPN's: the drivers of GPNs, the industries that are more suitable for GPN's, the parts

of the value chain that are more globalized than others, and the countries which are attracting many of the FDI investment, as part of the GPN's.

The main question of this paper is: *How are in the different parts of the value chain in different industries, the determinants speed, costs and flexibility related to the location decision of those parts?* Cutting this main question in manageable parts shows that this main question focusses on location decisions. Another main part of the main question is about the different parts of the value chains, in the different industries. An important question here is: which industries are more globally fragmented or globally developed than others? After that, the value chains themselves will be analysed, where the main question will be about which parts are more suitable for a global division. The distinction between and within the value chains of the industries will be tested in the first two hypotheses, where the third one will be case studies of four industries, where also the economic regions that attract successfully certain parts of these value chains will be analysed. This part combines the insides from the first two hypotheses and applies these towards the location decision in the specific industries. Analysing the determinants of those countries also shows the social relevance of this thesis: if certain determinants are decisive or essential for location decisions, than governments could initiate policies to attract more MNE investments.

The structure of this paper is as follows: in the theoretical framework the concept of GPN's will be analysed more in depth, as well of the determinants of them. The hypotheses will be explained, and placed into a wider perspective of the literature about GPN's. The parts about the data and methodology will explain the dataset, the necessary transformations of the variables, and the choices for the proxies, and the models used in this study. This broad and analytic study concludes that speed and costs indeed are main determinants in the location decisions for the different parts of the value chain. Flexibility as determinant is too hard to measure promptly with this data.

2 - Theoretical Framework

2.1 History of the concept

Adam Smith wrote in the 18th century his magnum opus about the benefits of free trade (Smith, 1776). Some decades later, David Ricardo added his theory of comparative advantages, which meant, in opposition to the absolute (cost) advantages of Smith, that free trade offers the possibility to achieve a more beneficial outcome, when all relative strengths and weaknesses of countries, in relation to the costs of production, are used optimally (Ricardo, 1817). What both of them could not think of is happening two centuries later, even in a more advanced way. In the 17th century the VOC started as the first multinational enterprise (MNE), with stocks and shareholders, and investments towards the other part of the then-known world. They shipped full product to Amsterdam, which became the stockroom of Europe. In the ages that followed the *globalisation* of the world economy increased. The other development was that of the industries itself, especially in the first half of the 20th century. Surprisingly, this era of mass production, also called *Fordism*[1]*,* was largely *national* bounded (Chandler, 1990).The simplistic form of global economy of the VOC evolved from trade of full products into the global shipping to raw materials and components, which ended in the an economy where all parts of the value chain, so not only the physical product but every value adding part, is globally distributed. The world changed into an interdependent space, where goods, services and financial capital flows rapidly (Gereffi, Humphrey, Kaplinsky, & Sturgeon, 2001). The fragmentation of production is expanding more and more (Timmer, Erumban, Los, Stehrer, & Vries, 2014).

The study of this phenomenon started in the '90s with the research of the global commodity chain (GCC), with as major goal to unravel and to understand how industries were organized (Gereffi & Korzeniewicz, 1994). Object of study was/were the kind(s) of relationship(s) of the main actors (i.e. firms) that were involved in the production and distribution of particular goods and services (Bair, 2005). Two major distinctions in international economic networks were made. Firstly the *product-driven* networks, with as famous example the Japanese automobile industry in the '80, which contained 170 first-tier, 4,700 second-tier, and 31,600 third-tier subcontractors (Hill, 1989). The second set of networks was *buyer-driven:* 'industries in which large retailers, marketers, and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries, typically located in the third world' (Gereffi, 1999).

Following up the GCC studies, the global value chain framework (GVC), has as main concern the governance structures within and between different global industry sectors (Gereffi, Humphrey, &

[1] Named after Henry Ford, who started the production line of automobiles in 1903.

Sturgeon, 2005). This approach is often combined with geographical economics, where the focus is on economical and strategical elements, as external environment, specifically agglomeration economies, as determinants of a firms' location decision (Shaver & Flyer, 2000). This research suggests that geographical proximity *between firms,* boosts productivity and therefore creates incentives for co-location, which leads to economic clusters (Marchi, Maria, & Gerrefi, 2017). The paper of Alcacer and Delgado (2015) does exactly that, as it looks into firms' location decisions and takes into account all activities in the value chain. They focus on both the *internal agglomerations* (i.e. economies of scale and scope, intermediate inputs, knowledge sharing) and *external agglomerations* (i.e. institutions, labour regulations, unique (technical) knowledge present in universities) as determinants of this choice. Antras and Chor (2017) choose another perspective, that of the specialization of countries *within* the GVC. This paper touches upon questions as 'in which activities within GVC's are different countries specialising?' and 'what are the determinants of a country's positioning within GVC's?' The underlying idea of these questions is that upstream activities (such as delving of raw materials and manufacturing) take place in low developed countries, due to low labour and material costs (Fally, 2012). The more downstream activities (i.e. R&D, marketing, supplier services) will take place in the more developed countries (MIller & Temurshoev, 2017). In that case, a different place in the GVC points toward the development of a country. The major assumption here is that industries and firms are choosing (rationally) the optimal location for every part of the value chain by means of country determinants, in such a way, that a small change in one of the determinants could lead to a large-scale attraction of FDI. Exactly this assumption of constant dynamics, is one of the key insides of the GPN literature.

The global production network (GPN) framework, combines GCC and GVC insights, and combines this with the more sociological actor-network theory (ANT) and aims to reveal the multi-actor and multi-scalar characteristics of transnational production systems through intersecting notion of *power, value* and *embeddedness*, with a special focus on sub-national regional development and clustering dynamics (Coe & Hess, 2006). An important insight here is the focus on the word *network,* instead of chain, which points towards the non-linearity of this concept, which is inherent with complexity, of both the intra- and extra-firm relations. Next to that the word 'network' gets away from the more material connotation of a chain, which makes it possible to include non-tangible factors, such as knowledge dynamics, and it includes the 'missing links' in the common chain interpretations, such as logistical issues and the role of management consultants (Coe & Hess, 2006). The GPN framework can help us understand the patterns of uneven economic development in a globalizing world (Coe & Yeung, 2015). Although the GPN is, in contrast to GVC, *focussing on sub-national regions, because firms are*

situated in a particular place, not in 'national economies', both approaches are able to include the regional development in their framework of the global economy (Dicken, 2004).

2.2 Determinants in the GPN framework

GPN tries to give *explanations* of patterns of uneven territorial development in the global economy, by using four essential elements: *dynamics, strategies, value capture trajectories* and *regional development outcomes*. This process captures the rapid change from all the relevant factor (dynamics), the strategic (re)action of the firms, and their capability to gain from these changing circumstances, which result in different outcomes for different regions. The story could also start the other way around. The examples of labour (Smith, et al., 2002) shows the multilevel impact of labour migration (for example due to political instability), which is not merely a factor of exchange of location, but influences the region depending the strategic reaction of firms and governments.

This paper focusses on three major determinants: speed, costs and flexibility, as drivers of location choices within GPN's. These three determinants seem to be straightforward, but the literature shows their complexity and broadness. To make it more complex, the determinants overlap in some way. Often concepts are used in the same sentence, pointing towards a different effect. *Speed* not only captures transport time from region A to B (more in the upstream activities), but can also indicate the time-to-market in the more downstream activities. In the more recent literature the cost-capability ratio also includes a major part of speed: the capability to produce in high speed, to get the raw materials in a short period of time or to fix the IT problem in a weekend. Communication and the exchange of knowledge (spillovers) are closely related to 'speed'. *Cost* is for many centuries known as an important factor in economic choices, but in the GPN literature it most often refers to labour costs and transaction costs, which are relevant in the perspective of the international division of labour combined with the unequal distribution of wages, knowhow, skills and human knowledge, throughout the world (Fröbel, 1980). But also production costs, material costs, institutional costs, costs for the raising of finances, are mentioned, again in relation to the cost-capabilities ratio (Coe & Yeung, 2015). Rodrique (2006) points in his paper towards the organisational costs of this global distribution of the value chain, especially the costs due to risk. It is that risk that is related to the last determinant, flexibility. Most and for-all the flexibility tends towards the governmental structure in a country or region, the protection of ownership, ease to start a business or making a legal contract. These determinants are important in a location decision of an MNE. In the GPN literature flexibility also stands for the behaviour and management structure of the firm, given the earlier mentioned element of *value capture trajectories* (Pickles & Smith, 2016). The flexibility and the costs of a firm are also

related due to the geographical and cultural distance: the further a region is away, the harder (and more expensive) it is to start a business there or to manage it from the headquarters (Yusuf, Altaf, & Nabeshima, 2004).

2.3 Hypotheses

The first hypothesis tests if these three theoretical determinants of GPNs are indeed important in firms' location decisions. It tries to chart the state of GPN's in different industries. Next to that, it investigates if the driving forces of the theoretical GPN literature fits the reality of the different industries. The methodology of GVC analyses are used to test the GPN claims. The advantages of this is that it could give the GPN a more solid foundation in the empirics, but has as disadvantages that it only looks into a small part of the GPN themes, namely the dynamics and the strategic choices.

Hypothesis 1: Cost, speed and flexibility are in every industry important determinants in GVC's location choice.

Analysing the industries first is a good preparation for the focus on the global distribution of all different parts of the value chain. The next step is analysing what parts of the value chain are more globally distributed and what the determinants of these choices are. Literature tells us many interesting things about these location choices of firms and the different considerations, which are needed with different parts of the value chain.

