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De invloed van ruimtelijke verandering op operationele strategieën in de vroeg-moderne Nederlandse scheepvaart

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SUMMARY

The influence of spatial change on operational strategies in early-modern Dutch maritime shipping: a case-study on Dutch maritime shipping in the Gulf of Finland and on Archangel, 1703-1740

1. Introduction

Until the beginning of the 18th century Dutch trade relations were almost fully concentrated in Archangel, the only Russian port where foreigners could trade directly with Russians. To a lesser degree, Narva, Vyborg and Nyen – three Swedish towns in the eastern Gulf of Finland – were of some importance for Dutch trade at the end of the seventeenth century. The foundation and rapid development of the Russian city of St. Petersburg on the same place as where Nyen used to be until 1703 must have led to a fundamental change in the patterns of Dutch maritime shipping in the Gulf of Finland and in Archangel in the course of one generation. Commonly known numeric data about the growth of the number of inhabitants, the number of manufactures, the relocation of governmental functions and the increase in the number of foreign merchants active in St. Petersburg convincingly underwrite this assumption. Since the attractiveness of St. Petersburg and the efficiency of the “special treatment” orchestrated by Peter the Great (1672-1725) had such a large impact on all levels of society that they had led to the rapid development of the city, it can be assumed that the foundation and growth of St. Petersburg must also have had a profound impact on Dutch maritime shipping in the first decades of the eighteenth century, with noticeable shifts towards the new “central point” as a result.

In historiography, there is a strong tendency to describe the foundation of St. Petersburg in 1703 as a mythological event. Citations of scholars referring to Peter the Great’s extraordinary idea to build his empire’s new capital “in the swampy desert of the Neva delta” are countless. A vast amount of literature that has been devoted to the study of the Swedish province of Ingermanland, its policies, its economic life and its cities in the seventeenth century is most of the time ignored. It is often forgotten that Nyen, a trading town in the easternmost part of the seventeenth century Swedish realm was located on the shores of the Neva. Nyen benefited from its excellent strategic location and, together with Narva, it became a growing threat for Russian export trade via Arkhangel’sk in the closing decades of the seventeenth century. Peter the Great’s war against Sweden was aimed directly towards the province of Ingermanland, in which both Narva and Nyen were located. The conquest of Nyen was immediately followed by the foundation of St. Petersburg; a clear sign of the economic goals that ruled Russia’s war against Sweden.

In the historiography of Dutch maritime shipping and trade with Russia in the eighteenth century, the influence of the foundation of St. Petersburg is treated ambiguously. Quantitative researchers deny St. Petersburg’s position as Russia’s major port in the eighteenth century, pointing out the small number of Dutch ships that visited Russia’s new capital, the small ship size and small tonnage of cargo that was exported from St. Petersburg. On the basis of vast amounts of numerical data, the conclusion is reached that St. Petersburg never replaced Archangel during the eighteenth century, neither in terms of the number of ships, nor in terms of cargo carried. Qualitative historical research on international shipping and trade with Russia reaches the exact opposite conclusion: “What was lost by Archangel, was won by St. Petersburg” is a recurrent formulation in such studies.

2. Contrasting approaches, contrasting results

In the previous paragraph, we have uncovered a fundamental discrepancy between quantitative and qualitative research techniques. Whereas quantitative historians like Van Brakel and Knoppers are stuck on a macroeconomic level of analysis, qualitative researchers like Veluwenkamp, Repin and others take the opposite position. They have adopted a micro historical approach, founded in the detailed empirical study of specific groups of people or specific places. In the case of Van Brakel and Knoppers, the macroeconomic tone of their work can be related to a positivist (neoclassical) approach towards economic history. Their quantitative orientation, however, comes at a cost: a large number of questions about the structure and mechanism of economic systems remains to be asked. Data about Dutch maritime shipping, gathered from Dutch archival sources is the sole basis for mathematical procedures that ought to confirm or deny existing views on Dutch trade in St. Petersburg. The archival sources used by Van Brakel and Knoppers obtain their value only thanks to the vast amount of numerical data they contain. Maritime shipping itself is nothing more than an illustration of trade.

This is also true for the qualitative approach. In the case of Veluwenkamp's work, the treatment of maritime transportation as a *spin-off effect* of trade is the logical consequence of the type of questions that a qualitative approach to economic history involves. By focusing on merchants and merchant networks, maritime shipping almost automatically disappears to the background, although Veluwenkamp also returns to quantitative data about Dutch maritime shipping from time to time. Just like in Van Brakel's and Knoppers' case, maritime shipping does not play more than an *illustrative* role in Veluwenkamp's primarily anthropological discourse.

There is one point on which both contrasting approaches clearly agree: none of them sees the transportation of goods by sea as a full part of early-modern economic systems. Despite the fact that researchers like Steinberg have substantiated that "transportation space" is a social space, constructed in the same way as the nodes it connects, early-modern maritime shipping is seldom studied as an integral economic activity. Rather it is seen as a *spin-off effect* and even more often as an *illustration* of trade. Exemplary is Knoppers' study, which is constructed entirely around the quantification of ship registrations in Amsterdam, but nevertheless is called "Dutch *trade* with Russia".

Additionally, a second bottleneck in the study of early-modern maritime shipping must be brought to our attention. This impasse is the apparent inability of historians of Dutch maritime shipping to righteously address the informative wealth of available sources and to apply existing techniques for the processing and analysis of large data sets.

Two approaches remain dominant. On the one hand, the first type of maritime studies looks for macroeconomic developments in Dutch trade on the basis of quantified numeric data. In this approach, names of ship masters and ships are processed strictly in a numeric way. On the other hand, the second type of studies *does* include alphanumeric data about the name of the ship master and/or the ship. Often this type of maritime studies takes the form of small-scale sample studies in which data about one or two years is examined in detail. In some cases, such sample studies constitute part of larger quantitative studies of the first type; often such samples are used to prove the reliability of the sources used on the basis of an *in extenso* comparison with one or more similar sources. Recurrent patterns, changes in habits and the organizational structure of maritime shipping remain invisible in both approaches.

However, the necessity to include alphanumeric data has been acknowledged previously: “(...) alphanumeric data (...) is essential for the analysis of the shipping community (...)”, De Buck and Lindblad wrote in their 1990 article about the Dutch *galjootsgeldregisters*. Unfortunately, their statement still waits for its practical execution. Even Welling’s more recent research, which is based on the entire digitalization of the *paalgeldregisters* for the years 1771-1787 and which does in fact include a vast amount of alphanumeric data in the form of the name of the ship master, does not change this situation. Welling limits the use of his database to macroeconomic quantifications, thus effectively ruling out all possible gains from the inclusion of alphanumeric data.

This situation is contrary to the enormous developments in the use of computers in historical research. Detailed studies about methodological problems like nominal record linkage and name standardization have created the necessary prerequisites for the execution of actual alphanumeric research in which long(er) periods of time can be studied and dynamic evolutions in maritime shipping can finally get the attention they deserve.

The current state of the discipline is marked by a lack of knowledge about the organizational structure of early-modern maritime shipping⁶²⁴. It is, however, exactly in the organizational structure of economic activity that change becomes apparent, and therefore it is no surprise that neither quantitative nor qualitative approaches are capable of making the influence of the foundation of St. Petersburg on Dutch maritime shipping in the Gulf of Finland and in Archangel comprehensible.

Therefore, it is my claim that in order to understand the foundation of St. Petersburg in function of its influence on Dutch maritime shipping an evolutionary theory and methodology need to be adopted, since they can overcome the limitations of neoclassical and institutional approaches to economic history. In a broader sense, this statement contains a claim for more attention towards economic-theoretical research as supplier of explanatory mechanisms of economic-historical phenomena. With this claim to adopt an evolutionary theory and method for the study of maritime shipping, my research subscribes to a tradition in economic history, which explicitly looks for advice from economic theory for the construction of an analytical framework. Proof of the necessity of such an approach is the incapability of neoclassical and institutional approaches to formulate an answer to our central research question.

