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The Determinants of International Migration in Early Modern Europe: Evidence from the Maritime Sector, c. 1700–1800[1]

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Abstract

This paper offers the first multivariate regression study of international migration in early modern Europe. Using unique eighteenth-century data about maritime workers, we created a data set of migration flows among European countries to examine the role of factors related to geography, population, language, the market and chain migration in explaining the migration of these workers across countries. We show that among all factors considered in our multivariate analysis, the geographical characteristics of the destination countries, size of port towns, and chain migration are among the most robust and quantitatively the most important factors influencing cross-country migration flows.

Keywords: international migration, economic development
JEL: F22, F63

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Non-technical summary

Migration was a common feature of pre-industrial societies. Because the vast majority of migrations took place within the confines of a country, a province or even a parish, in most cases such moves occurred over relatively short distances. However, long-distance migrations, involving moves of hundreds of kilometres or more, often of individuals entering foreign territories, were hardly rare (Page Moch 2003; Manning 2005; Van Lottum 2007; Bade et al. 2013). Recent estimates show that international mobility levels increased strongly after the medieval period, peaking in the late seventeenth century. In the latter half of the seventeenth century an estimated 8 percent of European individuals (residents of Russia excluded) could be considered an international migrant (Lucassen and Lucassen 2009). These numbers were surpassed only during the mass migrations to the New World in the nineteenth century (Hatton and Williamson 1998). Traditionally, studies on early modern international migration focus on two groups in particular: refugees and elite migrant groups (or individuals from them). Notwithstanding the substantial cultural and economic importance of these migrant groups, in reality they constituted only a fraction of Europe's internationally mobile population (Lucassen 2012).

This paper offers the first multivariate regression study of international migration 'common men and women' in pre-industrial Europe. Using unique eighteenth-century data about maritime workers, we created a data set of migration flows among European countries to examine the role of factors related to geography, population, language, the market and chain migration in explaining the migration of these workers across countries. We show that among all factors considered in our multivariate analysis, the geographical characteristics of the destination countries, size of port towns, and chain migration are among the most robust and quantitatively the most important factors influencing cross-country migration flows.

Introduction

Migration was a common feature of pre-industrial societies. Because the vast majority of migrations took place within the confines of a country, a province or even a parish, in most cases such moves occurred over relatively short distances. However, long-distance migrations, involving moves of hundreds of kilometres or more, often of individuals entering foreign territories, were hardly rare (Page Moch 2003; Manning 2005; Van Lottum 2007; Bade et al. 2013). Recent estimates show that international mobility levels increased strongly after the medieval period, peaking in the late seventeenth century. In the latter half of the seventeenth century an estimated 8 percent of European individuals (residents of Russia excluded) could be considered an international migrant (Lucassen and Lucassen 2009). These numbers were surpassed only during the mass migrations to the New World in the nineteenth century (Hatton and Williamson 1998). Impressive as they may be, such estimates underplay the impact of international migration in economic core regions, which were invariably located in urban areas. For instance, in Amsterdam around 1700 – at the time still one of early modern Europe's key economic centres – no less than 40 percent of its population had been born abroad (Lucassen 2002). In the sending countries the impact was large, too; around 1650, one in every ten individuals born in Scotland was living abroad (Van Lottum 2007).

Traditionally, studies on early modern international migration focus on two groups in particular: refugees and elite migrant groups (or individuals from them). Famous refugee migrations include those of Protestant Huguenots who fled persecution in seventeenth- and eighteenth-century France to various cities in northwestern Europe (Schilling 1983; Pettegree 1986; Cottret 1991), and the Southern Netherlanders who moved from the Spanish Netherlands to the young Dutch Republic in the late sixteenth and early seventeenth centuries (Gelderblom 2000; Briels 1978). An earlier example is the well-documented Jewish diaspora from the Iberian Peninsula following the Alhambra Degree in 1492 (Edwards 1988; Israel 1985;

Ruderman 2010). Other, no less conspicuous migrations given ample attention in the historiography are those of (international) merchants and other prominent migrant groups comprising scientists, intellectuals and artists (Bade et al. 2011).

Notwithstanding the substantial cultural and economic importance of these migrant groups, in reality they constituted only a fraction of Europe's internationally mobile population (Lucassen 2012). Not unlike in the industrial (and post-industrial) era, during the early modern period international migration consisted mostly of men and women travelling from one country to another in search of work or economic betterment. This internationally mobile group included a variety of occupations that are usually labelled as unskilled or semi-skilled: domestic servants, petty traders, cobblers, day labourers, soldiers as well as the group that is the focus of this study, seamen (Moch 2003). The importance of labour mobility of 'common' workmen *and* working women for the eighteenth-century economy is difficult to overstate. Although during the seventeenth and (particularly) the eighteenth century important advances in technology were made, labour inputs remained an essential ingredient in bringing about economic expansion (Allen 2009; Mokyr 2002; Mokyr 2010). Therefore, as local or regional population growth was often not sufficient to satisfy labour demand – particularly in urban environments – the influx of immigrants was a structural prerequisite to maintaining a healthy economy. Even though the actual involvement of migrant workers could differ from sector to sector and from region to region, most economic core regions were therefore characterised by high levels of immigration; often from close by, but there were also many migrants from abroad (De Vries 1984).