First, it makes a distinction between upstream and downstream activities. Ernst and Kim (2002) argue that GPNs typically combine a breath-taking speed of geographic dispersion with spatial concentration: much of the recent cross-border extension of manufacturing and services have been concentrated on a growing, but still limited number of specialized low-cost clusters. This points towards a difference between the time firms are active in a region which depends on the activity in that industry, so the place in the supply chain. The OECD and the World Bank made a report (2014) where they use the GVC metaphor of a ladder, where they say '*The disaggregation of production into separate stages allows their* [as in countries'] *firms not only to find their place on the ladder, but to move up the rungs as their capabilities improve. GVCs encourage that upward movement by rewarding skills, learning, and innovation.'*(OECD, 2014; p 10-11.) The idea here is that a region could climb the ladder by specialising in, and getting 'higher' parts of the value chain over time. That point of profiting from the most ideal combination of costs, speed and flexibility makes this global structure so attractive for firms: '*these networks provide the flagship with quick, and low-cost access to components, subcontracting services and knowledge that are complementary to their own businesses*' (Ernst, 2001); p 1420).

Second, Antràs and Chor (2017) make the point that downstream activities are more often in regions where the final product or service is sold to the consumer, where sectors that sell little to consumers are more likely to be upstream in the value chain. This implies that downstream activities would take place in more developed countries. In a study about the Asian GVC's the authors make the point that Asia was able to increase the number of job opportunities (relative to the rest of the world), but was also able to increase the real income of workers (Kiyota, Oikawa, & Yoshioka, 2016). Improving your capabilities, or specializing in a particular part of the value chain makes your region more productive, but will also lead to higher labour costs, because the workers are more skilled than the relatively cheaper option with lower productivity. Keeping this cost-capability ratio in mind, for some regions investing in higher quality or productivity will be (at least in the short run) could cost them work. Due to the highly dynamic character of GPN's, firms are (theoretically) able to switch to the upstream activities easily.

The second hypothesis tests if the components speed, costs and flexibility are important in the firms' location decision for all the parts of value chain. The expectation is that the industrial components of speed, costs and flexibility are more relevant for downstream activities than for upstream activities.

Hypothesis 2: For the downstream activities in the value chain are speed, costs, and flexibility more relevant than for upstream activities.

The third and last hypothesis dives deeper into the value chains in four chosen industries: financial services, industrial machinery, consumer products and transportation. These case-studies touch upon the differences of the first two hypotheses. The third hypotheses test if these differences are manifest in the location decision of firms in those industries, by connecting the particular determinants to economic regions. The financial industry is a typical example of an industry without (nearly) any physical (production), so we expect here that the downstream activities at this industry are not related to speed (in the sense of transportation-time) and costs (wages and manufacturing). Flexibility and communication seems to be very important, so these determinants should be traceable in the upstream activities of the financial industry (Hoberg & Phillips, 2010). Europe is often seen as the economic region with which is the most flexible, so we expect that the financial industry will be mainly focussed there (Basile, Castellani, & Zanfei, 2008).

Hypothesis 3a: The financial industry will be centred in the economic region Europe, due to the determinant flexibility.

Industrial machinery is a classic example of an industry with a strong focus on physical production (Athukorala, 2011). For transportation speed seems the most important determinant in the downstream activities. The literature is clear about the positive relation between MNE location

decision in industrial machinery and investment in and availability of harbours (Song & Geenhuizen, 2014), roads (MacCarthy, 2013), trains (Martin & Rogers, 1995) and airfields (Khadaroo & Seetanah, 2008). Many studies about location decisions and industrial machinery are case-studies in particular countries or between regions, which makes a comparison between economic regions (as used in this study) in the industrial machinery hard. What most studies have in common is that a well-developed infrastructure improves the changes of attracting parts (mostly downstream activities) of the value chain from the industrial machinery.

Hypothesis 3b: The industry industrial machinery will be centred well-developed regions, due to the determinant speed.

Transportation is not only one of the catalyst of the GPN, it is also an industry in itself, with services not only related to speed, but also strongly to flexibility: '*There is a level of mobility of raw materials, parts, and finished products in a setting which is fairly regulated with impediments such as tariffs, quotas, and limitations to foreign ownership'* (Hesse & Rodrigue, 2006). The literature point towards this combination of determinants as import factors in the location decision in this sector (Rosenhead, Elton & Gupta, 1972; Jayaraman, 1998; Shen, 2006). Especially North America and Europe are economic regions where this combination can be found (Martin & Sunley, 2008), but recent studies are also pointing towards China, Japan, Singapore and Korea (Button, 2010).

Hypothesis 3c: The transport industry will be centred western countries or in South-East Asia, due to the availability of the combination of the determinants speed and flexibility.

Consumer products nowadays, is an industry strongly influenced by internet, which made both the upstream and downstream activities more and more global (Gereffi, 2009). Consumer products is an industry which does not have a strong preference for one specific determinant, where all three the determinants are arguably important in this sector (Zhanga, Vonderemse, & Lim, 2003). The literature tells us that in this industry there are differences between the downstream and upstream activities and the particular determinants. The last hypothesis will test if this is also traceable in the differences in the location decisions of these different parts of the value chain.

Hypothesis 3d: *: The industry consumer products has a globally divided supply chain, due to the different relation between each part and the determinants cost, speed and flexibility.*

The hypotheses 3a-d will focus on economic regions and how they are perform in attracting FDI investments. This does not directly give a causal relation with the three determinants tested in the first two hypotheses, but combining these different models gives an inside in both side of the same medal: where the parts of the value chains go (hypothesis 3) and what drives them (hypotheses 1 and 2).

Together these hypotheses answer the main question of this paper: *How are in the different parts of the value chain in different industries, the determinants speed, costs and flexibility related to the location decision of those parts?*

3 – Data and Methodology

3.1 Data sources and variable description

The dataset for this thesis originates from the database of FDI markets (Financial Times Ltd., 2018) and consist of a large number (203,356) of unique FDI investments from all over the world (252 countries) in the period 2003-2016. It is a combined dataset, because these sets were primary separated in two parts, divided in the periods 2003-2012 and 2012-2016. Prior benefit of this dataset is the availability of the *industry activities* wherein the investments were made, what made it possible to do the GVC analyses. The variable *industrysector* consisted of 39 different industries, whereof 13 are used in hypothesis 1, due to the number of observations. This dataset was provided by the Erasmus University Rotterdam. This dataset tries so give the complete sample of al FDI investments, but is likely incomplete. It is likely that parts of the world with a less strict in documenting all the investments, which leads towards a selection bias. Therefor is chosen for all the investments (147,547) coming from western countries (Europe and North-America), which could lead as well to a selection bias due to preferences or patterns from these regions, but it is less likely that important investments are missing. The problem of sample selection still occurs in the data. In the descriptive statistics can be seen that Africa, Latin America and Asia are underrepresented in the data.

3.1a Dependent variables

For the first two hypotheses the dataset was transformed into a discrete choice dataset, with *investment* as dependent variables. This dependent variable exists of a 1 when an investment took place in that particular country, and had a 0 for all other countries. The third hypothesis uses Economic Region as dependent variable in the multinomial logit model, a variable that consist of 7 Economic Regions: Europe and Central Asia, East Asia & Pacific, Latin America & Caribbean, Middle East & North Africa, North America, South Asia and Sub-Saharan Africa.

3.1b Independents

The independent variables from the first two hypotheses added after the discrete choice model was created. For every determinant (speed, costs and flexibility) three proxies are chosen. For speed *import* (the mean number of days in takes to import a good or agglomerate per country), *log_containers* and log_airpass are used. All three variables come from the WorldBankData and the variables for *containers* (as in number of containers expected per year in the harbours) and *airpass* (as in number of passengers arriving per year in that country per airplane) are transformed into logarithms (WorldBankData, 2018). These three variables together

For *costs,* the cost of labour are used (Feenstra & Hanson, 2001). Data about precise labour cost in each industry is too limited to use, so the *minimal wages* in 2018 are used as fraction for the relative differences in wages per country (Brochu & Green, 2012). Although the minimum wages could differ per sector, it is at least a good scale to compare the labour costs between countries. . The minimum wages from 2018 (adjusted towards $) come from International Labor Organisation. For the other years a proper the minimum wages were untraceable or incomplete. The next proxy (derived from the WorldBankData) for costs is *natural:* the idea is that countries that more rely on their natural resources, also can provide these raw materials for a lower price, which makes them an interesting region for especially downstream activities (Vachon & Klassen, 2008). *Unemployment,* also derived from the WorldBankData, influences the costs on the labour market inversely: an increase of the available workers lowers the costs of them (Helpman & Itskhoki, 2010). What the unemployment rate does not tell, is which people are unemployed in a country at a certain moment in time. That is of course relevant for a firm when a specialised worker, or a particular group of workers is needed for a specific operation. So a subdivision of unemployment per fitting workers per part of the value chain is not possible. The three variables together form a good proxy for the determinant *costs.*

Speed is captured by the variables *log_airpas, log_containers* and *import (*mean number of days to import a good) and are all derived from the WorldBankData and transformed towards logarithms in the case of *containers (*number of containers entering the harbour per year) and *airpas* (number of passengers arrived per airplane per year). Again, these variables focus on the physical production, mostly in downstream activities. The literature about production is clear about the importance of these kind of variables in the location decisions within industries (Olhager, 2003). In the more specialized research programs of the geographical economists, cities and city-networks are objects of interest. Next to the already proven importance for good functioning harbours and airfields (and especially the combination of those) in regions (Mollick, Ramos-Duran, & Silva-Ochoa, 2006), the importance for world cities seems to be even bigger (Derudder & Witlox, 2008). The variable log-airpas captures both the number, seize and effectiveness of airfields in a country. Log_containers covers for harbours their size, logistic performance and accessibility. The correlation between log-airpas and log-containers is also 0.71, which is very high, but in this case that is a good thing: it both stands for the underlying determinant of speed (Table 1).The argument here is that good and valid proxies can be correlated but should be unbiased (Mahnken, Chen, Brown, & Gajewski, 2014).