Rephrasing the subject of my case study in broader terms, my research goal is to understand the influence of spatial change on economic activity. Specifically, I try to understand how spatial change affects maritime shipping. This specification serves a double purpose. Firstly, it makes an activity commonly seen as a spin-off effect of trade central to the analysis. Secondly, it makes the interaction between land and sea a core analytical issue. I carry out the study of the influence of spatial change on maritime shipping in a historical context, thus subscribing to Paul David’s claim to use the past as “a museum of interesting cases” that provides a better empirical basis than the present.

3. Theory & Method

3.1. Evolutionary economics

After having defined the subject of the case-study in such broad economic geographical

⁶²⁴ I understand the term “organizational structure” as “the way in which the activity of transporting goods is carried out”. The focus is on maritime shipping operations and the ways in which they are organized.

terms, an evolutionary approach appeared to be logical, both in its theoretical and in its methodological sense. In an evolutionary model, humans are defined as *homo sapiens oeconomicus* (HSO). Humans are embedded in an economic environment in which they create new ideas or follow them. Humans can solve problems by initiating novelty (*generic level*), just as they can decide to follow or ignore the novelty introduced by other humans (*operant level*). When novelty is introduced to the environment of HSO (*origination*), it can be adopted by other individuals (*adoption*). Following, the adopted novelty can become a behavioral habit or a routine. Many individuals have the opportunity to use the adopted habit recurrently (*retention*). Thus, HSO is the basic unit of *microeconomics*.

In order to underpin the processes by which *many individuals* recurrently use certain behavioral habits or routines, evolutionary economics turns to *population thinking*. Population thinking is a non-conventional type of aggregation, denoted in evolutionary economics by the term *mesoeconomics*. The same trajectory of *origination-adoption-retention* is now applied to many individuals, i.e. a population. The agent is free to choose and adopt from a variety of habits and routines, thus giving shape to *dynamic populations* of economic actors. What is crucial here is that the recurrent adoption of a certain novelty by many individuals can be associated with the notion of institution and, thus, with the existence of organizational routines. For an institution to remain effective, a regular supply of new *rule followers* is necessary. When a certain routine does no longer attract new *rule followers*, it stagnates and will be left by its population next. The necessity of “new supply” is therefore a key element in the analysis of populations of economic actors.

Using an evolutionary model of economics, it is possible to identify dynamic processes of change in organization on individual (*microscopic*) and population (*macroscopic*) levels, while avoiding the main shortcomings of the traditional typological research program: (1) the reduction of individual agents to “representative agents” (*homo oeconomicus*) and (2) the aggregation of individual behavior on the basis of uniform laws and mathematical procedures. By conceptualizing the activities of individual economic agents and of populations of economic agents as a continuous process evolving in time and space, an evolutionary approach is designed well to understand (1) how populations that are confronted with change react by introducing novelty and (2) how change influences the populations themselves. Additionally, thanks to the recent *evolutionary turn* in economic geography, valuable insights about spatial change can also be linked to the core principles of evolutionary thinking, thus providing a more explicit spatio-temporal framework for the analysis of the creation and diffusion of new routines and of mechanisms that enhance the diffusion of ‘superior’ routines over others.

3.2. Transportation

The central actors in this research have *transportation* as their core economic activity. This obliges us to draw special attention to what Philip Steinberg calls *transportation space*, the geographical space in which the economic activity of re-allocating, distributing and transferring goods unfolds. Steinberg’s concept suggests that transportation can be characterized as an independent profitable activity, rather than as an external cost that is part of the production process. Steinberg states that *land-based nodes* can not be understood separately, and appeals for the full consideration of the role of what he calls *ocean spaces* and other *in-between spaces*. “(...) Transportation routes are socially constructed spaces in many of the same ways as the nodes they connect”, Steinberg concludes.

Impetus for the study of transportation as central to the understanding of (regional) economic

development have been formulated several times by economic theorists and geographers alike. Exemplary is Ullmans definition of transportation as “(...) a measure of the relations between areas and is therefore an essential part of geography”. Despite the complementary character of transportation geography and economic geography, the influence of transportation geography as an object of study within spatial sciences remains relatively small.

In my opinion the limited attention for transportation geography in spatial and economic sciences is at least partly a consequence of the specific focus of transportation studies on the location of routes, the structure and development of transportation networks or the influence of new technologies on existing transportation networks. In most of these studies, only the aggregated level of networks and sector-specific developments is taken into consideration. The micro level of individual economic decision making remains in the dark. The micro level, however, is deemed essential to gain an understanding of the formation, structure and development of networks at the aggregated level. By studying transportation networks as dynamic networks of populations, I hope to overcome this limitation, without losing the possibility to analyze the macro level of aggregation.

The previous paragraphs have made it clear that it is necessary to position early-modern maritime shipping in a spatial economic system conceptualized in an evolutionary manner. In other words, it can be claimed that it is necessary to study early-modern maritime shipping as an integral economic activity that is not defined by the nodes it connects, nor by its social structures exclusively, but by both elements at the same time.

3.3. Towards an evolutionary information system

From a theoretical point of view the insights of evolutionary economics are very appealing. The question remains, however, how this type of thinking can be applied to historical practice. It is clear that, in order to carry out an empirical study in an evolutionary fashion, we would need to process sources that allow us to study human behavior on both micro- and mesolevels of analysis. Following, we would need to address them in such a way that both individual economic agents and populations of economic agents can be studied as dynamic, evolving entities. Having considered these practical issues, the idea took shape to build a database that could serve a tool for the analysis of human behavior, the behavior of changing populations and the institutions of early-modern maritime shipping. Consequently, this idea added a methodological dimension to my research goals. This methodological dimension can be rephrased in the following question: “Does the adaptation of early-modern maritime shipping resources to the theoretical and methodological insights of evolutionary economics enhance our knowledge of early-modern economic systems and – in a broader sense – of the influence of spatial change on economic activity?”.

Prior to the analysis of early-modern maritime shipping as an integral economic activity, I completed a process of assessment and selection of sources suited for the study of Dutch maritime shipping in the Gulf of Finland and Archangel first. Based on their temporal and geographical scope, and their complementarity, I selected the *Danish Sound toll registers*, the *Dutch Sound toll tables*, the *galjootsgeldregisters* of the Directory Boards of Baltic and Muscovite Trade in Amsterdam and the so-called *schipgeldregisters*. Following, I constructed a relational database for the input of data from these sources. Then, I executed a number of steps to prepare the data for nominal record linkage, using a strategy that was based on that of contemporary automated record linkage systems. This whole process served one goal: the development of an information system that allows studying spatial change in an evolutionary

manner. In this final paragraph, I will highlight a number of features of this evolutionary information system. These features all serve one or more stages of the evolutionary empirical analysis. Next to a number of common aggregations like annual numbers of ship masters, breakdowns of the origin of ship masters, average ship sizes and others (see appendix 2), a number of features has been created in which population thinking becomes explicit. These features are the main analytical tools of this study. Each of the four of them highlights a specific aspect of the behavior of dynamic populations of Dutch ship masters active in maritime shipping in the Gulf of Finland and Archangel.

The first analytical tool is the *repetitiveness tool* and the *consecutiveness rate* that is a part of it. The *repetitiveness tool* provides breakdowns of the individual behavioral patterns that Dutch ship masters adopted in their activities on one route. An example of such breakdown can be found in appendix 3. The *consecutiveness rate* (CR) is a calculation of the average time frame of a particular pattern divided by the number of ship masters that follow this pattern. The closer the consecutiveness rate comes to 1, the smaller the time frame in which the ship master carried out his voyages. The consecutiveness rate can be read as the number of years one ship master needs to carry out one journey to a certain destination. In the empirical analysis, I have distinguished between repetitive patterns with a scattered character ($CR > 2$) and patterns with a strong consecutiveness rate ($CR < 2$), meaning that all journeys were carried out within a limited period of time. Within this group, a further distinction can be made between $CR < 1$ and $1 < CR < 2$. When CR is smaller than one, this means that the ship masters carried out multiple voyages in the course of one year.