The international migrations of 'common men and women' in pre-industrial Europe have been receiving scholarly attention in recent years. Insights have been gained into the processes of integration and assimilation (Moch 2003; Kuijpers 2005; Sogner 1993) and the mapping of key migration routes on the continent (Van Lottum 2007). What is lacking for this period, however, are quantitative studies analysing the drivers of international labour

migration. This is not to say there has been no attention paid to factors shaping pre-industrial labour migrations. Several studies have highlighted the importance of the classic drivers of labour migration caused by unequal economic development, such as wage differentials and divergent economic opportunities (Lucassen 1987; Bade 2003; Van Lottum 2007; Van Bochove 2008; Van Lottum 2011). Others have emphasised the importance of 'softer' determinants of migration such as the existence of trade connections and migrant networks (Lesger 2006; Sogner 1993; Antunes 2013). Nevertheless, although some work has been done on a national level (e.g., Kitch 1986 on migration to London), no rigorous quantitative analyses currently exist that aim to uncover the principal forces behind international labour migration in the pre-industrial era.

This paper aims to shed light on this underexplored topic by focusing on the determinants of international migration in early modern Europe. Specifically, it offers a quantitative examination of the drivers of international migration by focusing on the maritime sector at the beginning and the end of the eighteenth century in Europe. Because general statistics on international mobility are not available for the pre-industrial (i.e., pre-census) era, we believe that a sectoral perspective focusing on a key segment of the pre-industrial European economy provides a good alternative. The maritime sector is one of the best documented sectors of early modern Europe (Lucassen and Unger 2011; Van Royen et al. 1997), and as far as we are aware it is the only sector that allows the creation of migration flows between European countries using a single source. Most importantly, it was shown that it reflects well general trends in international migration flows (Van Lottum et al. 2009; Van Lottum 2007; Van Lottum 2011; Van Lottum 2015; cf. Lucassen 2002). Creating these country-level international migration flows makes it possible to examine the effects of geographic, population, linguistic, and market characteristics of European countries as well as the role of chain migration, and the international political situation on the migration of maritime workers across countries.

The lack of quantitative studies on international migration in early modern times is in stark contrast with studies on nineteenth-century migration (often referred to as the Age of Mass Migration) in which quantitative assessment of the determinants of international migration flows (using country-level data) is one of the central themes (see in particular the work of Hatton and Williamson [1998 and 2008]). This imbalance in attention to the determinants of international population movements means that we have very little knowledge about how the underlying principles of this earlier phase of international migration differed from those of the industrial era. In a seminal paper published in the *Journal of Global History* in 2009, Lucassen and Lucassen (see also Lucassen and Lucassen 2010) argued against what has become known as the *mobility transition* thesis, a theory formulated in 1971 by the geographer Wilbur Zelinsky. This theory argued that the industrial era demarcated a clear break with the early modern period; only with the advent of modernisation did the European population become truly mobile. Presenting new estimates of pre-industrial migration rates (Lucassen and Lucassen 2009; Lucassen and Lucassen 2010), the two authors refuted this claim; they convincingly showed that before industrialisation European populations had already been highly mobile and that the transition to modernisation did not result in a substantial break (i.e., a take-off) in migration levels. Nevertheless, we know very little about whether the transition to industrialisation meant any change in the nature and extent of international migration, as no rigorous analyses exist about the driving forces behind early modern international migration.

The paper is structured as follows. First, in the next section we will discuss the dataset and its origins and elaborate on how migrations in the maritime sector relate to international labour migration in general. We will then explain the variables we will use in our analysis. After laying out our multivariate analysis of the key determinants of migration, we will discuss the results.

Dataset

The analysis in this paper makes use of the Prize Paper Dataset (PPD), a dataset containing a variety of data relating to the eighteenth-century maritime sector. The initial data collection took place as part of the ESRC–funded project "Migration, human capital and labour productivity: The international maritime labour market in Europe, c. 1650–1815," and has been coded and standardized. This data have been used in a number of studies, including assessments of human capital and labour productivity levels in the eighteenth-century maritime sector (Van Lottum and Van Zanden 2014). The PPD consists of two relational databases: one pertaining to ships and one to their crews. The PPD contains circa fifteen thousand individual individuals who served aboard more than four thousand ships in a span of time that covers different periods between 1702 and 1803. In this paper we focus on two distinct periods from the dataset, each covering about a decade. Period 1 covers the start of the eighteenth century, from 1702 to 1712; Period 2 begins in the last decade of the eighteenth century and extends into the nineteenth: 1793–1803.

The PPD uses data derived from a section of the archive of the High Court of Admiralty (HCA): the interrogation of persons on board of those ships taken as 'prizes' by the British Navy or private men-of-war (TNA HCA 32) (Van Lottum et al. 2011). To establish whether a ship or its goods could be regarded a rightful prize, the High Court of Admiralty had to decide whether the ship in question indeed belonged to an enemy nation, and also whether this determination applied to its crew and cargo. This was established, among other means, through the questioning of a selection of crew members. These interrogations followed a standardised procedure, which by the end of the eighteenth century consisted of 34 questions. The questions concerned personal information such as the interrogee's age, place of birth and residence, but also related to information about the ship (e.g., its age, the place where it was built), the voyage

(its origin and destination, for example) and its cargo (for instance, the exact contents of the cargo and further information concerning ownership).

Given the fact that crews were interrogated during times of international conflict, an important issue is the extent to which the data from the PPD provides a normal representation of migratory behaviour. We believe that it does. Analysing labour productivity levels using the PPD, Van Lottum and Van Zanden (2014) showed that the data from the PPD do not demonstrate any bias. A comparison of labour productivity levels (measured in tons per man) between times of peace and war showed that there were no significant changes in performance: ships tended to sail with a similar tonnage and the same number of men.