Table 1: Correlation Table of the Variables

	log_gdpp	log_con	log_air	taxrate	Cor	internet	unemp	min_wage	start	import	legal	natural	educexp	inflation	growth
log_gdpp	1														
log_contai~s	0.3094	1													
log_airpas	0.5228	0.7083	1												
Taxrate	-0.1549	0.0691	0.0326	1											
Cor	0.8449	0.2496	0.3917	-0.2207	1										
internet	0.8283	0.2894	0.3876	-0.0917	0.7997	1									
Unemp	-0.0142	-0.1518	-0.0848	0.1089	-0.037	-0.0133	1								
minimumwage	0.6412	0.2511	0.4233	0.0739	0.57	0.6135	-0.037	1							
Start	-0.4465	-0.1112	-0.1237	0.054	-0.4839	-0.4754	-0.0103	-0.0893	1						
Import	-0.608	-0.2202	-0.2151	0.1467	-0.7004	-0.6653	0.0731	-0.1956	0.5411	1					
Legal	0.013	-0.0439	-0.0066	-0.0921	0.2002	0.0801	-0.0296	0.0336	-0.0999	-0.261	1				
Natural	-0.171	-0.0948	-0.0223	-0.1187	-0.2778	-0.4333	-0.0811	-0.2481	0.1829	0.483	-0.2672	1			
educexp	0.3629	-0.0642	0.0664	0.0781	0.3561	0.4074	0.2754	0.3415	-0.1922	-0.1895	0.0608	-0.1298	1		
inflation	-0.3579	-0.0639	-0.1274	0.1259	-0.4159	0.4042	0.0095	-0.141	0.1972	0.5498	-0.1478	0.3333	-0.1252	1	
Growth	-0.2549	0.0299	-0.1084	-0.0508	0.2101	-0.3534	-0.2767	0.2323	-0.2059	0.2103	-0.0386	0.2911	-0.3227	0.0734	1

Flexibility is maybe the most debatable determinant to find good proxies for. The term itself is what Wittgenstein would call a family-resemblance: most people are able to list some synonyms, and maybe even some variables which could measure flexibility for a bit, but finding a satisfying variable is hard. The variables *legal, corruption* and *number of days to start a business* are all variables (derived from the WorldBankData) that focus on the government, the circumstances and the functioning of the political and legal climate. This determinant *political institutions* is proven to be important in the location decisions of MNE's (Bénassy-Quéré, Coupet, & Mayer, 2007) but is hard to measure. The choice for focussing on the bureaucratic side for firms of this determinant, with the variable number of days to start a business, captures at least a part of the flexibility of a country that firms need to take into account while making a location decision. Adding corruption as proxy could be explained in two ways: '*Favours can be positive or negative elements of the business environment. On the one hand, favours can facilitate extant business transactions or trigger ones that would not otherwise occur. On the other hand, they can lead to inefficient outcomes, since decisions may not be made based on the underlying capabilities of market participants'* (Mudambi, Navarra, & Delios, 2013*; p4).* Here the choice for corruption was done because it is often seen as a *soft* determinant for managers: it stands for many things in a country, such as work-ethics or reliability of the government(al system) (Carter, Maltz, Maltz, Goh, & Yan, 2010). Interesting for this paper is that corruption is often associated in the literature with transaction costs (Wei, 2001) and the correlation with especially minimum wage (which is used in this study as proxy for costs) is also high (0.57), although the expected relation is the other way around, that a low minimum wage would be correlated with more corruption. The variable used for corruption (*corr*) is the CPI index from the publications of the organisation Transparency International which publishes every year on a 0-100 scale the performances of the countries (Transparency International, 2018). In the years 2002-2007 they used a different scale, so the performances of 2008, where used as a fraction for those years. The variable *legal* (measured by the CPIA method in a 0-12 scale) stand for the strength of the legal rights in a country and was chosen because of the protection of property rights is essential for firms to even consider a location (Coeurderoy & Murray, 2014). For both upstream and downstream activities this essential condition is needed, and is often related negatively with flexibility of the labour market (Javorcik & Spatareanu, 2005), but in correlation table this effect is small (0.0366 correlation with minimum wage). Considering the availability of variables, these three form together a solid proxy for the determinant *flexibility.*

The third hypotheses has the different parts of the value chain as dependent variables. This division of the value chain was already present in the original dataset.

3.1c Control Variables

The first two hypotheses are tested in a model where next to the independent variables some control variables were added, to improve the quality of the model and to prevent for confounding variables. Most of these control variables are derived from the World Bank (WorldBankData, 2018). GDP per Capita (*gdpp*), GDP growth (*growth),* unemployment rates as percentages of the labour force (*unempl),* inflation in percentages *(inflation),* the number of internet connection points per 1 million people *(internet),* percentages of a countries government budget spend on education *(expeduc),.* The variable *gdpp* is transformed into logs, to take into account that the huge numbers from those variables do not skew the outcome of the models. The corporate tax rates come from the KPMG database (KPMG, 2018).

3.2 Descriptive Statistics

Are the industries really global? This question is one of the first questions that arises, even before analysing the determinants of firms' location choices. Most of the investments (57.5%) go to the economic regions Europe & Central Asia (43.9%) and North America (13.7%). The Pacific (20.0%) gets also an important share of the investment, but the other regions get minor shares (Latin America 9.0%, Middle East and North Africa 5.4%; South Asia 5,9%; Sub-Saharan Africa 2.6%). Keeping in mind that these are only the investments from the western countries and that this dataset is (only) a sample of all the investments made worldwide, the question raises if the world is indeed as globally structured as often said, although this problem could also be inherent to this dataset.

The literature gave more rise to the conclusion that different parts of the value chain were divided globally (Pietrobelli & Rabellotti, 2011). The influence and strategies of firms in local clusters in relation to globally operating firms has been subject of much research, and the conclusions are multiple and inconclusive, but most people agree on the fact that the global value chain exists (Humpfrey & Schmitz, 2000). The dataset shows some important insights about this point (Table 2). Firstly that the number of investments differ per part of the value chain. Service centres (SSC), education and training (E&T) and technical support centres (TSC) and of course maintenance are parts of the chain where rarely no investments take place. For maintenance and technical support this is not surprising, though the objects of these parts are at the already existing buildings and systems. But service centres and education can be done far away from the 'home country'. The next thing that is noticeable is that the part Design, Development and Testing (DDT) is very Asia-centred, and that Headquarters (HQ) if they move outside a western country also go there. Striking is also that East Asia and the Pacific as a region in total, gets as many investments as North-Africa, Sub-Saharan Africa, Latin America and the

Caribbean and South Asia combined(!). In a more in depth look per country, the idea could rise that GDP per capita is still one of the most important factors, considering the fact that from the 30 countries that conceive more than 1000 investments are all very well-developed countries, except from Thailand and India, which are known for their attractiveness due to low costs and high capacity (Saxenian, 2010).

Analysing the downstream activities as extraction, manufacturing, maintenance, construction and logistics shows that in these parts of the value chain, the industry is more equally divided over the economic regions. Especially the pure downstream activity of extraction, which is the only part of the value chain where most of the investments not go to Europe and Central Asia. The upstream activities strikes that East Asia and the Pacific is catching up North America, and sometimes even passed them. Also in the upstream activities Europa and Central Asia is the big gainer of the investments. This could also be due to a problem in representativity of especially Latin-America and Africa in the data.

Table 2: The number of investments per Economic Region divided by industry-activity

	BS	Cons	CCC	DDT	E&T	Elec	Extrac	HQ	IT	Logi	Maint	Manu	Recy	R&D	Retail	SSC	SMS	TSC	Total
Economic Region																			
East Asia & Pacific	5,394	635	371	1,722	410	164	337	1,337	556	1,367	379	6,165	36	690	941	159	8,409	179	**29,291**
Europe & Central Asia	10,393	2,716	780	2,786	457	1,254	393	2,927	1,381	4,697	626	12,859	243	920	4,626	495	16,388	361	**64,302**
Latin America & Caribbean	1,589	497	292	449	96	396	546	250	333	686	147	3,731	38	128	599	97	2,640	74	**12,588**
Middle East & North Africa	2,096	413	80	276	166	80	150	341	68	336	126	1,044	37	90	209	13	2,331	25	**7,881**
North America	3,857	243	365	877	126	258	128	1,588	360	1,217	249	4,173	87	281	1,074	61	4,934	62	**19,940**
South Asia	1,210	201	143	1,376	200	98	51	162	139	309	105	2,004	9	320	163	201	1,898	129	**8,718**
Sub-Saharan Africa	836	77	38	88	65	132	343	77	93	184	56	693	5	25	120	5	906	16	**3,759**
Total	**25,375**	**4,782**	**2,069**	**7,574**	**1,520**	**2,382**	**1,948**	**6,772**	**2,930**	**8,796**	**1,688**	**30,669**	**455**	**2,454**	**7,732**	**1,031**	**37,506**	**846**	**146,479**

3.4 Methodology and Models

Hypotheses one and two are tested with the use of a conditional logit model (CLM), where the third one make us of the multinomial logit model (MLM). Both CLM and MLM are discrete choice models used to analyse the choice of an individual among a set of J alternatives (Hoffman & Duncan, 1988). CLM is often used for analysing the location decision of firms (Devereux, Griffith, & Simpson, 2007). MLM is used in the third hypotheses as a way to compare the different performances of the economic regions in attracting parts of the value chain. In the case of CLM the *dependent variable* is the binary variable *investment*, which shows in which country in each set of 147 possibilities, the investment take place. The individual that chooses in both the models are the firms. The independent variables are the variables used for the determinants speed, costs and flexibility and the control variables are the country variables *log_gdpp, growth, tax, internet, educexp and inflation*.