The second analytical tool is the *changing population tool*. This tool consists of a spreadsheet and three charts (see appendix 4). It is drawn up for each of the ports in the eastern part of the Gulf of Finland and for Archangel individually. The *changing population tool* contains information about the internal behavior of the populations of ship masters active on one route. Starting point is the assumption that a route continuously needs new supply in order to develop and avoid stagnation. However, a route cannot survive without stability (i.e. supply certified for a number of consecutive years). Through comparison of the share of new supply and the share of “known participants” on a certain route at a certain point in time, the *changing population tool* allows to distinguish between stable and unstable populations. It allows determining when stagnation becomes a problem. The three charts of the changing population tool summarize different relations per individual port. The first two charts contain information about the total annual number of ship masters active in one port and the amount of new ship masters entering the port in one year, as opposed to the number of ship masters that had already been in this port previously. The first chart contains absolute numbers; the second one shows relative positions. The third chart visualizes the relation between ship masters that have been to the port under study only once as opposed to the relative number of ship masters that made more than one journey to this port.

The third tool in the evolutionary information system is the *spatial change tool* (see appendix 5). This tool is based on the *changing population tool*. It provides details about the ship masters that appeared to be members of more than one population in the period under study. These ship masters carried out journeys to various ports. Their identification directly served the analysis of spatial change and how ship masters reacted to it. The *spatial change tool* allows discerning when ship masters changed routes, while also providing the necessary information to establish whether or not such changes occurred in the patterns of many ship masters at the same time. Moreover, the spatial change tool allows establishing the long term effects of spatial shifts, making it possible to separate permanent from temporary shifts,

while also making evolutions towards the establishment of patterns with greater complexity visible.

Finally, a more complex feature of the evolutionary information system is the possibility to re-construct individual ship masters' activities. The *individual career tool* can be seen as an elaboration of the *spatial change tool*, in the sense that the changes that occurred in the ship masters' activities were now compiled for each individual ship master (see appendix 6). The elaboration of the *individual career tool* involves a process that starts with the use of selection criteria in the queries based on the source tables. A standard name and standard first name have to be entered as criteria. Following, the data from the four different sources can be compared, matched and compiled into one *metafile*. Minor differences between data items in the various sources are denoted in order to make the underlying match scoring process comprehensible.

4. Results of the case-study

On the basis of an extensive empirical analysis, it became clear that the evolution of Dutch maritime shipping in the Gulf of Finland and Archangel in the first half of the eighteenth century was marked by the interplay of two complex processes: *polarization* and *specialization*. The process of *polarization* was a *land-based* process, while that of *specialization* was *sea-based*. *Polarization* was a process that took shape in Russia, while *specialization* was a process that evolved in the organizational structure of the Dutch maritime shipping population active in the Gulf of Finland and Archangel. It was observed that both processes reached a culmination point in 1724, after which they continued to exist in the form of a new order, marked by growing complexity.

4.1. Polarization

The first process that I have discerned in the course of my empirical analysis is that of *polarization*, a term that I have chosen to denote the cumulative effect of a variety of land-based changes that shared a common goal: making St. Petersburg a "New Amsterdam". As became clear studying Russia's economic policy under the reign of Peter the Great (1689-1725), the changes that were part of *polarization* affected among others: (1) the Russian Empire's governmental structure, (2) distant regions in Russia's interior, (3) Novgorod and Pskov and in a broader sense North-West Russia as a whole and (4) the hinterlands of ports in the eastern part of the Gulf of Finland and of the port of Archangel. In brief, *polarization* affected all possible geographical levels. The process of *polarization* in the first decades of the eighteenth century cannot be separated from two related motives: *dominium maris baltici* and *nation building*. *Dominium maris baltici* stands for domination in the Baltic Sea, a wish that occupied many of the powers surrounding the Baltic Sea for several centuries. From the seventeenth century, when Sweden became a dominant power in the Baltic, the meaning of *dominium maris baltici* became related to the expansion politics of maritime powers. It is in this same sense that Russia's motivation to strive for *dominium* needs to be understood. Russia wanted to become a maritime power. The reforms that were necessary to achieve this goal had a scope that went far beyond the political level. The establishment of a Russian navy, merchant marine and a dedicated, self-conscious economic policy were indispensable ingredients for the successful control of the Baltic.

Nation building was the second key concept in the first decades of the eighteenth century; it

is a term that can have various meanings, depending on the angle chosen. In all cases, however, *nation building* stands for a whole of institutions, rules and (power) relations that manifests itself in a distinct territory.

The *polarization* process was a gradual process that consisted of a number of different phases. A constant that can be observed throughout these different periods is that of the *polarization* process gradually getting a more and more limited geographical focus. While the first measures, like conquering new territory, affected roughly speaking the entire State, later measures that could be linked to the *polarization* process, like had a local character.

Peter the Great's aim to make Russia a maritime power and a strong empire invoked a large number of changes in the Russian Empire's governmental structure. First of all, the Russian Empire grew significantly under the reign of Peter the Great. In 1721 the Russian Empire controlled several ports in the Baltic Sea, whereas at the end of the seventeenth century it had only one direct connection to Western Europe via Archangel and it was forced to endure that part of its trade went through Swedish hands first via ports in the Baltic. Together with its territorial expansion, the Russian state underwent far reaching administrative changes.

Soon after Ingermanland was conquered, the administrative confirmation of its annexation in the Russian Empire started. As early as 1702 [??] the so-called *Ižorskaja Kanceljarija* (also called *Ingermanlandskaja* or *Semenovskaja Kanceljarija*; Chancellery of Ingermanland) was founded in Semenovskoe. This chancellery was directed by Aleksandr Danilovič Men'šikov and was responsible for governing the newly conquered Ingermanland. In practice, the chancellery of Ingermanland managed to attract a very large part of the state's budget. Thus, the first signs of a concentration of power in St. Petersburg became apparent.

While warfare moved further South after 1705, notwithstanding several scraps in the Gulf of Finland, the bureaucratization of the newly conquered territories surrounding the Gulf of Finland continued. This process took place on various levels of Russian society. In March 1708 the many different offices of the Chancellery of Ingermanland were united. At the end of 1708, a new phase in the administrative reforms started with the publication of an *ukaz* on the foundation of provinces (*gubernija*) and the attachment of cities to them. One of the eight provinces of which the Russian Empire consisted after 1708 was the Province of Ingermanland. St. Petersburg and 29 other cities among which Narva, Novgorod, Pskov, Velikie Luki, Jaroslavl' and Tver' were part of this new province. Again, a movement towards concentration of power in St. Petersburg was obvious; strategically important trading towns like the ones mentioned, were administratively connected to St. Petersburg. In 1712, this administrative measure was followed by the relocation of the Russian capital with the majority of its (administrative, military and naval) functions from Moscow to St. Petersburg.

After 1710, a number of economic-political, administrative and infrastructural reforms were introduced at a greater pace. After the conquest of Narva in 1704, its inhabitants were banned to Russia (part of them to Vologda). In February 1712, the Senate issued a so-called *žalovannaja gramota* in which they confirmed all privileges, rights and freedoms that were previously granted by the Swedish Queen. In the same year, Narva's trade was connected to that of St. Petersburg: citizens of Narva were obliged to conduct trade via St. Petersburg and the city hall of St. Petersburg sent a mayor (*burgomistr*) to Narva to collect taxes until a new tax tariff would be introduced. In 1714, the citizens of Narva had the right to return to their homes. In 1718, existing Swedish privileges were again confirmed. By providing the merchants of Narva with the possibility to trade under the conditions that they were used to, the Russian government clearly tried to promote trade from Narva as opposed to Archangel.

From the early eighteenth century, increasing attention was paid to the establishment of a Baltic fleet, which resulted in the foundation of a number of ship wharfs and additional industries (manufactures): ship building and timber production, weaponry, metallurgy and iron industry, and textile industry. For this case-study, the stimulating effect of these industries on Russian exports is of primary importance. Even though the Great Northern War against Sweden surely had a slowing effect on their development, the explanation for the type of exports from St. Petersburg and other Russian ports after 1721 must be located in the first decade of the eighteenth century. The early development of the ship building industry was an important impulse for the timber producing industry. In addition to state-controlled ship building wharfs, a number of regional centers for the production of timber arose in the first decades of the eighteenth century. In 1706, the first fine-blade sawmill was put into use in the area around Archangel, soon followed by sawmills in Narva and in the surroundings of Novgorod, along the Sias and near Vyšnij Voloček, both located along waterways that lead directly to St. Petersburg (see appendix 1 pt. 3). The iron industry, at that time organized and controlled by the government, developed quickly in the first decades of the eighteenth century and was located in the Olonec Region (north of Lake Onega) and in the Ural Mountains (see appendix 1 pt. 4). Despite its large distance to the Baltic front, the production supplies in the Urals appeared to be profitable and of good quality. Problematic, however, was the large distance to St. Petersburg and the difficulties in transporting iron from the Urals to the Russian capital: there was no direct connection over water between the two regions. In 1703 and 1709, a canal was dug between the Tsna and the Tverca Rivers close to Vyšnij Voloček (see appendix 1 pt. 3). From 1710 onwards, iron could be transported over water to St. Petersburg, though even then transportation was time-consuming (up to five months) and difficult (especially on Lake Ladoga).