The dataset covers a broad geographical range. Because ships could carry a false flag, British privateers – who operated in all European seas – seized nearly every ship they came across, regardless of the true nation of origin. As a result the archive covers ships and crews from *all* maritime nations in the north Atlantic. This includes Britain itself – ships taken by an enemy ships that were subsequently retaken had to follow the standard interrogation given to crew members of all other ships. As a result, the PPD covers all maritime nations in Europe. This is shown in Figure 1, which depicts the places of origin of crews in the PPD.

[FIGURE 1 about here]

Immigration rates, the dependent variable in our analysis, is derived from the PPD. Based on standardised categories to register countries of birth, residence and employment, all individuals in the PPD have been assigned a migration code: N, M or NRM. Native workers (N) lived and worked in their country of birth, migrant workers (M) lived and worked in a country other than their country of birth, while non-resident migrants (NRM) resided in their country of birth but worked for foreign employers (in the migration literature they are often referred to as temporary workers) (Lucassen, 1987). In our analysis we focus solely on the

sedentary M category, which we use to calculate the size of migration flows between pairs of countries – i.e., from country of birth to country of residence. As there were significant changes in national territories between the beginning and end of the eighteenth century we have used present-day borders instead of historical ones. Despite the obvious anachronisms (Belgium, for instance, did not yet exist, nor was there a unified Germany), this will not hamper our analysis; we believe the use of modern borders allows for a more consistent comparison of the migration flows between the beginning and end of the eighteenth century. For Period 1 (c.1700) our analysis is based on 77 country pairs, consisting of 14 recipient countries; Period 2 (c.1800) consists of 94 country pairs and 19 recipient countries.[2]

The migration flows that can be constructed from the PPD not only provide a unique insight into international migration in the maritime sector, they also offer a good representation of general trends in international migration during the early modern period. Comparison between the general trends of international migration in early modern Europe and studies focused on international migration to specific countries show that the size and direction of migration flow match well with those constructed using the PPD. A first example of the latter is provided in Table 1 below, in which we compare data from the PPD to Lucassen's (2002) estimates of the size of four migrant communities in the province of Holland (based a range of [in particular] civic sources). The latter study is one of the few studies that provides a reliable national estimate of immigration levels for the early modern era. Applying the same categorisation as Lucassen, Table 1 shows that the PPD provides largely similar figures. Not

[2] Using present-day borders and names this involves the following countries: 1700: Belgium, Denmark, England, France, Germany, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Scotland, Spain, Sweden. 1800: Belgium, Denmark, England, France, Germany, Ireland, Northern Ireland, Italy, Lithuania, the Netherlands, Norway, Poland, Portugal, Scotland, Spain, Sweden, Switzerland, Ukraine, Wales.

only does the overall share of foreigners in Holland match Lucassen's estimate, but the size of the individual migration flows are also largely similar.

[TABLE 1 about here]

Turning from the more specific, national-level perspective to broader continental migration flows, we find a further illustration of the representativeness of the migration flows based on the PPD when we look at a visualisation of the major migration patterns based on the PPD in Figure 2. These maps depict the direction of the 20 largest migration flows at the beginning and end of the eighteenth century. Two key observations, exemplifying the representativeness of the PPD migration data, can be made. First, the maps show distinct differences in the level of international labour mobility in northern and southern Europe. Figure 2 shows that in both Period 1 and 2 the most sizeable migration flows were to be found in northwestern Europe.

[FIGURE 2 about here]

The relatively low level of international labour mobility in southern Europe, as opposed to high levels in the northwestern part of the continent, is consistent with more general assessments of migration in the early modern period, which show that a key feature of early modern labour migration patterns was the marked difference in the level of international (labour) mobility between northern and southern Europe (Lucassen and Lucassen 2010). A second observation is that the maps show that within northern Europe very little migratory contact between England and the continent existed – this is also visible in Table 1. This, too, mirrors the more general picture of migration patterns in early modern Europe emerging from

the literature, which identifies a British migration system as relying on a native labour supply to a far greater extent than its continental counterpart (Van Lottum 2007; Van Lottum 2011).

Empirical Framework and Explanatory Variables

An analysis of migration flows across countries can be framed using standard approaches to migration in which migration flows are related to the characteristics of countries of origin – so-called push factors – and/or those of destination – pull factors. We have decided to analyse migration flows between the pairs of countries from the vantage point of the *destination countries*, hence we focus on the pull factors. In our regression model, migration rates ca. 1700 and 1800, respectively, are related to nine independent variables. These can be subsumed within four broader groups of explanatory variables: geographical characteristics, population and linguistic characteristics, market characteristics, and chain migration. Table 2 offers the definitions of each variable, followed by text that discusses each in greater detail.

[TABLE 2 about here]

Geographical characteristics include three variables: the distance between the country of origin and the destination country, an indicator of a common border between the destination and the country of origin, and the length of coastline. The distance between the origin and destination country is seemingly straightforward, and one would expect it to have, at greater distance, a detrimental effect on migration flows. The existing research on pre-industrial migration, however, points out while in some cases distance really discourages potential migrants (e.g. the case of London analysed by Schwartz 1973), this is not always the case. For example, Amsterdam – the key Dutch economic core – attracted more migrants from Germany and Scandinavia than from elsewhere in the Dutch Republic (Lucassen 1996). Therefore we

pay close attention to this factor so that we can reliably establish the role of distance in migration flow across European countries.