The MLM is used for the third hypotheses, and compares the different economic regions. In the case studies the four different industries are analysed and the MLM model shows where the different parts of the value chain are more likely to go. The comparison between these economic regions in how they are able to attract these parts of the value chain, gives inside in how these industries are structured. Here the dependent variable is the economic region and the independent variable the different parts of the value chain.

The important assumptions for the CLM and MLM (McFadden, 1974) is that of the independence from irrelevant alternatives (IIA). This assumption implies that the probability ratio of individuals (so the firms) choosing between (at least) two alternatives does not depend on the availability or attributes of the other alternatives. In geographical economy the IIA violation is often a problem (Boschma & Frenken, 2011). In the paper of Guimaraes, Figueiredo & Woodward (2004) is argued that the research in industrial location decisions have been unable to accommodate the IIA problem fully within the CLM. Also the assumption that firms have the same preferences (or that their preferences depend on observable characteristics), is quite problematic.

4 – Results

4.1 Results of the Industries

The outcomes of the conditional logit model are presented in Table 3 and in Table A3. Table 3 presents a selection of four industries, because these industries show the most interesting results. Communication, Food and Tobacco, Industrial Machinery and Textile, while Table A3 presents all the industries with more than 1000 unique investments. The determinants for speed, costs and flexibility are presented each with their three proxies, and followed with the control variables. For *speed* the proxy log-airpas has in each industry a positive and significant (at 1%) effect on location decisions, which means that a higher number of passengers in a country, which stood more used (and probably better organised) airfields, increase the probability of attracting FDI investments in that country. Log-containers has in nearly every industry the same effect. The relevance of days to import is more divided. The industries in Table 3 show a positive and significant effect (at 5%) for consumer products, food and tobacco, industrial machinery, but this effect is for all other industries not significant (Table A3).[2] The exception on that is the automobile industry that shows a negative and significant effect from import on the location decision (Table A3).

For *costs minimumwage* is sometimes insignificant (automobile, chemicals and metals) and is negative and significant (1%) for all other industries except for food and tobacco (negative at a 5%-level) and positive (at 1%) for textiles. This last industry is remarkable, because this means that a higher minimum wage would increase the possibility of attracting FDI, which is not directly where this industry is known for. *Natural* always has a negative effect, and is in each industry significant, although the level of significance varies. *Unemployment* is insignificant in five industries and increases the probability of attracting FDI in other industries. This means that a higher unemployment rate indeed attract FDI investments, which is in line with the expectations. A higher unemployment rate points toward enough supply on the labour market, which lowers the price of labour

The determinant *flexibility* shows some interesting things about the industries. Coal and Oil (Table A3) is attracted to countries with lower legal rights, and corruption is very often an insignificant variable. Chemicals and Metals are attracted to countries with a higher rate of corruption. Overall flexibility shows that it is a determinant that is hard to measure with the variables that are used here in this paper. For the industries Business services, Financial services, metals the variables seems to fit quite well, but for example Coal and Oil is insignificant at nearly all three variables. The control variables are

[2] The exception on that is the automobile industry that shows a negative and significant effect from import on the location decision (Table A3).

(except for inflation and educexp) overall significant (at different levels between 1-10%) and with the expected signs.

The first hypotheses '*Cost, speed and flexibility are in every industry important determinants in GVC's location choice',* should be partially rejected. Costs and speed seems to be important in nearly every industry, but flexibility is hard to measure with the variables used in this study. So the quantitative evidence for that last determinant is still missing.

Table 3: Determinants Location Choices per Industry (Conditional logit)

	Com	**F&T**	**IM**	**Text**
Speed				
Log_containers	0.227***	0.209***	0.028	0.128***
	(0.028)	*(0.038)*	*(0.028)*	*(0.046)*
Log_airpas	0.675***	0.548***	0.724***	0.683***
	(0.026)	*(0.038)*	*(0.032)*	*(0.046)*
Import	0.016**	0.019**	0.017**	0.009
	(0.007)	*(0.008)*	*(0.008)*	*(0.012)*
Costs				
Unemp	0.014***	-0.006	0.014**	0.043***
	(0.005)	*(0.006)*	*(0.006)*	*(0.006)*
Natural	-0.020***	-0.051***	-0.036***	0.031***
	(0.005)	*(0.011)*	*(0.006)*	*(0.011)*
Minimumwage	-0.001***	-0.000**	-0.000***	0.000***
	(0.000)	*(0.000)*	*(0.003)*	*(0.000)*
Flexibility				
Legal	0.056***	0.110***	0.062***	0.098***
	(0.010)	*(0.013)*	*(0.011)*	*(0.014)*
Cor	0.008**	0.012***	0.007**	-0.003
	(0.003)	*(0.005)*	*(0.003)*	*(0.004)*
Start	0.003*	0.007***	0.001	0.020***
	(0.002)	*(0.002)*	*(0.002)*	*(0.002)*
Controls				
Log_gdpp	0.181**	0.045	0.201***	-0.284**
	(0.073)	*(0.098)*	*(0.075)*	*(0.129)*
Growth	-0.052***	-0.028**	0.014	-0.012
	(0.011)	*(0.012)*	*(0.010)*	*(0.015)*
Inflation	0.041***	0.016	-0.002	-0.029*
	(-0.011)	*(-0.011)*	*(-0.011)*	*(-0.016)*
Educexp	-0.154***	-0.107***	-0.023	0.065*
	(0.028)	*(0.034)*	*(0.028)*	*(0.037)*
Taks	-0.023***	-0.019***	-0.021***	-0.051***
	(0.005)	*(0.006)*	*(0.005)*	*(0.006)*
Internet	0.014***	0.017**	0.015***	0.048***
	(0.005)	*(0.007)*	*(0.005)*	*(0.007)*
Observations	20880	9561	15637	11297

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4.2 Results of the different parts of the value chain

After investigating the differences between industries the next step is the results of the value chains themselves, presented in Table 4 and Table A4. Here again the most remarkable results in outcomes (in the sense of significance and unexpected outcomes) are presented here in Table 4, where the full Table A4 could be find in the appendix. The first column shows the overall outcomes, with all significant variables, at a 1% level and the expected signs. Analysing the outcomes of the conditional logit regarding the different parts of the value chain shows that speed is nearly everywhere significant and positive, although the days to import in some parts is irrelevant. Which is not a remarkable outcome for some parts, just as R&D, ICT and Business to Business, Design and Testing (what should the physically import or export), but it is remarkable for logistics and retail, which is a quite physical part of the value chain. One possible explanation for this could be that other factors (such as location and marketing) are nowadays more import than the physical factors of these industries. Another option is the belief of firms that they could organize a better distribution channel by themselves.

For costs, the unemployment has a positive and significant effect at a 1% level) for all the labour-intensive parts of the value chain, except for the part of constructions. Headquarters, ICT and R&D, the more high-educated parts of the chain, does not follow this path, which indicates that the comment about the distribution of the unemployment per education level, was probably useful. The bunch of the unemployed people will be low-educate, which has a positive effect for the labour costs for low-educated workers, but this does not say a thing about the high-educated labour costs. Natural and minimum wage seems very useful variables in this model, although little distinction is made by them between the parts of the value chain.

Flexibility is again hard to measure, and seems more important in the downstream activities, by looking at days to start a business. But the other proxies do not show us a clear difference between these upstream and downstream activities. Corruption is also here a versatile variable. What stands out is that the differences between the parts of the value chain are mostly made between the significance of the variables, not between the signs of them. This seems to be surprising, but it is not. For example the relevance of availability of raw materials in a country, is irrelevant for ICT, while it is significant for manufacturing. But this is a different thing then claiming that the availability of these materials should have a negative effect on the location decision for ICT. So not the signs in this table are the point of interest, but the significance of the variables, which are related to the existence of a relation between those variables and the location decision of the particular parts of the value chain.

Coming back to the second hypothesis '*For the downstream activities in the value chain are speed, costs, and flexibility more relevant than for upstream activities.',* it is possible to see the differences

between the upstream and downstream activities, but it goes too far to say that flexibility is more relevant for downstream than for upstream activities. Some of the proxies for costs and speed are indeed more focussed on upstream and downstream activities, but there is no ground to say the determinants costs, speed or flexibility as a whole determinants are more related to those particular parts of the value chain. So hypothesis two should be rejected.

Table 4: Determinants Location Choices per part of the value chain (Conditional logit)

	Total	BS	DDT	ICT	Manu	S&M
Speed						
Log_containers	0.179***	0.212***	0.140***	0.302***	0.127***	0.178***
	(0.006)	*(0.015)*	*(0.037)*	*(0.074)*	*(0.016)*	*(0.013)*
Log_airpas	0.645***	0.636***	0.619***	0.756***	0.621***	0.657***
	(0.006)	*(0.014)*	*(0.035)*	*(0.072)*	*(0.017)*	*(0.012)*
Import	0.006***	0.004	0.020*	0.021	0.001**	0.008***
	(0.001)	*(0.004)*	*(0.011)*	*(0.021)*	*(0.003)*	*(0.003)*
Costs						
Unemp	0.013***	0.016***	0.014**	0.010	0.008***	0.020***
	(0.001)	*(0.003)*	*(0.007)*	*(0.013)*	*(0.003)*	*(0.002)*
Natural	-0.024***	-0.013***	-0.036***	-0.012	-0.031***	-0.020***
	(0.001)	*(0.003)*	*(0.010)*	*(0.018)*	*(0.003)*	*(0.003)*
Minimumwage	-0.000**	-0.000***	-0.001***	-0.000**	-0.000***	-0.001***
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Flexibility						
Legal	0.063***	0.052***	0.088***	0.069**	0.067***	0.062***
	(0.002)	*(0.005)*	*(0.014)*	*(0.028)*	*(0.005)*	*(0.004)*
Cor	0.002**	0.003	0.010**	0.005	0.000	-0.000
	(0.001)	*(0.002)*	*(0.004)*	*(0.008)*	*(0.002)*	*(0.001)*
Start	0.003***	0.003***	0.025	0.005	0.001*	0.003***
	(0.000)	*(0.001)*	*(0.002)*	*(0.004)*	*(0.001)*	*(0.001)*
Control						
Log_gdpp	0.194***	0.119***	0.341***	0.391*	0.231***	0.305***
	(0.020)	*(0.037)*	*(0.101)*	*(0.206)*	*(0.040)*	*(0.032)*
Growth	-0.004**	0.009	-0.032**	-0.079***	-0,007	0,003
	(0.002)	*(0.005)*	*(0.013)*	*(0.027)*	*(0.006)*	*(0.005)*
Inflation	0.032***	0.048***	0.046***	0.027	0.017***	0.037***
	(0.002)	*(0.006)*	*(0.016)*	*(0.032)*	*(0.005)*	*(0.005)*
Educexp	0.001	0.003	0,021	-0.143**	-0.007	0.002
	(0.006)	*(0.015)*	*(0.037)*	*(0.066)*	*(0.016)*	*(0.013)*
Internet	0.020***	0.028***	0.019***	-0.005	0.008***	0.024***
	(0.001)	*(0.003)*	*(0.006)*	*(0.014)*	*(0.026)*	*(0.002)*
Observations	2,545,467	100,189	8,564	3,643	85,031	193,604

Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

4.3 Case studies

The hypotheses tested at the case studies look into the geographical distribution of the parts of the value chain in these industries. In the industry financial services are most of the investments (in total) done in Europe and Central Asia (Table A5.2). When looking more in depth, we see that Sales, Marketing and Support (SMS) in this industry is more likely to chose a location in East Asia & Pacific, Latin America and South Asia, all relative to Europe and Central Asia (significant at a 1% level). Hypotheses 2 showed that flexibility for this part of the value chain is important (Table 4), so this is not what was expected in hypothesis 3a. This result could be explained the fact that SMS is a part of the value chain that is bounded to a physical location: people in Latin America want to speak to a person there if they have problems with their loans, or want to speak to an advisor if they need a new mortgage. Notice that the regions Middle East & North Africa (at a 10% level) and Sub-Saharan Africa (at a 5% level) are less likely to attract SMS relative to Europe and Central Asia in this industry. This could indicate that the overall performance of these regions (in terms of GDP and growth) are important for this part of the value chain are an important determinant. That the Service and Support Centres are more likely to be placed in South Asia relative to Europe and Central Asia (significant at a 1% level) is not even surprising anymore, while it is known that most of these activities are heading towards India. That headquarters are more likely to go to North America (significance at a 5% level) relative to Europe and Central Asia is in line with hypothesis 3a. That North America is more likely to attract Customer Contact Centres relative to Europe and Central Asia (significant at a 1% level) is also in line with this hypotheses. From the parts of the value chain that had enough observation the hypotheses 3a, stating that '*The financial industry will be centred in the economic region Europe, due to the determinant flexibility*' cannot be rejected fully. We should keep in mind that some countries are over, and other are underrepresented in the data, as can be noticed from the differences in SE's and the great differences in the magnitudes of the outcomes (for example -15.83 for SSC in SS-Africa).

Table 5.1 MNL Economic Regions Financial Services (relative to Europe & Central Asia and BS)

	EA & P	LA & C	ME& Naf	N Am	SA	SS-Africa
CCC	-0.15	-0.07	-0.94**	0.83***	0,33	-2.01**
	(0.23)	(0.36)	(0.46)	(0.18)	(0.36)	(1.01)
Headquarters	-0,17	-0.58*	-0.08	0.31**	-0.38	-0.00
	-0,17	-0,32	(0.22)	(0.15)	(0.35)	(0.28)
SMS	0.45***	0.60***	0.07	-0.15*	0.79***	-0.45***
	(0.07)	(0.10)	(0.10)	(0.09)	(0.11)	(0.16)
SSC	0.16	-0.41	-1.38**	0.26	1.70***	-15.82
	(0.22)	(0.43)	(0.59)	(0.27)	(0.22)	(1.03)
Constant	-0.93***	-2.04***	-1.76***	-1.14***	-2.43***	-2.29***
	(0.03)	(0.05)	(0.04)	(0.03)	(0.06)	(0.05)
Observations	10.992	10.992	10.992	10.992	10.992	10.992

Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Hypothesis 3b looks into the Industrial Machinery sector, and stated that most of this industry would be centred in well-develop countries, due to the high-developed transportation capabilities, which is important for this industry. The outcomes are mostly not significant, so an interpretation is quite hard (Table A5.3). The numbers of observation in the separated parts are often quite low, but overall most investments take place in western countries, except that China and India are well-represented (Table A5.1).

Hypothesis 3c is about the transport industry, which was expected to be centred in western countries and South-East Asia, due to the combination of the determinants speed and flexibility. With this sector also the number of observation was a problem, so that only Sales, Marketing and Support could be compared to logistics (Table 5.2). The outcomes show that SMS is more likely not to be centred in western countries, were all the outcomes are positive and significant (at 1% level) for non-western countries. This is an interesting and unexpected outcome and not in line with the expectations. Here again, his could be due to the availability of this part of the value chain in the data. It is also possible that SMS is again a necessity in a foreign country to work there. This is not unlikely that a small truck service, storehouse or office is a kind of necessary condition to work in that country, as part of your supply chain. Although this is an interesting outcome, the data is not sufficient to draw some general conclusions.

Table 5.2 MNL Economic Regions Transportation (relative to Europe & Central Asia and logistics)

	EA & P	LA & C	ME& Naf	N Am	SA	SS-Africa
SMS	0.67***	0.38***	0.70***	0.10	0.90***	1.38***
	(0.07)	(0.10)	(0.12)	(0.09)	(0.12)	(0.18)
Constant	-1.27***	-1.96***	-2.59***	-1.67***	-2.76***	-3.70***
	(0,05)	(0.06)	(0.08)	(0.05)	(0.09)	(0.14)
Observations	6,204	6,204	6,204	6,204	6,204	6,204

Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Hypothesis 3d looked into the industry consumer products. In this industry the expectation was that due to the different characteristics of the parts of the value chain, these parts would take place all over the world (with specific preferences for each part of the value chain, but not for the whole value chain of this industry). The outcomes seems to be as expected. For the logistics it is less likely to go to countries with East Asia & Pacific, Latin America & Caribbean, and Middle East & North Africa (all significant at 1%) relative to Europe and Central Asia. The manufacturing seems to take place more often in Latin America and South Asia (significant at 1%) relative to Europe and Central Asia, which could be due to lower wages in those regions. This could also be the reason that North America shows a negative coefficient in manufacturing, relative to Europe. For retail Europe is the most important place, all the other regions show (if they show a significant effect) a negative coefficients, which means that it is less likely that an investment in retail will take place there. Table A5.1, which shows the specific countries that attract many investments, shows that the consumer products are some (mostly western) countries that attract in many different parts of the value chain, but what is most clear is that this industry is indeed globally distributed. So this hypothesis cannot be rejected.

Table 5.3 MNL Economic Regions Consumer Products (relative to Europe & Central Asia and headquarters)

	EA & P	LA & C	ME& Naf	N Am	SA	SS-Africa
Logistics	-0.69***	-0.18	-2.78***	-0.19	0.40	-0,88
	(0.22)	(0.39)	(0.78)	(0.20)	(0.50)	(0.77)
Manufacturing	0.06	1.25***	-0,18	-0.61***	1.49***	0.52
	(0.20)	(0.35)	(0.38)	(0.20)	(0.47)	(0.63)
Retail	-0.62***	0.26	-0.70*	-0.58***	0.01	0.14
	(0.20)	(0.35)	(0.37)	(0.18)	(0.48)	(0.61)
SMS	-0.10	0.57	0.07	-1.02***	0.62	0.33
	(0.20)	(0.35)	(0.37)	(0.21)	(0.49)	(0.64)
Constant	-0.98***	-2.42***	-2.42***	-0.73***	-3.11***	-3.62***
	(0.18)	(0.33)	(0.33)	(0.17)	(0.46)	(0.59)
Observations	4.309	4.309	4.309	4.309	4.309	4.309

Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

5 – Conclusion and Discussion

The main question of this paper was '*How are in the different parts of the value chain in different industries, the determinants speed, costs and flexibility related to the location decision of those parts?*' This paper tried to find the empirical foundation for the claim made by the researcher in (mostly) economic geography about the main determinants of GPN's. As seen in hypothesis 1 which looked into the differences between industries, costs and speed are indeed important in the location decisions of firms, while the determinant flexibility was not that clearly perceptible. In the value chains themselves the difference between downstream and upstream activities could be made for speed and costs, especially for the more physical proxies for these determinants, but again the empirical proof for the same claim about flexibility was not found. The case studies showed that investments in these industries are often centred in Europe and Central Asia. Where some particular parts of the value chain where headed towards regions that has particular capabilities in terms of costs, speed and flexibility. A causal relation between these two parts (the first two hypotheses and the third one) is not what the models where showing, but it showed at least a likely connection between those two relations.

Questions about the global distribution of the value chains are risen during this study (the big majority of the FDI investment still goes to the high developed countries), and it seems to be that essential parts of the value chain are located in a certain region, where the surrounding activities will end up as well. That this type of specialisation pays off is seen in the cases of Mexico, Romania, Angola and Egypt. Also, the determinants speed and cost are important for the location decisions of the different parts of the value chain, and can therefore be seen as determinants of GPN's. Flexibility is a determinant that has more theoretical explanatory value than an empirical foundation. This paper tries to fill the quantitate gap in the GPN literature, by testing the determinants. Many aspects of GPN's, such as the network relations between the parts of the value chains and the embeddedness in the social and cultural regions, is not analysed in this research. The conclusion that speed and costs are main determinants in the location decision, is a valuable finding for both policy reasons as well as for further research. This study tried to find proxies for the determinants speed, costs and flexibility. Policy makers could do the same thing and try to improve particular parts in their country, related to these determinants. This is where this study can be connected with the literature concerning development economics and the studies of geographical economics. Here the importance of these determinants for location choices is shown, where the two other fields show more precisely how particular variables could influence FDI investments and through that the economy of a region or country.