Russia's regional economic policy in the second decade of the eighteenth century was marked by a policy aimed to secure the position of St. Petersburg against Archangel and, at a later stage, against Narva. While Narva was left in peace until 1718, numerous attempts were made in the years 1714-1720 to limit Russian exports from Archangel for the benefit of St. Petersburg. Decisive for the further development of trade via Archangel was an order issued by Peter the Great in November 1717 and the reaction of Novgorodian and Pskovian merchants on it. From 1718 onwards 2/3 of all Russian exports would have to go via St. Petersburg and only 1/3 via Archangel. Novgorodian and Pskovian merchants reacted to these new regulations with a request to allow them not to send their goods to Archangel anymore (as was ordered in 1701); with the port of St. Petersburg nearby, they did no longer see the need to do so. As this request perfectly answered to the wishes of Peter the Great, it is no surprise that the merchants Novgorod and Pskov got their permission already in the same year. Merchants of Kargopol' on the other hand, which asked for the exact opposite, because of the large distance to St. Petersburg (see appendix 1 pt. 3), received a negative answer from the Senate.

From 1718 and until the introduction of the new customs tariff in 1724, trade regulations in Narva also underwent some fundamental changes, which without exception were inspired by Peter the Great's wish to make St. Petersburg the Russian Empire's main port. On the one hand, the growth of trade via Narva continued to be a matter of concern, but on the other hand, measures were taken to avoid trade in St. Petersburg to be disturbed by Narva. Nevertheless, it was only after the end of the Great Northern War that effective measures could be taken to promote trade in St. Petersburg.

In an *ukaz* dated November 26, 1721 it was stated that only goods originating in Pskov and its district could be transported to Narva for export. Goods originating near Gžackaja Pristan' and closer to Velikie Luki had to be sent to St. Petersburg instead of Riga; Riga's hinterland was limited to West-Russia and Ukraine. The hinterland of Archangel was limited to the areas in the districts along the Northern Dvina that had an immediate connection with Archangel via this river. Export goods that were transported previously to the Jug River or other rivers, or to Vologda via the winter route, now had to be transported to St. Petersburg instead. In 1722 merchants of Pskov obtained the freedom to send their goods to Narva or St. Petersburg according to their needs, which subjected Narva once more to severe competition from St. Petersburg. In the same year, Narva was put under the rule of the governor of St. Petersburg after which both St. Petersburg and Narva obtained a tax advantage of 2% and 1% respectively as opposed to other ports in the Baltic Sea.

Next to this reshaping of the hinterlands of Russian ports in the Gulf of Finland and Archangel, from an administrative, institutional point of view, the *Instruction about the use of forest resources (val'dmejsterskaja instrukcija)* of December 1723 and the customs tariff of 1724 appeared to be of major importance for a good understanding of the further development of foreign trade with Russia in the eighteenth century. From the point of view of industries, the further diffusion of the Dutch fine-blade sawmill technology in the eastern part of the Gulf of Finland, the foundation of textile manufactures around St. Petersburg and the further development of the iron industry in the Ural Mountains would have a major impact on the respective roles of St. Petersburg, Archangel, Narva and Vyborg in Russia's foreign trade.

The *Instruction about the use of forest resources* allowed logging timber along the Northern Dvina and its adjacent rivers (i.e. in the hinterland of Archangel). Furthermore, it contained a number of regulations that gave an impulse to the export of timber products from the areas surrounding Lake Ladoga, Lake Ilmen and its adjacent rivers. Much to the discontent of Novgorodian and Pskovian merchants, in the *Instruction about the use of forest resources*, extensive rights were granted to Russian and foreign merchants for logging masts along the Luga and Pljussa Rivers.

In 1724, a differentiated customs tariff was introduced. This customs tariff applied to the import and export of goods via St. Petersburg, Vyborg, Narva, Archangel and Kola. According to the new tariff, on almost all exports from Archangel an additional levy of 25% applied, next to the 5% export duty that also applied to the exports from St. Petersburg and the other ports mentioned in the 1724 tariff regulation. With the customs tariff being introduced, St. Petersburg's exceptional position was strengthened once again.

The period that followed the death of Peter the Great in 1725, was described by Kahan as follows: "[First], (...) the process of development of manufactures, started in the pre-Petrine period and gaining momentum under Peter, continued – at least in the private sector – into the post-Petrine period; [second], (...) during the post-Petrine period the tendencies toward a strengthening of the entrepreneurial group were developing within a framework of government policy that was rather favorably inclined toward cooperation with this particular group. Thereby, the continuity in policy and economic activity between the Petrine and the post-Petrine periods were essentially maintained". A number of differentiated tax rules continued to be applied to trade via Archangel. Following a regional administrative reform in 1727, Pskov and Velikie Luki became part of the District of Novgorod. Narva's main timber supply routes were located in this district along the Luga and Pljussa Rivers. In September 1728, the former dis-

district of Velikoluck was added to Narva's hinterland, while merchants kept the freedom to transport local production or local raw materials from the districts of Pskov and Velikoluck to St. Petersburg or Riga instead of Narva. Export products originating elsewhere, but imported to both districts, had to be transported to St. Petersburg. This rule mainly applied to hemp (*pen'ka*), flax (*lën*), leather (*juft'*) and other, similar products. After the introduction of a new customs tariff in 1731, trade regulations started to have a more local character, and were primarily devoted to the battle against timber exports from Narva and Vyborg that exceeded all existing norms in the early 1730s. At the same time, differentiation between Archangel and St. Petersburg continued to exist, albeit in a less severe way. It would take another thirty years for the differences in tax treatment between Archangel and St. Petersburg to disappear completely.

4.2. Specialization

Under the umbrella of the abstract term *specialization* a process can be found that was already present in the organizational structure of Dutch maritime shipping in the Gulf of Finland and in Archangel before the beginning of the eighteenth century (i.e. exceeding the time frame of this study). What I have observed in my case-study is a process in which this already internally existent specialization took a radically new form after the foundation of St. Petersburg with its accompanying political, geographical and economic changes. On the basis of the empirical analysis, the *specialization* process could be explained as the interplay of a number of combined features: port of destination, origin of the ship masters, cargo carried and size of the ship. Dependent on the relative weight of either of these variables in the ship master's decision making, a continuous trade-off between cargoes and routes can be observed, resulting in a prevalence of either flexibility or repetitiveness in the operational and organizational structures of the ship masters' activities.

The interplay of port of destination, cargo, origin of the ship master and size of the ship must be understood as a parameterization of a complex of underlying business relations between merchants and other merchants, merchants and ship masters, ship masters and charterers, mutually between ship masters, etc. Reconstruction of these relations would require in-depth research into the characteristics and the behavior of each of these groups of economic actors, which falls outside the scope and aims of this particular research. That the denoted parameters port of destination, cargo, origin of the ship master and size of the ship do indeed represent these complex relations appeared from a non-exhaustive study of the contents of correspondence between ship masters and merchants and mutually between ship masters

(1) disorder

In the beginning of the eighteenth century, the existing organizational structure of Dutch maritime shipping in the Gulf of Finland and Archangel suffered from disorder (see appendix 2 pt. 1). The political changes that succeeded each other at great pace in the opening years of the eighteenth century caused a shock in the organizational structure of Dutch maritime shipping in the Gulf of Finland and Archangel. In 1702 63 Dutch ship masters sailed to Archangel and 46 others made a return journey to one of the ports in the eastern part of the Gulf of Finland, which at that time was already a war zone⁶²⁵. 10 of them visited the ports of Narva and Vy-

⁶²⁵ For reasons of clarity, the year 1702 was arbitrarily chosen as the starting point of the empirical analysis. Doing so, it was possible to touch upon the role of Nyen at the beginning of the eighteenth century, while avoiding to be distracted too much by the organizational structure of Dutch maritime shipping under Swedish rule.

borg; 26 returned to Amsterdam from Nyen. As we have already observed in the analysis of the polarization process, Nyen was a popular destination for timber exports to the Netherlands at that time. Following the conquest and consecutive destruction of Nyen in 1703 and Narva in 1704, the existing relationships between the Dutch maritime shipping population and the geographical area of the Gulf of Finland would undergo profound changes.