Migration distance can be calculated in numerous ways. The most straightforward option we consider is the calculation of straight-line Euclidean distance (or 'as the crow flies'), which is calculated by measuring the distance between the geometric centres of the countries of origin and destination.[3] Other varieties we consider record the distance between the largest sea ports, or the distance between the capitals of the respective countries.[4] An alternative way of measuring the distance, and more closely related to the actual distances travelled by the migrants, is the distance between country of origin and destination travelled over sea (the sea route), using the largest port of the country of origin and destination as point of departure and arrival, respectively.[5] Our preferred measure is this last one, but, as robustness check, we have also used the other three measures of the distance between the origin and destination countries, as will be discussed in the next section.

While this aspect is certainly crucial, other characteristics related to the geographical position of the countries can also influence migration flows. We consider the existence of a common border between the origin and destination countries – this variable has received significant attention in studies on contemporary migration (see e.g., Helliwell 1998). We will

[3] The longitude and latitude of the country centroids, necessary to calculate Euclidean distance are based on: https://www.pdx.edu/econ/country-geography-data.

[4] Based on De Vries (1984).

[5] De Vries' (1984) urbanisation estimates are used to determine the largest port cities for each country in 1700 and 1800; the distance travelled by sea is calculated using the tool available on: http://ports.com/sea-route/. For obvious reasons, no such distance could be calculated for countries lacking *direct* access to sea, which in our dataset applies to Switzerland and Ukraine (as Note 2 indicates, two countries for which we have data available only for 1800).

use the length of a country's coastline as an indicator of its maritime potential.[6] We are the first to examine the impact of both factors on migratory patterns in early modern times. The total size of (sea)port populations, based on De Vries' (1984) urbanisation figures,[7] are used to investigate an important premise of the basic gravity model of migration, which suggests that, ceteris paribus, the size of the population in a destination has an important (positive) effect on migrations as this means a larger labour market for immigrants (Lewer and Van den Berg 2007). Because we take a sectoral approach in this paper, in contrast to most national studies we zoom in on the population of port cities, because this most effectively represents the destination labour market.

Linguistic similarities between the countries are captured by a binary variable indicating whether the destination and the country of origin share a common language or not.[8] Language characteristics of origin and destination countries have received attention in studies analysing contemporary migration (e.g., Adserà and Pytliková 2015), but not in the research on early modern migration. There are studies on early modern migrations that consider the role of other migrants in the destination country speaking the same language (see, for instance, Kuijpers 2005; Page Moch 2003; Janssen, 2016). These studies, however, primarily discuss the value of migration networks in facilitating information (something we capture with the chain

[6] The length of coastline is provided by the CIA World Factbook: https://www.cia.gov/library/publications/the-world-factbook/. As explained in note 6, no data is available for Switzerland and Ukraine.

[7] For 1700 the total size of port city populations could not be calculated for Norway and Northern Ireland; as De Vries applies a minimal size of 5.000 inhabitants, the populations of the main ports in these countries were too small to be included in his dataset. As mentioned in note 6, Switzerland and Ukraine lacked direct access to sea, therefore no data was available for these countries.

[8] This is based on the majority language in a country, source: https://www.cia.gov/library/publications/the-world-factbook/.

migration variable discussed below) rather than specifically the linguistic similarities between countries, as is usually the case in studies on contemporary population flows.

The group of market characteristics include the market potential of the destination country, and labour productivity in the maritime sector in that country. Market potential is expected to be an important migration factor as it captures the economic viability and strength of the destination country's maritime sector, hence its potential for migrants to achieve some degree of economic success.[9] Research on twentieth-century Europe has also shown it to have an important effect: migrants follow market potential (Crozet 2004). We are not aware of any studies on pre-industrial Europe that examine the effect of market potential on the flows of international migrants; ours would be the first to do so.

Labour productivity in the maritime sector has shown to increase substantially during early modern times, often outstripping productivity growth in other sectors (Lucassen and Unger 2011).[10] Since this offered opportunities for economic betterment of incoming migrants, we consider it to be an important factor affecting international migration and include it into our regression analysis. As such, it also serves as a proxy for maritime wage data, which unfortunately very scarcely available for this period (Van Royen et.al 1997).

[9] We calculate market potential as a weighted average of the population of all countries in our sample. Population size is based on data provided by Clio Infra: https://www.clio-infra.eu/Indicators/TotalPopulation.html#datasets. The weights are the inverse of a distance between the countries. Since we analyse the maritime sector, the distances are calculated between the major seaports of the countries (see note 6). As a robustness check, we use distances between the countries' capitals and between the countries' centroids, respectively. The results were qualitatively unchanged; they are available from the authors upon request.

[10] In this paper we use estimates of labour productivity provided by Van Lottum and Van Zanden (2014). The index of productivity used in this study is a tonnage per man ratio, and is – as indicated in the previous section – calculated using data from the PPD. Van Lottum and Van Zanden's study provides labour productivity estimates only for the following countries: Portugal, Italy, France, Belgium, Ireland, England, Scotland, Spain, Denmark, Norway, the Netherlands, Sweden, Germany.

Chain migration, which constitutes the network of migrants in the destination country, has been identified as an important determinant of early modern international migration flows; migrants already settled abroad are thought to have facilitated the migration and settlement of compatriots (Page Moch 2003; Hoerder 2002; Janssen 2016). This is very instructive, but unlike the extensive research into international migration in the nineteenth century (see in particular Wegge 1998; Hatton and Williamson 1998), the approach to early modern migration is chiefly qualitative. Studies offer detailed qualitative accounts of the importance of migration networks in providing information about economic possibilities in foreign destinations (Lucassen 1987) and the way such information was transmitted between 'home' and 'abroad' (Sogner and Van Lottum 2007). Our study, however, is the first quantitative analysis of chain migration for the early modern period.