5.1 Limitations and Recommendations

A major problem is the measurability of the intrinsic holistic concepts from the GPN literature: in particular the determinants speed, costs and flexibility. When studying a particular industry or regional cluster, the choice for the variables which cover the concepts costs, speed and flexibility is more precise. In the more capital intensive industries, the costs (i.e. machinery and raw materials) are different from the more knowledge-driven industries (i.e. financial services). When studying a particular industry the choice of variables can fit reality very well. This thesis has a more general approach, which results in more general, and sometimes less fitting, variables for the components. The choice of the same variables for all the industries enables us to compare different industries and industry-activities, which is the major approach of this study. This approach comes with the cost of being not as precise as particular case studies could be. The choice of the proxies for the determinants is therefore one of the main debatable parts of this paper. Although they are founded in the GPN literature and economical reasonable, it still is a weak point of this research. As seen in the previously described results, flexibility is often not significant in the data. And flexibility is a determinant that is hard to measure. The theoretical concepts of the GPN literature are more holistic than the models in this paper could measure. That is the cost of doing a descriptive investigation about GPN's: there is a high heterogeneity of the variables. Flexibility could be a determinant that lies more at the actors of the GPN's, than at the regions. While this paper was focussing on the location decisions, this part is totally untreated in this research.

Clustering the firms in the conditional logit would improve the quality of the models. Also the size of the investment is in this choice dataset ignored, which could give an inaccurate representation of the global distribution of the value chains. The IIA violations in the conditional logit model are seen as problematic, which could be tested by a Hausman specification test, or a Probit Model, which is less sensitive for this violation, but logit models are more general used in location decisions. Also the choice for western countries as source-country could influence the results.

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Appendix

Table A1: Correlation Table of the Variables

	log_gdpp	log_con	log_air	Taxrate	cor	internet	unemp	min_wage	start	Import	legal	natural	educexp	inflation	growth
log_gdpp	1														
log_contai~s	0.3094	1													
log_airpas	0.5228	0.7083	1												
taxrate	-0.1549	0.0691	0.0326	1											
cor	0.8449	0.2496	0.3917	-0.2207	1										
internet	0.8283	0.2894	0.3876	-0.0917	0.7997	1									
unemp	-0.0142	-0.1518	-0.0848	0.1089	-0.037	-0.0133	1								
minimumwage	0.6412	0.2511	0.4233	0.0739	0.57	0.6135	-0.037	1							
start	-0.4465	-0.1112	-0.1237	0.054	-0.4839	-0.4754	-0.0103	-0.0893	1						
import	-0.608	-0.2202	-0.2151	0.1467	-0.7004	-0.6653	0.0731	-0.1956	0.5411	1					
legal	0.013	-0.0439	-0.0066	-0.0921	0.2002	0.0801	-0.0296	0.0336	-0.0999	-0.261	1				
natural	-0.171	-0.0948	-0.0223	-0.1187	-0.2778	-0.4333	-0.0811	-0.2481	0.1829	0.483	-0.2672	1			
educexp	0.3629	-0.0642	0.0664	0.0781	0.3561	0.4074	0.2754	0.3415	-0.1922	-0.1895	0.0608	-0.1298	1		
inflation	-0.3579	-0.0639	-0.1274	0.1259	-0.4159	0.4042	0.0095	-0.141	0.1972	0.5498	-0.1478	0.3333	-0.1252	1	
growth	-0.2549	0.0299	-0.1084	-0.0508	0.2101	-0.3534	-0.2767	0.2323	-0.2059	0.2103	-0.0386	0.2911	-0.3227	0.0734	1

Table A2.1 : Determinants Location Choices per Industry

	Auto	BS	Chem	Coal&Oil	Com	CP	FS	F&T	IM	Metal	S&IT	Text	Trans
Speed													
log_containers	-0.133*	0.186***	0.145***	0.227***	0.227***	0.195***	0.186***	0.209***	0.028	0.222***	0.224***	0.128***	0.170***
	(0.076)	*(0.016)*	*(0.041)*	*(0.065)*	*(0.029)*	*(0.053)*	*(0.019)*	*(0.038)*	*(-0.028)*	*(0.058)*	*(0.016)*	*(0.046)*	*(0.027)*
log_airpas	0.662***	0.669***	0.463***	0.658***	0.675***	0.471***	0.642***	0.548***	0.724***	0.702***	0.645***	0.683***	0.597***
	(0.086)	*(0.015)*	*(0.044)*	*(0.084)*	*(0.026)*	*(0.049)*	*(0.020)*	*(0.038)*	*(0.032)*	*(0.059)*	*(0.013)*	*(0.046)*	*(0.030)*
Import	-0.033**	-0.002	-0.013	0.007	0.016**	0.031**	0.018***	0.019**	0.017**	-0.005	0.013***	0.009	0.014**
	(0.014)	*(0.004)*	*(0.009)*	*(0.012)*	*(0.007)*	*(0.012)*	*(0.005)*	*(0.008)*	*(0.007)*	*(0.009)*	*(-0.004)*	*(0.012)*	*(0.006)*
Costs													
Unemp	0.024**	0.017***	0.024***	-0.004	0.014***	0.011	0.004	-0.006	0.014**	0.023**	0.017***	0.043***	0.006
	(0.012)	*(0.003)*	*(0.007)*	*(0.013)*	*(0.005)*	*(0.008)*	*(0.004)*	*(0.006)*	*(0.006)*	*(0.009)*	*(0.003)*	*(0.006)*	*(0.005)*
Natural	-0.057**	-0.017***	-0.036***	-0.051***	-0.020***	-0.022*	-0.027***	-0.051***	-0.036***	-0.029***	-0.019***	0.031***	-0.023***
	(0.029)	*(0.003)*	*(0.007)*	*(0.009)*	*(0.005)*	*(0.012)*	*(0.004)*	*(0.011)*	*(0.006)*	*(0.008)*	*(0.003)*	*(0.011)*	*(0.005)*
minimumwage	0.000	-0.000***	0.000	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**	-0.001***	0.000	-0.001***	0.000***	-0.000***
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.003)*	*(0.000)*	*(0.000)*	*(0.000)*	*(0.068)*
Flexibility													
Legal	0.176***	0.035***	0.075***	-0.035*	0.056***	0.103***	0.059***	0.110***	0.062***	0.047***	0.057***	0.098***	0.087***
	(0.025)	*(0.006)*	*(0.014)*	*(0.020)*	*(0.009)*	*(0.016)*	*(0.007)*	*(0.012)*	*(0.011)*	*(0.015)*	*(0.005)*	*(0.014)*	*(0.009)*
Cor	-0.005	0.002	-0.008**	0.005	0.008**	-0.002	0.008***	0.012***	0.007**	-0.019***	-0.002	-0.003	0.001
	(0.000)	*(0.000)*	*(0.004)*	*(0.007)*	*(0.003)*	*(0.006)*	*(0.002)*	*(0.005)*	*(0.003)*	*(0.005)*	*(0.002)*	*(0.004)*	*(0.003)*
Start	0.007*	0.003***	0.003	-0.001	0.003*	0.005**	0.003***	0.007***	0.001	-0.004**	0.004***	0.020***	0.006***
	(0.003)	*(0.001)*	*(0.002)*	*(0.003)*	*(0.002)*	*(0.002)*	*(0.001)*	*(0.002)*	*(0.001)*	*(0.002)*	*(0.001)*	*(0.002)*	*(0.002)*
Observations	2793	94109	6812	3238	20880	5448	41184	9561	15637	5442	112575	11297	17022

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2.2 Control Variables Location Choices per industry

Control	Auto	BS	Chem	Coal&Oil	Com	CP	FS	F&T	IM	Metal	S&IT	Text	Trans
log_gdpp	-0.018	0.144***	0.595***	0.230**	0.181**	0.477***	0.113**	0.045	0.201***	-0.078	0.297***	-0.284**	0.207***
	0.208)	*(0.038)*	*(0.100)*	*(0.111)*	*(0.073)*	*(0.126)*	*(0.048)*	*(0.098)*	*(0.074)*	*(0.109)*	*(0.042)*	*(0.129)*	*(0.070)*
Growth	-0.011	0.005	0.039**	0.029	-0.053***	-0.001	0.019***	-0.028**	0.014	0.066***	0.003	-0.012	-0.006
	(0.023)	*(0.006)*	*(0.016)*	*(0.020)*	*(0.011)*	*(0.017)*	*(-0.070)*	*(0.012)*	*(0.010)*	*(0.018)*	*(0.006)*	*(0.015)*	*(0.011)*
Inflation	0.023	0.042***	0.057***	-0.004	0.041***	0.001	0.039***	0.016	-0.002	-0.015	0.052***	-0.030*	0.008
	(0.023)	*(0.006)*	*(0.016)*	*(0.016)*	*(0.011)*	*(0.018)*	*(0.007)*	*(0.011)*	*(0.011)*	*(0.014)*	*(0.006)*	*(0.016)*	*(0.009)*
Educexp	0.102	-0.066***	0.181***	0.084	-0.154***	0.039	0.053***	-0.107***	-0.023	0.126***	0.001	0.065*	-0.060**
	(0.078)	*-0.015)*	*(0.039)*	*(0.066)*	*(0.028)*	*(0.046)*	*(0.020)*	*(0.034)*	*(0.028)*	*(0.048)*	*(0.015)*	*(0.037)*	*(0.027)*
Tax	-0.022	-0.015***	-0.022***	-0.051***	-0.023***	-0.013	-0.021***	-0.019***	-0.021***	-0.051***	-0.023***	-0.051***	-0.020***
	(0.010)	*(0.002)*	*(0.006)*	*(0.011)*	*(0.005)*	*(0.007)*	*(0.003)*	*(0.006)*	*(0.005)*	*(0.008)*	*(0.002)*	*(0.006)*	*(0.004)*
Internet	-0.017	0.024***	-0.013*	-0.008	0.014***	0.028***	0.023***	0.017**	0.015***	0.028***	0.026***	0.048***	0.018***
	(0.012)	*(0.003)*	*(0.007)*	*(0.014)*	*(0.005)*	*(0.008)*	*(0.003)*	*(0.007)*	*(0.005)*	*(0.009)*	*(0.002)*	*(0.007)*	*(0.005)*
Observations	2793	94109	6812	3238	20880	5448	41184	9561	15637	5442	112575	11297	17022