Narva and Nyen disappeared as possible destination for maritime shipping. Vyborg, on the other hand, which was located opposite of Narva on the northern border of the Gulf of Finland and would not be conquered by the Russians until 1710, became increasingly popular with Dutch maritime ship masters from 1705. Partly this is the result of a shift towards Vyborg of Dutch ship masters that were former members of the Narva and Nyen populations. As can be seen in appendix 6 pt. 1, this shift coincided with a less intensive shift towards Archangel. For the most part, the Vyborg population was “new” in the early eighteenth century. This population showed its first signs of routinization as early as 1705 as can be drawn from the graphs in appendix 4 pts. 9-11. This evolution could be related to a shift in the composition of Vyborg’s export in the first decade of the eighteenth century. Vyborg’s formerly popular exports of tar and pitch were gradually replaced by exports of timber products like barks, deals and (to a lesser degree) planks, which in turn could be related to the diffusion of the Dutch fine-blade sawmills across the borders of the Gulf of Finland (see *polarization* process). That this increase could take place despite the uncertainty in the Gulf of Finland, is evidence of the very high demand for timber products in the Netherlands at that time. In Archangel, a decrease in the number of Dutch ship masters could be observed until 1706. Mainly, this decrease was a consequence of the lack of new supply to the Dutch maritime shipping population, as can be observed in the graphs in appendix 4 pts. 1-3. In 1707 and 1708, the Archangel population grew significantly, thus paralleling the increase in the number of Dutch ship masters active on the Vyborg route. Despite the lack of sufficient information to actually prove it, I am inclined to believe that there is a relation between the decrease in export value, the growth in Dutch shipping and the construction of the first Dutch fine-blade sawmill in the area around Archangel in 1706. However, this novelty would not immediately be followed by its further development; warfare – again – interrupted the course of Dutch maritime shipping in the Gulf of Finland and Archangel.

(2) monopoly

The disturbances of war in the Baltic Sea eventually led to a near monopoly position of Archangel in Russian trade in the years 1709-1717 (see appendix 2 pt. 2). This near monopoly found expression in a continuous positive trend in the number of Dutch ship masters that realized return journeys to Russia’s White Sea port. Initially, Peter the Great’s attempts to promote trade via St. Petersburg instead of via Archangel seemed to have had little effect. Only in 1717, three years after Peter’s first attempts, a transformation took shape. Novgorodian and Pskovian merchants, who back in 1701 were forced to redirect their good streams to Archangel, would play a decisive role in this transformation.

The population of Dutch ship masters active on the Archangel route consisted of 436 members in the first two decades of the eighteenth century. These 436 ship masters accounted for a total of 1003 ship movements between 1697 and 1717. The average number of ship masters that made only one return journey in the course of these 21 years was 23%. In absolute numbers, this meant that 258 out of 436 ship masters, or 59%, appeared in the *schipgeldregisters* only once. Just over 40% of all members of the Archangel population in the years 1697-1717 made more than one journey to Archangel.

Making use of the charts of the changing population tool, more detailed patterns could be observed. On the chart in appendix 4 pt. 2, it could be seen that the share of “new” participants on the Archangel route grew significantly in the years 1713-1715, which would eventually lead to the all time high of 1716. This period of expansion was preceded by a period of growing specialization in the years 1709-1712. In these years, the share of “new” participants diminished in favor of a growing share of “known” participants on the Archangel route (see appendix 4 pt. 2). In 1712, the share of “new” participants decreased at an unusual pace, leading to temporary stagnation in the participation of Dutch ship masters in the Archangel trade. Thus, it had to be concluded that Dutch maritime shipping to Archangel received a new external impulse in 1713-1715. This external impulse was probably the renewed permission to export grain from Archangel. This permission, then, must have undone the awaited effects of attempts to divert trade to St. Petersburg.

By taking a closer look at the organizational patterns brought to the surface using the repetitiveness tool (appendix 3) and the changing population tool (appendix 4 pts. 1-4), it was possible to assess the behavior of the Dutch maritime shipping population towards a destination that benefited from a near monopoly position at that time. As was described above, the majority of Dutch ship masters made only one return journey to Archangel in the years 1697-1717. 178 ship masters realized two or more journeys. Of this group of ship masters, 74 had a disperse pattern with a limited number of voyages ($CR > 2$, see appendix 3). On the other hand, 104 ship masters seemed to have executed their journeys in an organized manner, limiting the time that elapsed between two return journeys and showing a preference for multiple consecutive voyages ($CR < 2$, see appendix 3). The share of these 104 ship masters in Dutch shipping to Archangel in the period 1697-1717 was 53% (529 out of 1003 ship movements)⁶²⁶. This meant that more than half of all voyages were executed by a relatively small group of ship masters that adopted strategies in which (temporarily) “fixed” routes and organizational routines played a key role. Existing assumptions about early-modern ship masters as “randomly seeking the highest possible profit” appeared to be applicable only to part of the maritime shipping population. This part of the population is large in absolute numbers and their presence is essential. The “one-time-only” participants provide the shipping population active on the Archangel route with its necessary added value. As a continuous addition of “new” supply, they are one of the necessary constituents of a stable and specialized population. Such a population of Dutch ship masters sailed the Archangel route in the first two decades of the eighteenth century.

While Dutch shipping activities in Archangel flourished, their presence in Narva, Vyborg and St. Petersburg was very small. In fact, no population had been established yet, since these cities were conquered by Russia. It would take until 1718 before the measures gathered under the umbrella of polarization would start to sort effect, but once that had happened, things changed rapidly.

(3) transformation

Archangel’s monopoly effectively came to an end in 1718, when the ports in the eastern part of the Gulf of Finland resumed their activities, now under Russian reign. The far-reaching changes of the *polarization* process described in the previous paragraph were matched by the increasingly fast adaptation of the population of Dutch ship masters to these new circumstances. The *specialization* process boosted after 1718 and resulted in the establishment of

⁶²⁶ This calculation was made on the basis of the number of shipmasters for which the average CR of the patterns they followed was smaller than 2.

a new order as early as 1724. The seven-year period between 1718 and 1724 could effectively be called a period of transformation, marked by recurrent changes in the relative position of the various ports in this study as opposed to one another (see chart 1718-1724 in appendix 2 pt. 3). The main empirical features of this process of transformation were: (1) the increasing number of gradual shifts of the shipping population active on the Archangel route to the newly established populations active on the Narva and Vyborg routes (an individual example of the first empirical feature can be found in appendix 6 pt. 2); (2) the almost complete absence of shifts from Archangel to St. Petersburg; (3) the immediate appearance of a strong interference between the populations of Dutch ship masters active on Narva and Vyborg routes; (4) the formation of a separate population of Dutch ship masters on the St. Petersburg route, with almost no previous experience in the region of the eastern part of the Gulf of Finland, or any significant interference with the other Dutch maritime shipping populations active in the same region. All these empirical features of the transformation process were observed using the spatial change tool for the years 1718-1724 (see appendix 5).

In the period 1718-1724 108 Dutch ship masters were active on the Archangel route, 152 on the Narva route, 129 on the St. Petersburg route and 103 on the Vyborg route. However, the total population of Dutch ship masters active in this period was not 492, as would be the case when all ports would have had separate populations, but 415. There was interference between the various populations active in the eastern part of the Gulf of Finland and in Archangel. This interference was the strongest between Archangel and Narva, Archangel and Vyborg, and Narva and Vyborg. The number of Dutch ship masters that was active not only on the St. Petersburg route, but also in one of the other ports in this case-study was limited to 20 on a total of 129 Dutch ship masters, or 16%. This low degree of participation of Dutch ship masters in the St. Petersburg population differed strongly from the interference rates of the Vyborg (45%), Narva (36%) and – to a lesser degree – Archangel (25%) populations.