Regression Analysis

Using the explanatory variables discussed in the previous section, and summarised in Table 2, our regression specification is as follows:

$$migrinflow_{ij} = \alpha + \beta_1 Geo_j + \beta_2 Pop_j + \beta_3 Market_j + \beta_4 ChainMigr_j + \gamma_i + \delta_j + \varepsilon_{ij} \quad (1)$$

where $migrinflow_{ij}$ is migration inflow from country i to country j; variables Geo_j, Pop_j, $Market_j$, $ChainMigr_j$ denote the vectors of geographical, population and linguistic, market, and chain migration variables; γ_i and δ_j are origin and destination-country indicator variables, and ε_{ij} is error term. We estimate equation (1) with OLS and use heteroscedasticity-robust standard errors. The consistency of the estimator requires all variables to be exogenous. Admittedly, some of the variables related to the population, market potential, and labour productivity might

be endogenous. Therefore, we decided to be conservative and will interpret our results as indicators of important multivariate correlations rather than of necessarily causal relationship.

We also consider the issue of multicollinearity among the explanatory variables. Correlation coefficients among the variables revealed that only the correlation between market potential and labour productivity in the maritime sector might give rise to the multicollinearity issue (correlation is about 0.7), therefore we estimated equation (1) with each of them separately as well as together. Correlations among other variables are low: even the correlation between market potential and distance is only about 0.4. Despite the inevitably high correlation between the market potential and the labour productivity of the maritime sector, we conjecture that they each capture different factors affecting migration flows. Market potential may be a proxy for economic opportunities opened up to the maritime sector, but these may not be immediate. Labour productivity in the maritime sector, on the other hand, captures monetary gains, which are more immediate than those gains offered by market potential.

[FIGURES 3 and 4 about here]

Before we present the regression results, we will discuss several graphs that outline a relationship between migration rates and a few explanatory variables. Figures 3 and 4 show relationships between migration rates and the distance between origin and destination countries, the share of population in ports, labour productivity in the maritime sector, market potential, and chain migration for the respective years of 1700 and 1800. We see that migration rates are negatively related to the distance between the country of origin and that of destination, confirming our prior belief that distance inhibits migration. The share of population in ports and labour productivity is positively related to migration, which suggests that the larger the ports are, the more attractive they become for migrants. Ports are indeed primary places of employment opportunities for maritime workers – potentially one of the most important factors

affecting migration flows. We also observe a positive correlation between labour productivity and migration flows, suggesting the importance of economic betterment on migration levels. Lastly, Figure 4 indicates a strong relationship between the stock of migrants in 1700 and migration rates in 1800. This suggests a rather impressive persistence effect of a past generation of maritime migrants onto later maritime migrants. Overall, Figures 3 and 4 also show that despite different magnitudes, the correlations between the examined variables and migration rates have the same direction: a remarkable stability, considering the interval between the two periods under scrutiny spans about one hundred years.

Though important and revealing, the graphs discussed in the previous paragraph show simple, unconditional correlations. Multivariate analysis is required to gain further insight into the complexity of factors influencing migration flows. Therefore, we use regression analysis and estimate equation (1) to shed further light on the determinant of cross-country migration. We estimate equation (1) for the respective years of 1700 and 1800 and present various specifications to check the robustness of our findings. We will first discuss whether the relationships between migration flows and various factors are statistically significant and whether they are positive or negative; then we will discuss their relative importance; finally, in the next section, we will offer possible explanations of these results.

[TABLE 3 about here]

Table 3 present the results for the year 1700. We see that distance is always statistically significant and negatively related to migration flows, whereas other geographical characteristics – a common border and the length of coast – are mostly insignificant.[11] In the

[11] We have conducted extensive robustness checks with respect to the distance measure and estimated all regressions specification with three other distance measures: straight-line Euclidean distance calculated as the

first two specifications, the presence of a common border seems to have a negative and significant effect but the statistical significance disappears in the remaining five specifications. As for the population and linguistic characteristics, the share of population living in port towns is always significantly related to migration flows, whereas common language has no significant impact. Market characteristics exhibit a similar pattern qualitatively: labour productivity does not exert a significant impact, and market potential is always positively and significantly related to migration flows in the maritime sector. Overall, the results for 1700 suggest that distance between countries always deters migrations flows, and the larger the share of population residing in port towns, the larger the inflow of migrants from abroad. A similar effect as this latter result applies to a country's market potential: the larger the potential is, the larger the inflow of migrants into that country. As we do not have any data on maritime migrants before 1700, the chain migration variable is not included for this year.

[TABLE 4 about here]

Table 4 presents the results for the year 1800. As for the geographical characteristics, we see that, again, distance has negative and significant effect on migration flows. However, unlike in the year 1700, the length of coastline does exhibit a significant and positive effect on migration. The existence of a common border remains an insignificant factor. The effect of population and linguistic characteristics remain qualitatively unchanged relative to the year 1700. Common language has no significant effect, and again the share of the population in port towns is positively related to migration, although not in all specifications. Market

distance between the geometric centres of the countries of origin and destination; sea routes between the countries; and distance between the capitals of the countries. In all cases, the distances have negative and significant impact on migration flows.