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A3.1: Determinants Location Choices per part of the Value Chain

	BS	Cons	CCS	DDT	Elec	HQ	ICT	Logis	Manu	R&D	Retail	S&M	Total
Speed													
log_containers	0.212***	-0,072	0.299***	0.140***	0.258**	0.204***	0.302***	0.185***	0.127***	0,020	0.210***	0.178***	0.179***
	(0.015)	(0.058)	(0.101)	(0.037)	(0.101)	(0.048)	(0.074)	(0.033)	(0.016)	(0.096)	(0.042)	(0.013)	(0.006)
log_airpas	0.636***	0.945***	0.463***	0.619***	0.724***	0.650***	0.756***	0.621***	0.621***	0.528***	0.598***	0.657***	0.645***
	(0.014)	(0.075)	(0.084)	(0.035)	(0.114)	(0.042)	(0.072)	(0.033)	(0.017)	(0.088)	(0.041)	(0.012)	(0.006)
import	0,004	0,012	0,0143	0.020*	0,0114	-0,010	0,021	0,007	0.008**	0,014	-0,005	0.008***	0.006***
	(0.004)	(0.011)	(0.022)	(0.011)	(0.020)	(0.013)	(0.021)	(0.001)	(0.003)	(0.025)	(0.012)	(0.003)	(0.001)
Costs													
unemp	0.016***	-0,010	-0,007	0.014**	-0,005	-0,005	0,010	0.013**	0.008***	0,002	0.030***	0.020***	0.013***
	(0.003)	(0.011)	(0.024)	(0.007)	(0.015)	(0.010)	(0.013)	(0.005)	(0.003)	(0.024)	(0.005)	(0.002)	(0.001)
natural	-0.013***	-0.020***	-0,005	-0.036***	-0.069***	-0.050***	-0,012	-0.041***	-0.031***	-0.041**	0.039***	-0.019***	-0.024***
	(0.003)	(0.007)	(0.018)	(0.010)	(0.022)	(0.012)	(0.018)	(0.007)	(0.003)	(0.019)	(0.011)	(0.003)	(0.001)
minimumwage	-0.000***	-0.000***	-0.000***	-0.001***	-0,000	-0.001***	-0.000**	-0.000**	-0.000***	-0,000	0,000	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Flexibility													
legal	0.052***	0.069***	0,020	0.088***	0.074***	0.037**	0.069**	0.071***	0.067***	-0,016	0.110***	0.062***	0.063***
	(0.005)	(0.012)	(0.032)	(0.014)	(0.028)	(0.019)	(0.028)	(0.011)	(0.005)	(0.041)	(0.013)	(0.004)	(0.002)
cor	0,002	-0,007	-0.040***	0.010**	0,007	-0,006	0,005	-0,001	0,000	0.029***	-0.012***	-0,000	0.002**
	(0.002)	(0.006)	(0.014)	(0.004)	(0.009)	(0.006)	(0.008)	(0.003)	(0.002)	(0.011)	(0.004)	(0.001)	(0.001)
start	0.003***	0.009***	0.017***	0,003	0,002	0,003	0,005	0.007***	0.001*	0,009	0.021***	0.003***	0.003**
	(0.001)	(0.003)	(0.005)	(0.002)	(0.004)	(0.003)	(0.004)	(0.002)	(0.001)	(0.006)	(0.002)	(0.001)	(0.000)
Observations	100.189	4.557	1.603	8.564	1.912	6.227	3.643	14.826	85.031	1.079	13.808	193.604	2.545.467

Table A3.2. Control Variables for the location choices per part of the Value Chain

	BS	Cons	CCS	DDT	Elec	HQ	ICT	Logis	Manu	R&D	Retail	S&M	Total
Control													
log_gdpp	0.119***	-0,105	0,367	0.341***	0,00776	0.327***	0.391*	0.294***	0.231***	0,230	-0,139	0.305***	0.194***
	(0.037)	(0.116)	(0.249)	(0.101)	(0.248)	(0.124)	(0.206)	(0.083)	(0.040)	(0.280)	(0.133)	(0.032)	(0.020)
growth	0,009	0.026*	0.123***	-0.032**	-0,018	0,020	-0.079***	-0,006	-0,007	0,011	-0.058***	0,003	-0.005**
	(0.005)	(0.015)	(0.043)	(0.013)	(0.026)	(0.017)	(0.027)	(0.013)	(0.006)	(0.040)	(0.017)	(0.005)	(0.002)
inflation	0.048***	0,003	-0,017	0.046***	-0.048*	0.048**	0,027	0.037***	0.017***	-0,048	-0.031*	0.037***	0.032***
	(0.006)	(0.013)	(0.040)	(0.016)	(0.026)	(0.021)	(0.032)	(0.012)	(0.005)	(0.049)	(0.017)	(0.005)	(0.002)
educexp	0,003	0,074	0,141	0,021	0,009	0,004	-0.143**	-0,022	-0,007	-0.358***	-0,031	0,002	0,001
	(0.015)	(0.054)	(0.105)	(0.037)	(0.078)	(0.052)	(0.066)	(0.031)	(0.016)	(0.129)	(0.034)	(0.013)	(0.006)
internet	0.028***	0.039***	0.129***	0.019***	-0,020	0,009	-0,005	0,008	0.008***	-0,019	0.056***	0.024***	0.020***
	(0.003)	(0.011)	(0.026)	(0.006)	(0.017)	(0.009)	(0.014)	(0.006)	(0.026)	(0.015)	(0.007)	(0.002)	(0.001)
Observations	100.189	4.557	1.603	8.564	1.912	6.227	3.643	14.826	85.031	1.079	13.808	193.604	2.545.467

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A4.1 Determinants for the value chains for the industries Financial Services and Industrial Machinery (multinomial logit)

	Industrial				Financial			
	HQ	Main	Manu	SMS	BS	CCS	HQ	SMS
Speed								
import	-0,024	0,0151	0.074***	0,001	0.0183***	0,0986	0,002	-0,004
	(0,036)	(0,031)	(0,012)	(0,0105)	(0,007)	(0,076)	(0,046)	(0,014)
log_containers	0,0438	0,179	-0,0534	0.0936**	0.212***	0.940***	0.290*	0.152***
	(0,109)	(0,117)	(0,049)	(0,0412)	(0,029)	(0,265)	(0,155)	(0,058)
log_airpas	1.128***	0.699***	0.675***	0.686***	0.625***	-0.360*	0.524***	0.658***
	(0,124)	(0,157)	(0,052)	(0,041)	(0,030)	(0,218)	(0,148)	(0,051)
Costs								
minimumwage	0.000*	-0,001	-0.001***	-0.001***	-0.000**	-0,000	0,001	-0.001***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)	(0,001)	(0,000)
unemp	0,0111	-0,0454	-0.0193*	0,009	0,003	-0,105	-0,031	-0,012
	(0,022)	(0,029)	(0,011)	(0,008)	(0,006)	(0,064)	(0,020)	(0,009)
natural	-0,048	-0,019	-0.054***	0.051***	-0.024***	-0.246***	-0.115**	-0.032**
	(0,045)	(0,026)	(0,012)	(0,010)	(0,006)	(0,081)	(0,046)	(0,013)
Flexibility								
legal	-0,043	0.094**	0.089***	0.026*	0.058***	0.225***	0,008	0.031*
	(0,048)	(0,044)	(0,017)	(0,014)	(0,011)	(0,086)	(0,062)	(0,019)
cor	-0,019	0.032**	0.026***	0.015***	0.011***	0,020	0,022	-0,003
	(0,013)	(0,016)	(0,005)	(0,004)	(0,003)	(0,028)	(0,016)	(0,006)
start	-0,011	0,000	0,004	-0.006***	0,003	0.033**	0,001	0,003
	(0,008)	(0,007)	(0,003)	(0,002)	(0,002)	(0,016)	(0,009)	(0,002)
Control								
log_gdpp	-0.686**	0,007	0.242*	0.297***	0,009	0,273	-0,225	0.447***
	(0,313)	(0,276)	(0,135)	(0,112)	(0,070)	(0,503)	(0,392)	(0,135)
growth	-0,005	-0,043	0.037***	0,017	0.018*	0.130***	0,022	-0,004
	(0,026)	(0,036)	(0,014)	(0,011)	(0,011)	(0,045)	(0,030)	(0,016)
inflation	0,046	-0,037	-0,007	0,006	0.033***	-0.159*	-0,008	0.069***
	(0,060)	(0,060)	(0,018)	(0,014)	(0,010)	(0,088)	(0,049)	(0,016)
educexp	-0.389***	0,068	-0.141***	0,030	0,050	0,063	0,247	0.090**
	(0,128)	(0,118)	(0,053)	(0,038)	(0,031)	(0,330)	(0,167)	(0,044)
internet	0,003	-0,024	0,006	-0.013**	0.019***	0.068**	0,009	0.019**
	(0,016)	(0,027)	(0,007)	(0,006)	(0,006)	(0,033)	(0,019)	(0,008)
taks	-0.109***	-0,009	0,007	-0,001	-0.024***	-0.060*	0,005	0,001
	(0,022)	(0,026)	(0,008)	(0,007)	(0,005)	(0,035)	(0,020)	(0,007)
Constant	-5.882**	-16.91***	-16.11***	-17.58***	-17.88***	-18.76***	-14.79***	-19.44***
	(2,986)	(2,654)	(1,354)	(1,194)	(2,416)	(3,909)	(4,718)	(1,422)
Observations	9.156	15.143	67.709	111.559	13.518	5.163	8.147	94.347