The complex process of transformation that became apparent in the spatial change tool could be summarized in the interference overviews added in appendix 5 pts. 2-3. In these overviews, not only the situation for the years 1718-1724 is captured, but also the further developments of the same population after 1724. The degree of interference of the Dutch maritime shipping population active in the Gulf of Finland and Archangel between 1718 and 1724 became even stronger as time evolved. The period of transformation found its confirmation in the years after 1724. The growing interference between various populations was understood as an extra expression of the process of learning and rivalry that took place in 1718-1724 and that resulted in a new order from 1725 onwards.

(4) new order

The so-called new order that appeared after 1724 was marked by the absence of significant changes in the participation of Dutch ship masters on one or another route. Until 1731, the positions of the four central ports in this study would stay the same. Narva took the lead, followed by St. Petersburg, Vyborg and Archangel (see appendix 2 pt. 4). The activities of the Dutch shipping populations in the second half of the 1720s had the following characteristics: (1) in Archangel, a very small population of Dutch ship masters continued its operations; (2) in Narva, a large, highly specialized population of ship masters dominated timber exports; (3) in Vyborg, a small population of ship masters dominated timber exports; (4) in Vyborg and in Archangel, an increasing part of the Dutch shipping population interfered with that of Narva, providing evidence of a hierarchical relation in which Vyborg and Archangel welcomed Narva's overhead; (5) in St. Petersburg, a far from stable population of Dutch ship masters im-

ported and exported valuable goods. Specialization was apparent on various levels. The Archangel population was specialized in its specific route; the Narva and Vyborg populations were specialized in their routes and in the cargoes that they carried from these ports; the St. Petersburg population was – even though formally unstable – active on a route that was used for the import and export of specific kinds of goods that were valued highly at customs. By calling the period starting in 1725 a “new order”, it is by no means intended to suggest that there are no further developments to be observed. Quite the contrary. In the second part of the 1720s the empirical analysis of the various Dutch maritime shipping populations already showed many signs of growing complexity. For instance, increasing interference between the populations on the Narva and Archangel routes could be observed, which also had its effects on the composition of the Vyborg population. On the basis of the interference overviews introduced earlier (see appendix 5 pts. 2-3), it could be observed that the interference between the populations active in Archangel and in Vyborg almost completely disappeared in favor of a large increase in the interference between the Narva, Vyborg and Archangel populations. At the same time, repetitiveness breakdowns for all four ports in the case-study, would certainly provide evidence for the distinctions made between Narva and (to a lesser degree) Archangel on the one hand, and Vyborg and St. Petersburg on the other hand. The same observation could be made using the changing population tool (see appendix 4 pts. 2-3, 6-7, 10-11, 14-15).

(5) growing complexity & order under threat

In the early 1730s the growing complexity that already made its appearance in the closing years of the 1720s would become a dominant feature of Dutch maritime shipping in the Gulf of Finland and Archangel. This growing complexity took the following forms: (1) intra-year interference between populations; (2) temporary shifts to a destination other than the dominant destination when external circumstances provided unusual opportunities; (3) temporary shifts to a destination other than the one being dominant, when external circumstances forced the ship master to do so.

A closer look at the shipping patterns in appendix 6 part 3 reveals a clear repetitive character (i.e. the existence of a dominant route) in all cases. At the same time, the patterns of Dirk Claasze Hop, Gerrit Claas Hop, Jan Pieters Swaan and Jappe P. Swaan clearly show that ship masters consciously shifted from one route to the other when external circumstances required him to do so. When turning to the additional information gathered from the sources, we can get a first clue of the reasons for the emergence of these ‘pattern shifts’.

Dirk Claasze Hop carried out 22 return voyages in the years 1724-1739. Eight of them were between Narva and Amsterdam, 14 between Archangel and Amsterdam. As far as we know, Dirk Claasze Hop started his career on the Narva route, from where he imported cargoes of timber [5.2.239]⁶²⁷. He then switched to Archangel for the first time in 1726 returning with a cargo of grain (?) [5.2.239]. This journey set the tone of the next thirteen years, during which Dirk Claasze Hop annually made one return journey to Archangel early in the year [5.2.239; 5.3.266]. Interestingly enough, in four cases in the years 1730-1733, he completed a journey to Narva after having returned from Archangel [5.3.266]. This is in itself evidence of the ship master's concern with his possibilities to maximize profit. More important, however, is that this operational strategy coincided with a further evolution of Dirk Claasze Hop's activities on

⁶²⁷ Here and in the rest of the summary, numbers between [...] refer to the correspondent number in the appendices. When reference is made to one particular ship master registered in the appendices, the number will be structured as follows: [5.2.239], which means that I am talking about the ship master located under number [239] in appendix 5 part 2.

the Archangel route. From 1731 onwards, Hop returned from Archangel with an ever increasing volume of cargo (expressed in the *lastage* of the cargo⁶²⁸, or CL). Following Knoppers' analysis of the meaning of '*lastage* of the cargo' (CL) and '*lastage* of the ship' (SL), it can be stated that these cargoes did not consist of timber. Hence, in that case, CL would be equal to SL. The pattern of Dirk Claasze Hop can thus be summarized as *repetitive in routes, flexible in cargoes*. Dirk Claasze Hop's career thus contains proof of the first two types of growing complexity, namely: the appearance of intra-year interference between populations and the appearance of temporary shifts when external circumstances provided unusual opportunities. In Dirk Claasze Hop's case the export of ship loads of grain from Archangel was such an opportunity.

In the case of Jan Pieters Zwaan [5.3.709] the third type of growing complexity finds expression. As can be seen in the appendix, only when external circumstances forced him to leave the Narva route, Zwaan appeared on the Vyborg route [5.3.709]. He did not change the type of cargo that he carried, however, as the constant CL clearly shows. From 1734 onwards, the existing order seems to have been become threatened, probably as a reaction to the severe actions the local government of the St. Petersburg district (of which Narva was part) undertook to fight the increasing abuse of forest resources for export purposes (see: the *polarization* process). Ship masters from Hindeloopen temporarily moved away from Narva, and called at Vyborg, Kronstadt and even St. Petersburg and Archangel instead. These *minor shift* are exemplified by the shipping patterns of Jan [5.3.709] and Broer Zwaan [5.707]. In those cases, where the ship masters in question re-oriented from Narva to Vyborg and Kronstadt, no changes in the cargo can be found. In case of a shift to Archangel, the different route also provoked a different kind of cargo to be exported from these places..

Of course, not all ship masters were touched by the growing complexity in the organizational structure of Dutch maritime shipping in the Gulf of Finland and in Archangel. An example of a pattern that could be described as *repetitive in routes, repetitive in cargoes* was therefore included in appendix 5 part 3. The shipping pattern of Klaas Keimpes [5.3.347] differs from the previous patterns in the way that no shift to a different port of destination could be discovered in the sources. Even though such a shift may have occurred eventually, it is safe to say that the pattern of Klaas Keimpes was *repetitive in routes*. At the same time, we can see that Klaas Keimpes imported mixed cargo (Dutch: *stukgoed*) to St. Petersburg and exported products valued highly by the Danish customs officers in the Sound. Even though the actual diversity of products exported from St. Petersburg is unknown, it can be assumed that they were similar throughout the journeys. Therefore, I call this pattern *repetitive in cargoes*.

5. Generalization

The empirical results of the case-study show that the impact of a new port on the organizational structure of maritime shipping is anything but straightforward. The interplay of local and regional economic policies, infrastructural developments and the location of industries play a major role in the organization of maritime shipping destined to the places and regions that were affected by its interplay. The actual effect on the organization of maritime shipping, however, can be rather unexpected. The reason for this is that maritime shipping is an economic activity in its own right: maritime shipping is defined not only by the nodes it connects nor by its own social structures exclusively, but by both elements at the same time.