characteristics show very interesting and different results in comparison with the year 1700. First, labour productivity in the maritime sector becomes statistically significant, even in the specification including market potential. Market potential, on the other hand, is significant only in the specification without labour productivity, a major difference relative to 1700. Both factors – market potential and labour productivity – lose statistical significance once we include chain migration. Chain migration captures the effect of previous migration – in our case, migration in 1700 – and we see that it is positively related to the migration flows in 1800. A word of caution is required here. As we see in Table 3, because of lack of data, the number of observations in columns VII and IX drops when considering chain migration. Therefore, our conclusions need to be considered as tentative; more research is needed to firmly establish the effect of chain migration on international migration flows in early modern times. Overall, and in comparison with 1700, we can say that 1800 exhibits similarities as well as differences. Distance prevents migration flows in 1700 as well as 1800, while the size of port towns is conducive for it. Neither a common border nor a common language have an effect on migration flows either in 1700 or 1800, while the length of coastline acts as an attractor in 1800 but has no effect in 1700. Labour productivity in the maritime sector and market potential have different effects in 1700 than in 1800. In 1700, market potential is conducive to migration, and labour productivity in the maritime sector has no effect. That changes in 1800, when the maritime sector's labour productivity gains significance and market potential has lost its significance in most specifications.

[TABLE 5 and 6 about here]

Until now, we have focused on the statistical significance and sign of the relationship between the factors influencing migration and migration flows themselves. Before we discuss the results emerging from Tables 3 and 4 in greater detail, it is important to establish the relative

importance of each of the factors, in addition to their statistical significance. To do this, we have calculated standardized beta coefficients, which express the estimated coefficients as standardized coefficients with mean of 0 and standard deviation of 1. This allows us to compare the magnitudes of all the estimated coefficients, thus establishing their relative importance. Table 5 shows the beta coefficients for the year 1700, Table 6 for the year 1800. We see that in 1700, out of the statistically significant variables (highlighted in italics), the population of port towns has the largest impact, followed by distance and then market potential. In 1800, the relative importance of variables differs across specifications, but if we consider the most advanced specifications (column IX), then the length of coastline exhibits the largest effect, followed by chain migration and distance. If we were to consider a general pattern emerging from Table 6, then it would be fair to say that distance, chain migration and length of coastline are among the most important explanatory variables of migration patterns in 1800.

Explanation of the Findings

The multivariate analysis in the previous section offers us insights into the factors affecting international migration flows at the beginning and the end of the eighteenth century. The results clearly show that economic opportunities as well as the costs of migration crucially affected migratory patterns. Economic opportunities were captured by variables such as the population of ports, market potential, labour productivity (as a proxy for wage levels) and chain migration, while the distance between countries captured the costs of migration. The results also show that many factors played important roles in migration movements at the beginning as well as the end of the eighteenth century, though there are noticeable differences, such as the effect of labour productivity, which was insignificant around 1700. Furthermore, we believe it is important to recognize that some factors that help explain contemporary migration patterns,

such as commonality of language and common borders, are not relevant factors to help us account for migration flows in early modern Europe.

As we have seen, one of the very important factors which is positively related to the international migration of maritime workers is the population of ports. This confirms the basic gravity model, which suggests that migrants are attracted to places that provide ample economic opportunities, i.e., a large labour market. Indeed, the larger the population of ports in the receiving country, the higher the inflow of international migrants. There are several reasons why the size of the ports positively affected the international migration of maritime workers. First, larger ports meant more ships, hence more opportunities to work in the maritime sector. Ports (especially their inns and taverns) were natural places for the recruitment of maritime workers (Rediker 1989), and the larger the ports, the greater chance a migrant could find employment. Second, and related to what we have just suggested, larger ports meant greater employment opportunities in other sectors, too, not least because in port cities mortality levels were relatively high, and labour was always much in demand (Lawton 2002; De Vries 1984). Third, ports were natural entry points to a country, and thus functioned as places of exchange – not only of goods but also of information about the labour market situation in other parts of the country. Studies on Scandinavian emigration in the seventeenth and eighteenth centuries support these findings. For instance, the work of Hodne (1990) showed that trade connections between specific fjords in Southern Norway and not only Amsterdam, one of Europe's key maritime hubs, but also smaller port towns such as Hoorn and Enkhuizen had a direct impact on immigration levels in these localities. Similar evidence exists for persistent connection between small localities in Danish Western Jutland and Amsterdam (Graugaard 1992). Finally, large port cities such as Amsterdam and London functioned as gateways, not only to their direct hinterlands but to other parts of the continent or even the rest of the world in which such cities were the central node (Lesger 2006; see also Anthunes 2013). Moving to

such cities thus opened up possibilities of finding employment in different parts of the world, ranging from the other side of the Atlantic to Asia (Van Gelder 2004).

Distance between countries deterred migration flows. In finding a negative correlation between distance and the size of the migration our findings confirm another element of the gravity principle (see above) and more broadly underscore a basic premise that underpins most mainstream migration research (Ravenstein 1885, 1889; Borjas 1989; Zipf 1946; Carothers 1956; Karamera et al. 2000). This result reinforces our notion that travel costs, which are closely related to distance, play a crucial role in explaining migration flows. Indeed, the larger the distance, the longer it takes to reach the destination country, and the higher the monetary costs of travel. In addition, larger distances have a detrimental effect on the speed of information flow. Indeed, awareness of prospects elsewhere – whether there is demand for maritime work, which ports would most likely have ships hiring new workers, or what the general situation (plague, war, etc.) is in the ports – is crucial for migrants and potential migrants. The further away the country of origin is, the longer it takes for information to travel and the less accurate it will be, and thus the potential migrant will less likely act upon it.