Table A4.1 Determinants for the value chains for the industries Transport and Consumer Products (multinomial logit)

	Transport			Consumer Products				
	HQ	Log&Dis	SMS	HQ	Log&Dis	Man	Retail	SMS
Speed								
Import	-0,074	0,007	0.038***	0,051	-0,008	-0,014	0,057	0.061***
	(0,062)	(0,009)	(0,011)	(0,068)	(0,033)	(0,016)	(0,036)	(0,020)
log_containers	0,110	0.133***	0.135***	0.826***	0,282	0.269**	0.320***	0.200**
	(0,213)	(0,036)	(0,046)	(0,282)	(0,174)	(0,107)	(0,097)	(0,088)
log_airpas	0.572***	0.711***	0.517***	0,176	0.793***	0.444***	0.494***	0.475***
	(0,132)	(0,037)	(0,046)	(0,360)	(0,157)	(0,093)	(0,070)	(0,088)
Costs								
minimumwage	-0,000	-0.000***	-0.000***	-0,001	0,001	-0.001*	-0,000	-0.001***
	(0,001)	-(0.000)	(0,000)	(0,001)	(0,000)	(0,000)	(0,000)	(0,000)
Unemp	0.100**	-0,003	0,004	-0,004	0,032	0,001	0,010	-0,003
	(0,047)	(0,006)	(0,007)	(0,045)	(0,021)	(0,013)	(0,011)	(0,014)
Natural	-0.12***	-0.050***	-0.028***	-0.443**	-0.086**	-0,012	-0,025	-0.069***
	(0,044)	(0,010)	(0,008)	(0,194)	(0,042)	(0,026)	(0,023)	(0,017)
Flexibility								
Legal	0,032	0.077***	0.114***	0,157	0.095**	0.051**	0.194***	0.080***
	(0,057)	(0,013)	(0,015)	(0,108)	(0,043)	(0,026)	(0,029)	(0,029)
Cor	0,027	0,003	0.010**	0,015	-0,008	0,012	-0.03***	0.017**
	(0,019)	(0,003)	(0,005)	(0,033)	(0,012)	(0,011)	(0,008)	(0,008)
Start	-0,008	0.007***	0.004*	-0.030*	0,010	-0,002	0.022***	-0.008*
	(0,011)	(0,002)	(0,002)	(0,017)	(0,007)	(0,003)	(0,004)	(0,004)
Control								
log_gdpp	-0,478	0,134	0.323***	-0,416	-0,519	0,252	0.750**	0.964***
	(0,454)	(0,089)	(0,105)	(1,164)	(0,459)	(0,203)	(0,316)	(0,211)
Growth	0,030	-0.023**	0,012	-0,056	-0,004	-0,002	-0.059*	-0.076***
	(0,048)	(0,011)	(0,013)	(0,046)	(0,029)	(0,023)	(0,032)	(0,021)
Inflation	0.076*	0.050***	0,004	0,036	-0,067	0,012	-0,034	0.074***
	(0,043)	(0,012)	(0,014)	(0,096)	(0,046)	(0,028)	(0,036)	(0,023)
Educexp	-0,100	-0.061*	-0.104**	0,308	0.351**	0,046	0,076	0.163*
	(0,205)	(0,036)	(0,042)	(0,317)	(0,147)	(0,089)	(0,090)	(0,084)
Internet	-0,028	0,002	0.023***	-0,009	-0,022	0.000	0.049***	-0,002
	(0,028)	(0,005)	(0,008)	(0,027)	(0,020)	(0,013)	(0,012)	(0,013)
Taks	0,033	-0.032***	0,004	-0.060**	-0.10***	0,019	-0.06***	-0,007
	(0,026)	(0,006)	(0,007)	(0,030)	(0,023)	(0,012)	(0,014)	(0,013)
Constant	-8,896	-16.04***	-17.4***	-14.25*	-12.3***	-17.3***	-22.6***	-23.75***
	(6,297)	(1,009)	(1,199)	(8,45)	(4,525)	(1,902)	(3,891)	(2,441)
Observations	5.802	149.444	98.387	2.892	10.213	37.322	30.844	26.483

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A5.1 FDI investments per country

Consumer Products

Code	Headqua..	Logisti..	Manufac..	Retail	Sales, ..	Total
FRA	15	37	34	110	37	240
GBR	31	97	18	217	69	442
IND	5	24	72	43	34	203
MEX	4	10	56	41	21	133
POL	1	46	41	56	18	168
RUS	1	20	32	45	32	132
USA	49	114	99	176	66	518
Total	236	630	918	1.661	864	4.523

Industrial Machinery

	DDT	HQ	Log	MS	Man	SMS	Total
ARE	6	23	12	25	36	142	245
AUS	5	8	18	13	29	76	154
BRA	9	6	9	17	123	97	270
CAN	4	9	23	24	38	78	177
CHN	78	42	20	38	506	311	1.012
CZE	2	1	3	3	71	25	106
DEU	30	32	22	15	106	286	494
ESP	8	17	9	3	28	64	133
FRA	12	23	31	14	98	107	288
GBR	44	61	22	28	122	167	456
IND	58	20	5	20	343	167	623
MEX	4	5	7	13	138	84	251
MYS	5	11	7	15	42	61	142
POL	4	2	10	5	104	39	165
SGP	21	36	6	17	31	107	223
USA	41	173	51	53	406	350	1.081
Total	418	559	359	438	3.093	3.310	8.291

Table A5.2 FDI investment per country

	Transport			
	HQ	Log	SMS	Total
ARE	9	67	50	126
AUS	6	75	33	114
AUT	3	59	38	100
BEL	3	110	28	141
BRA	3	42	56	101
CAN	7	78	36	121
CHN	10	200	282	492
CZE	3	66	37	106
DEU	8	201	115	324
ESP	8	197	89	294
FRA	8	173	69	250
GBR	12	321	63	396
IND	10	112	139	261
ITA	2	80	41	123
MEX	4	156	79	239
NLD	11	90	29	130
POL	3	146	58	207
ROU	2	77	26	105
RUS	2	111	95	208
SGP	12	57	61	130
USA	30	321	182	533
Total	205	3.741	2.463	6409

	Financial Services				
	BS	CCS	HQ	SMS	Total
AGO	108	0	1	1	110
ARE	269	1	16	47	334
AUS	176	7	10	41	234
BGR	78	1	0	25	105
BRA	118	0	7	77	203
CAN	120	6	13	36	177
CHE	183	1	3	16	203
CHN	550	4	13	190	761
CZE	94	1	3	14	114
DEU	256	3	6	46	312
ESP	223	2	17	86	329
FRA	164	4	5	49	224
GBR	831	37	63	156	1.096
IND	286	7	7	113	444
IRL	144	9	19	38	219
JPN	98	0	1	15	114
MEX	97	1	2	43	144
MYS	103	0	0	35	145
NLD	89	0	4	11	104
PHL	28	13	4	46	106
POL	138	5	4	20	187
ROU	163	0	3	19	187
RUS	268	1	0	61	330
SGP	283	0	13	56	358
USA	1.099	48	53	168	1.383
VNM	75	0	6	20	101
Total	8.425	177	325	1.905	10.992

Table 5.2 MNL Economic Regions Industrial Machinery (relative to Europe & Central Asia and CCS)

	EA & P	LA & C	ME&NAf	N Am	SA	SS-Africa
DDT	0.74	13.47	0.52	0.64	1.58	12.34
	(0.54)	*(7.78)*	*(0.66)*	*(0,78)*	*(1.40)*	*(1.65)*
ET	0.65	14.62	1.03	1.02	1.92*	15.44
	(0.58)	*(7.76)*	*(1.10)*	*(0.81)*	*(1.07)*	*(1.65)*
Headquarters	0.30	13.40	0.48	1.77**	0.25	14.15
	(0.54)	*(7.76)*	*(1.06)*	*(0.77)*	*(1.06)*	*(1.65)*
Logistics	-0.01	13.95	0.40	1.07	-0.93	14.47
	(0.55)	*(7.76)*	*(1.07)*	*(0.78)*	*(1.13)*	*(1.65)*
Maintenance	0.81	14.99	1.49	1.40*	0.89	15.34
	(0.54)	*(7.76)*	*(1.05)*	*(0.77)*	*(1.06)*	*(1.65)*
Manufacturing	0.43	14.50	0.13	0.90	1.34	13.49
	(0.53)	*(7.76)*	*(1.04)*	*(0.76)*	*(1.04)*	*(1.65)*
SMS	0.45	14.30	1.02	0.77	0.61	14.69
	(0.53)	*(7.76)*	*(1.04)*	*(0.76)*	*(1.04)*	*(1.65)*
Constant	-0.96*	-15.87	-2.57**	-1.87**	-2.57**	-17.38
	(0.53)	*(7.76)*	*(1.04)*	*(-0.76)*	*(1.04)*	*(1.65)*
Observations	8.339	8.339	8.339	8.339	8.339	8.339

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1