⁶²⁸ A *last* is a volumetrical measure and a measure of weight that was equal to approximately 2000 kg.

In adopting organizational strategies varying from flexibility to repetitiveness in the choice of both cargoes and routes, maritime shipping is bounded by destination, the origin of the ship master, the size of his ship and the type of cargo carried.

Connections between the region of origin of a population of ship masters and the destination(s) frequented by these populations are present throughout the relational database. Instead of presenting these patterns one-by-one, I have summarized the data in the following table.

port of destination	region of origin												
	TOT	Frisia		North-Holland		Wadden Islands		West-Frisia		Baltics		Others	
		TOT	%	TOT	%	TOT	%	TOT	%	TOT	%	TOT	%
Archangel	547	125	23%	137	25%	140	26%	84	15%	6	1%	55	10%
Kronstadt	77	40	52%	11	14%	22	29%	1	1%	2	3%	1	1%
St. Petersburg	563	97	17%	192	34%	142	25%	22	4%	80	14%	30	5%
Vyborg	400	201	50%	82	21%	85	21%	19	5%	5	1%	8	2%
Narva	2213	1537	69%	306	14%	239	11%	55	2%	42	2%	34	2%
GRAND TOTAL	3800	2000	53%	728	19%	628	17%	181	5%	135	4%	128	3%

Table 50: Relation between region of origin and port of destination, Source: Galjootsgeldregisters, 1717-1740.

What we observe in the table above, is an obvious distinction between the specialized timber exporting ports of Narva, Vyborg and the less frequented port of Kronstadt on the one hand and the ports of St. Petersburg and Archangel on the other hand. The differences are most notable with regard to the participation of Frisian ship masters in maritime shipping on these routes. Frisian ship masters accounted for at least half of all ship movements from Narva, Vyborg and Kronstadt, with an exceptionally high number of movements originating in Narva (69%). On the other hand, ship masters from Frisia were not involved in maritime shipping on the Archangel or St. Petersburg routes to an extent higher than 23%. On these routes, ship masters from North-Holland and from the Wadden Islands were in favor. Of particular importance is the extent to which West-Frisian ship masters were active on the Archangel route as opposed to the other routes mentioned in the table. 15% of all Dutch ship movements on the Archangel route in the years 1717-1740 were executed by West-Frisian ship masters, most of them coming from Warder. This share is exclusive for Archangel and deserves to be studied in detail. Apparently, some of these ship masters made a shift to Narva at some point, which is reflected in the absolute numbers for West-Frisian ship masters on the Narva route; the share of these West-Frisians on the Narva route, however, remained very small (2%). The overall picture that evolves from the table above is one of specialization of Frisian ship masters in timber exports from the eastern Gulf of Finland. The exports of other goods (like hemp, for instance) were concentrated in St. Petersburg and to a lesser degree Archangel in the years 1717-1740. Frisian ship masters participated in these exports only to a limited extent, while ship masters from North-Holland and the Wadden Islands had a greater share on these routes. To sum up, we can indeed observe interdependence between the origin of the ship master and the port of destination, as this has already been recognized by Unger and Lindblad and De Buck. More precisely, we can observe that ship masters from one region seemed to be able to gain a dominant position on a limited number of routes. In the cases of Narva, Vyborg and Kronstadt, this position can be directly related to the export

characteristics of these ports (timber exclusively), while in the cases of Archangel and St. Petersburg the situation is less equivocal. However, even in those cases, the underlying patterns of flexibility and repetitiveness in terms of cargo, origin and destination are equally present.

In the following tables, relations between the port of destination and imported cargo, and the port of departure and exported cargo are established on the basis of the number of ship loads of one type of cargo per port of destination/departure.

CARGO	TOTAL	KRONSTADT	NARVA	ST. PETERSBURG	VYBORG
timber	650	52	452	16	130
grain	56	9	21	17	9
hemp	132	4	6	114	8
iron	7	1	0	6	0
leather	44	0	6	38	0
blanc	137	14	21	99	3
various	426	32	296	5	93
others	50	1	11	26	12

Table 51: Relation between port of departure and exported cargo. Number of ship loads counted. Source: Dutch Sound toll tables, 1714-1740.

It is fair to say that a strong relation between cargo and port of departure existed. Narva, Vyborg and Kronstadt were – before all – specialized in timber exports, while St. Petersburg played a profoundly different role. Exports from St. Petersburg consisted primarily of ship loads containing hemp, iron, juchten and to a lesser degree grain. There is little interference in the type of goods carried from Narva and Vyborg on the one hand and St. Petersburg on the other hand. This lack of interference becomes even more striking when looking at the table containing an overview of imported cargo per port of destination.

CARGO	TOTAL	KRONSTADT	NARVA	ST. PETERSBURG	VYBORG
ballast	1014	10	844	34	126
mixed cargo	214	0	3	202	9
tobacco	5	0	0	0	5
wine	14	0	1	13	0
salt	46	0	10	9	27
blanc	16	0	3	11	2
various	2	0	1	1	0
others	6	0	1	3	2

Table 52: Relation between port of destination and imported cargo. Number of ship loads counted. Source: Dutch Sound toll tables, 1714-1740.

Indeed, timber exports from Narva, Vyborg and Kronstadt coincided with the almost complete absence of cargo on the journey towards these destinations (marked by the notion *ballast*), whereas ship masters on their way to St. Petersburg usually had their ships loaded with mixed cargo and sometimes with wine. Only in a small number of cases did ship masters on their way to Narva or Vyborg carry tobacco or salt, thus making use of the very limited import possibilities that these ports had. The difference between St. Petersburg as opposed to the

other ports in the eastern part of the Gulf of Finland must be understood as a direct consequence of the *polarization* policy that was adopted in favor of St. Petersburg. However, this is not the complete story. In the following paragraph, I will substantiate that a strong relation also existed between the region of origin of the ship master and the cargo that he carried. This will be a preparatory step towards the final part of my argument.

Having established strong relations between port of destination and the origin of the ship master and between port of destination (or departure) and cargo carried from them, it no surprise that a strong relation can also be found between the region of origin of the ship master and the cargo that he carried. The obvious differences in the strategies adopted by ship masters originating from various regions in The Netherlands finds expression in the following breakdown of type of cargo per region of origin of the ship master

CARGO	TOTAL	FRISIA	N-HOLL.	WADDEN	W.-FRISIA	S.-HOLL	OTHERS
timber	650	358	176	45	18	36	17
grain	56	22	27	4	1	0	2
hemp	132	28	69	19	6	3	7
iron	7	1	5	0	0	0	0
leather	44	4	32	8	0	0	0
blanc	137	37	69	8	2	5	16
various	426	223	162	20	13	2	6
others	50	11	25	7	1	0	6

Table 53: Breakdown of type of cargo per region of origin of the ship master; number of ship loads counted. Source: Dutch Sound toll tables, 1714-1740.

The breakdown of type of cargo per region of origin of the ship master clearly shows that there is limited interference in the type of goods that they carried between the ship masters from different regions of origin. Despite the obvious limitations of the source material⁶²⁹, it is obvious that timber exports were controlled by Frisian ship masters. The participation of ship masters from North-Holland, South-Holland and the Wadden Islands was small compared to that of Frisian ship masters, but nevertheless the number of ship loads of timber products was the largest in these regions as well. Especially ship masters from South-Holland seemed to have been specialized in timber exports from the Gulf of Finland, albeit on a much smaller scale than the Frisian ship masters. Ship masters from North-Holland were dominant in the exports of iron, hemp, different kinds of grain and Russian leather. Remarkable, and in line with the established relations between the region of origin and the port of destination of the ship master, is the small number of ship loads that was carried by ship masters originating in Western-Frisia.

The enormous differences between the contents of ship loads destined to or originating from St. Petersburg and ship loads to and from the other ports in the easternmost part of the Gulf of Finland can now find their final confirmation through the observation of the average customs duty paid per last of cargo exported by Dutch ships from the Gulf of Finland (unfortu-

⁶²⁹ The overview presented here was compiled on the basis of data gathered from the Dutch Sound toll tables. So, there is no data available about shipmasters from Archangel. Unfortunately, in a considerable number of cases, no indication of the cargo carried was given in the Dutch Sound toll tables (blanco), while in other cases, large groups of different goods were gathered together without making it possible to connect one good to one particular shipmaster (various). On the other hand, in the majority of cases, only the dominant item of cargo is named, which makes the Dutch Sound toll tables a very convenient source for the creation of summaries like the table above.

nately, no similar data is available for Archangel).