Market potential, a factor that has not been studied for the early modern period, has shown to be conducive to the international flows of maritime workers in other eras. This finding suggests that the opportunities opened to the international maritime workers due to the potential of international trade is an important factor that helps account for pre-modern labour flows across countries. Our results are interesting for another reason as well. Even though the potential for trade may have entered the migrants' considerations, its quantitative importance (captured by the beta coefficients) indicates that it is only the third most important factor at the beginning of the eighteenth century, and it loses its importance in 1800 once chain migration is considered. This indicates that the opportunities for trade, while important, were not crucial in a person's decision to migrate or not. Two explanations can be offered. First, maritime migrants could have been concerned with their immediate work opportunities rather than trade

opportunities that had been opened to shipping companies but were not necessarily materialized by them. Another explanation is that maritime migrants had opportunities to wait for trade potential to materialize, taking on other work outside the maritime sector in the ports, as discussed above.

Chain migration, also dubbed the 'friends and family' effect, was a very important migration factor at the end of the eighteenth century. This confirms studies on the nineteenth-century transatlantic mass migrations, which regard this as a key factor in explaining the size and direction of migration flows (Baines 1994; Hatton and Williamson 1998). It also supports our conjecture about the role of migrants who are already living in the destination country. Several reasons may explain the importance of this factor. Migrants already residing in a destination country can provide information about the maritime labour market in that country, as well as local labour market conditions more broadly, information about travel costs and search costs related to the finding of work (Lucassen 1987; Hoerder 2002; Moch 2003). Those migrants can also help future migrants to cover travel costs with remittances; the costs of looking for work in a new country can be lowered through resident migrants' offers of lodging or monetary loans while a newcomer searches for work (Hatton and Williamson 1998; Bade 2003). Furthermore, this resident-migrant group can offer help with assimilation to local conditions and also provide marriage partners, thus lowering the emotional costs related to the relocation to a new country (Sogner and Van Lottum 2007).

Interestingly, our analysis shows that labour productivity – our proxy for wage levels – has a significant effect in 1800, but not in 1700. As (potential) wage-gain opportunities are at the core of general migration theory, and qualitative studies on the early modern period have also emphasised the importance of wage differentials in explaining international migration flows, this finding needs further clarification. We believe this shift towards a more important role for labour productivity in explaining migration is most likely an effect of the relative unattractiveness of the international maritime labour market at the beginning of the eighteenth

century. One century later, it had become more attractive for (potential) migrants. Recent estimates show that at the beginning of the eighteenth century mobility levels were relatively low, but they increased significantly during the century. This development reflects the economic development of the sector, which expanded significantly during the eighteenth century, not only in traditional maritime cores such as Amsterdam and London but especially in the maritime centres of Copenhagen in Denmark, Hamburg in Germany and Stockholm in Sweden (cf. Feldbæk 1993; Lucassen 1996; Magnusson 2010). Such increased economic activity created a greater demand for maritime workers in such centres, but also led to stronger competition for workers on the international labour market (cf. Lucassen 1996; Van Lottum 2011). Both developments likely led to a higher demand for workers and an increase in maritime wages that exceeded those in other sectors of the economy – many of which were less international. We find evidence for this conclusion in wage data taken from the Stockholm merchant marine, one of the few sources for wage data at both the beginning and the end of the eighteenth century (Van Lottum 2011). This data show that while at the beginning of the eighteenth century wages in the local building sector were 58% higher than maritime wages, this ratio fell to 'only' 37% in the last quarter of the century. In other words, in relative terms the maritime sector became more attractive. That our proxy for wage levels is not significant for the beginning of the century may illustrate the lack of chances for (direct) economic betterment through potential higher wages. But as the discussion above showed, this deficiency was compensated (at least to some extent) by the existence of (diverse) job opportunities in port cities and possible opportunities to trade, as captured by the port population size and market potential variables respectively, both of which appear comparatively high in the ranking of beta coefficients for 1700.

The common border variable had no significant effect on international migration flows. Since treaties favouring the free movement between neighbouring (or any other) countries did not yet exist, in our analysis this variable predominantly serves as a proximity variable. The

non-importance of the presence of a common border in a migrant's decision to move is likely be explained by the fact that it does not capture proximity effectively. In some cases, given the size and shape of a country, a place of residence in a neighbouring country may in fact not be nearer to one's origin than a country with which one does not share a border. For instance, a locality in southern Denmark may be much closer to a location in the northern Netherlands than one in eastern Germany. In such a case, a shared border does not accurately capture proximity as a factor.

Common language is also not a factor that explains migration flows in early modern Europe. One possible explanation for its negligibility is the fact that compared to the nineteenth and twentieth century, languages in the early modern period were not as uniform and demarcated from one another. Language or dialects did not stop at national borders, and because dialects could be widely different even within countries, it was common for compatriots not to be able to communicate with one another (Heerma van Voss 1996). This means that by assigning national languages to countries – as we did for the purposes of our analysis – we may have not done justice to the complexity of language in the early modern context. A second explanation is sector-specific. As Rediker (1987) argues, the labour process in the maritime sector had a very specific vocabulary, a maritime lingua franca, which one needed to master to be successful in the sector. Traditional language barriers were therefore much less important than being able to speak this sector-specific language.

Conclusions

In this paper we have demonstrated that there was much continuity between the principles determining international migrations in the early modern period and those in the modern era. Using a unique source that allowed us to construct international migration flows in a crucial sector of the European economy, and which give a fair representation of the general flows of

international migration on the continent, we found that four 'classic' determinants of international migration in the modern era – *distance*, *wage levels*, *population size* and *chain migration* – also played a crucial role *before* the onset of industrialisation.