Indeed, what can be observed here is the difference between so-called *rich trade* of small quantities of expensive goods from St. Petersburg as opposed to *bulk trade* of large, voluminous quantities of cheap (semi-)raw materials from Narva and Vyborg. The average custom paid for one last of cargo coming from St. Petersburg in the years 1722-1740 was 2,9 *rikstaler*. One last of cargo coming from Narva or Vyborg cost only 0,2 resp. 0,3 *rikstaler* at the Danish customs house in Helsingør. When taking a closer look at the data that constituted the basis of this calculation, the discrepancy becomes even more apparent. The total tonnage of cargo exported from Narva between 1722 and 1740 exceeded that of St. Petersburg more than eight times (338213 lasts of cargo from Narva against 41668 lasts of cargo from St. Petersburg), while the number of Dutch ships coming from Narva (2684) was only 3,5 times as big as the number of Dutch ships coming from St. Petersburg (810). At the same time, the total amount of customs paid by Dutch ship masters on ship loads coming from Narva (84549 *rikstaler*) accounted for only 71 % of the total amount of customs paid by Dutch ship masters on ship loads coming from St. Petersburg (119494 *rikstaler*).

In the previous paragraphs, I have explained how the polarization and specialization processes influenced the organizational structure of Dutch maritime shipping in the Gulf of Finland after the foundation of St. Petersburg. In the empirical analysis, I have substantiated that ship masters adopted a number of different strategies in their choice of routes and cargoes, varying from repetitive to flexible patterns. I have denoted the impact of external shocks on the ship masters' patterns, distinguishing between minor, temporary shifts and major, permanent changes in the ship masters' behavioral patterns. Until now, however, I have not explicitly paid attention to one underlying explanatory factor that – together with origin of the ship master, cargo carried and port of destination – played a decisive role in the formation of routes and routines. This final explanatory factor is the size of the ship.

The decisive role of the size of the ship can be substantiated by proving its connection to type of cargo carried, origin of the ship master and destination of the ship. It goes without saying that the size of the ship influenced the destination of the ship master and the type of cargo that he carried. In the following table, the recurring discrepancy between St. Petersburg and the other ports in the eastern part of the Gulf of Finland is present once again. On the basis of data compiled from the *galjootsgeldregisters*, it becomes clear that the ships used by the St. Petersburg population of Dutch ship masters were much smaller than those used on the Narva, Vyborg and Archangel routes⁶³⁰. Seemingly, ships of all sizes were present on all routes. It must be noted, however, that the table above is a static representation of the average ship sizes during the years 1722-1740. On the basis of this table, it is unclear whether or not the occurrence of temporary shifts might have blurred this representation; neither does this overview say anything about the number of small or large ships in the fleets to either of these ports.

	ARCHANGEL	NARVA	VYBORG	ST. PETERSBURG
AVG	133,2	135,5	124,6	65,3
MIN	27	24	22	15
MAX	230	210	216	180
STDEV	42,7	34,8	43,3	29,4

Table 54: Ship size distribution. Source: Galjootsgeldregisters, 1722-1740.

⁶³⁰ The table is based on standardized name and size information of all ships.

To sum up, in order to understand the impact of a new port on the organization of maritime shipping it is necessary to take into account both the interplay of economic geographical circumstances and the complex organizational structure of maritime shipping. In my case-study the interplay of economic geographical circumstances took the form of a process of *polarization*; while the evolution of the organizational structure of Dutch maritime shipping was described as a process of *specialization*. As became clear in the empirical analysis, both individual behavioral strategies of Dutch maritime ship masters and changes in the behavior of populations of ship masters could be related to the processes of *polarization* and *specialization*, resulting in an evolutionary pattern that shows remarkable resemblance to the theoretical analytical framework of evolutionary economics elaborated by Dopfer et. al. This, in turn, is proof of the successful application of evolutionary theory to a profoundly economic historical topic. The analysis of micro cases and their subsequent integration into a broader scope have clearly shown that databases in which the evolutionary framework of Dopfer, Foster and Potts is reflected enhance the explanatory possibilities of economic historians.

On the basis of the empirical analysis summarized above, it was possible to compile a preliminary taxonomy of shipping patterns on the basis of a continuous trade-off between cargo, port of destination and origin of the ship master. Dependent on the ship master's preferences with regard to cargo and destination, the following scheme could be established:

Routes/cargoes	Flexible	Repetitive
Flexible	Various cargoes, various routes	Various cargoes, one route
Repetitive	One cargo, various routes	One cargo, one route

Table 55: trade-off between repetitiveness and flexibility in the choice of cargo and routes

As I have elaborated in the analytical paragraphs of this paper, the combination of flexibility in routes and flexibility in cargoes occurred in the lesser amount of cases. The majority of cases showed evidence of flexibility towards either cargoes or routes, with a responsive higher or lower degree of repetitiveness in the choice of the corresponding variable. The last type of pattern, in which one cargo is exported from one port for a long period of time, often occurred in the shipping records, mostly in combination with temporary rises in flexibility in either cargoes or routes. The trade-off between flexibility and repetitiveness in routes and cargoes alone lacked the necessary explanatory power to address these temporary changes in *repetitive in routes*, *repetitive in cargoes*-patterns. This was where the third variable – *the external shock* – came into play. Based on the nature of the shocks, I have made a distinction between *minor shifts* and *major shifts*. As a rule, temporary changes in a *repetitive in routes*, *repetitive in cargoes*-pattern were defined as a *minor shift*. Permanent changes in the ship masters' routes were defined as *major shifts*. The analysis of the source material has brought a number of possible explanations for these shifts to our attention. Economic policy changes in the geographical areas that serve the port of destination of the ship master were the most common explanatory factor. Additionally, (cultural) changes in the region of origin at the port of destination also provoked shifts in the ship masters' behavioral patterns. The localization – be it in a physical or in a political sense – of the explanatory factors of *minor* and *major shifts* in the geographical areas connected to the port of destination and to the origin of the ship masters was interpreted as a call for the interpretation of maritime transportation as an economic activity that has its own, independent structures, while at the same time being

complemented by economic change in the 'nodes' that these transportation structures connect. In order to fully comprehend the changes that occur in shipping patterns as a consequence of *minor* or *major shifts*, it is necessary to define these 'nodes', i.e. the ports of destination, in their regional economic environment. The resulting view is one of maritime transportation as an *integral economic activity*.

I have underlined the importance of choice in the behavior of Dutch ship masters in the first half of the eighteenth century. The regional characteristics of both the areas surrounding possible ports of destination and the areas of origin of the ship masters have been put forward as decisive elements in the direction of the choices made by ship masters. Additionally, we have identified a number of factors that limit and structure the choices of ship masters in certain directions. Regional economic policies and the geographical embeddedness of the ship master in his region of origin have been described. As a result, we have established that ship masters operated within a multifaceted context in which the geographies of markets on the supply and on the demand side are main constituents.

Looking back at the detailed information in the appendices and at the statistical data in the previous paragraph it is fair to say that the ship master cared about the efficiency of his operations. Only when circumstances forced him to do so, would the ship master change his destination. Depending on the type of circumstances, be it a political change or a change on the demand side, the shipping patterns that evolved, showed a tendency towards more flexibility in the choice of either routes or cargoes. The examples where a relatively high degree of flexibility could be observed both in the treatment of cargoes and in the choice of routes are small in number, probably because of the higher operating costs involved in these continuous strategy changes.

With this final remark, we can finalize the attempt to generalize the results of the case-study on Dutch maritime shipping in the Gulf of Finland and Archangel in 1703-1740 by pointing to the presence of efficiency as a primary concern throughout the organizational structure of early-modern Dutch maritime shipping. In this sense, the analytical results of this paper serve as an answer to Paul van Royen's statement that "[the assumption] that ship masters 'specialized' in the navigation to a certain sea, as it is usually taken for granted, still has to be proved".