As mainstream migration theory suggests, our analysis showed that *distance* deterred migration flows, reflecting the importance of travel costs in migration decisions, but also the limitations imposed by large distances on the flow of information. Economic opportunities, captured by wage levels (in this study approximated by labour productivity levels), and the size of port populations were important, too – the former especially so by the end of the eighteenth century, when competition for maritime workers was strong and wages in the maritime sector increased more sharply than in other sectors. The *size of port populations* also had a positive effect on migration flows. We explained that large ports provided not only ample opportunities to make a living, both in and outside the maritime sector, but also served as nodes in information networks to the ports' hinterlands or even the wider world beyond Europe.

Our analysis also showed that *market potential*, a variable reflecting opportunities to trade, of which recent research has shown to be an important contributing factor in the establishment of migration flows, also played a significant role in the eighteenth century. Similarly, the *length of the coastline*, a variable we introduced to capture the maritime potential of a destination country, was also shown to be important; in 1800 it was a key explanatory variable of migration flows.

The fact that shared language between countries did not induce international migration reveals, however, that not all factors that are relevant in a modern context can be applied to the early modern era. Even if we had used contemporary borders in reconstructing international migration flows, the fact that true *national* languages did not yet exist in the modern sense – this was a feature of age of nationalism – would have rendered this variable ineffective. All the more surprising is the general stability in the importance of determinants between the early modern period and the modern era. This finding supports the notion that industrialisation and

modernisation did not constitute a clear break with the past, which is an important outcome of this study. As such, it complements the estimates by Lucassen and Lucassen (2009) of the size of migration flows, which indicated no clear caesura in international migration levels with the advent of industrialisation.

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Figure 1: Place of origin of ships and crews in the Prize Paper Dataset

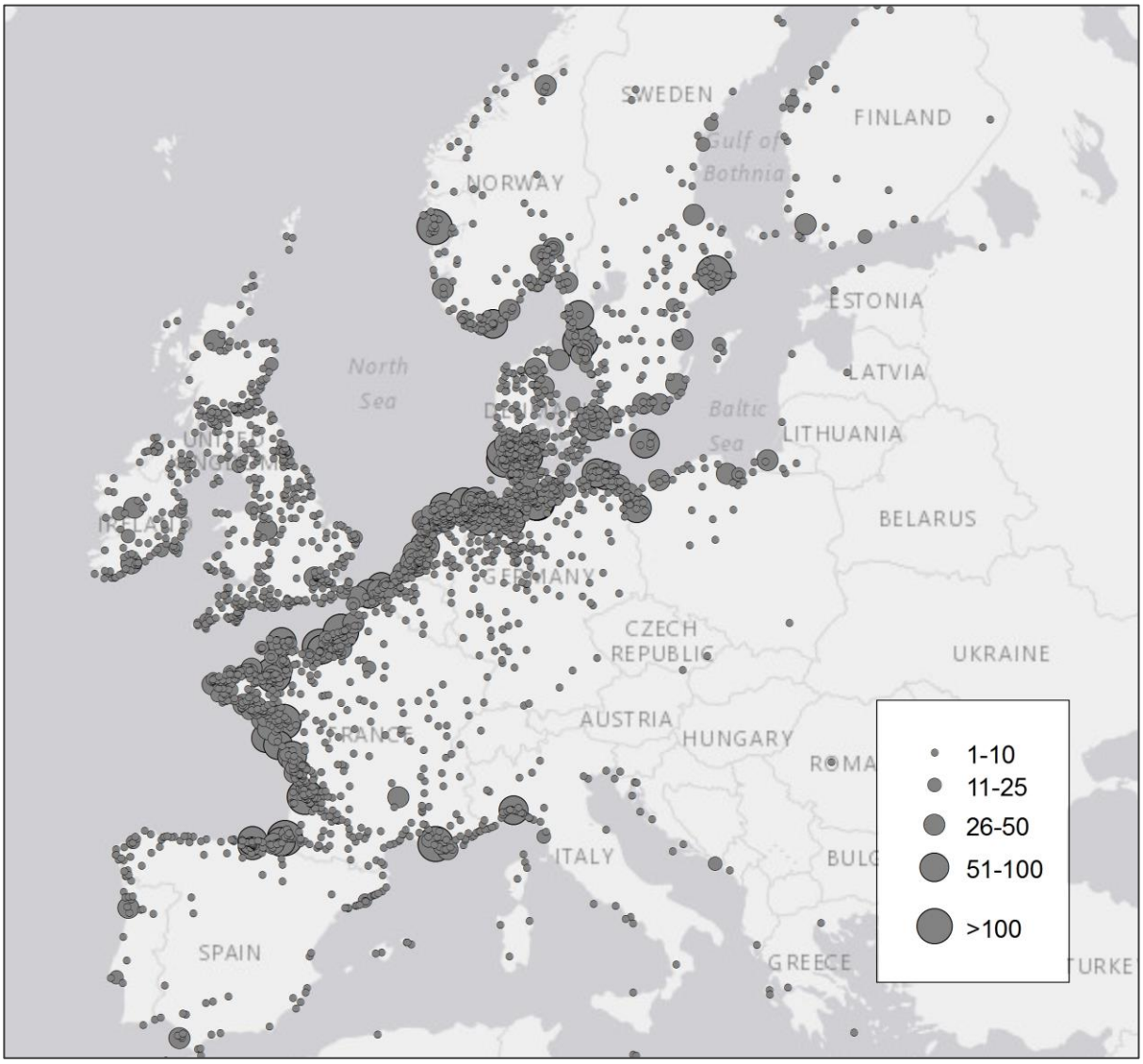

Figure 2. The 20 most sizeable international migration flows between European countries

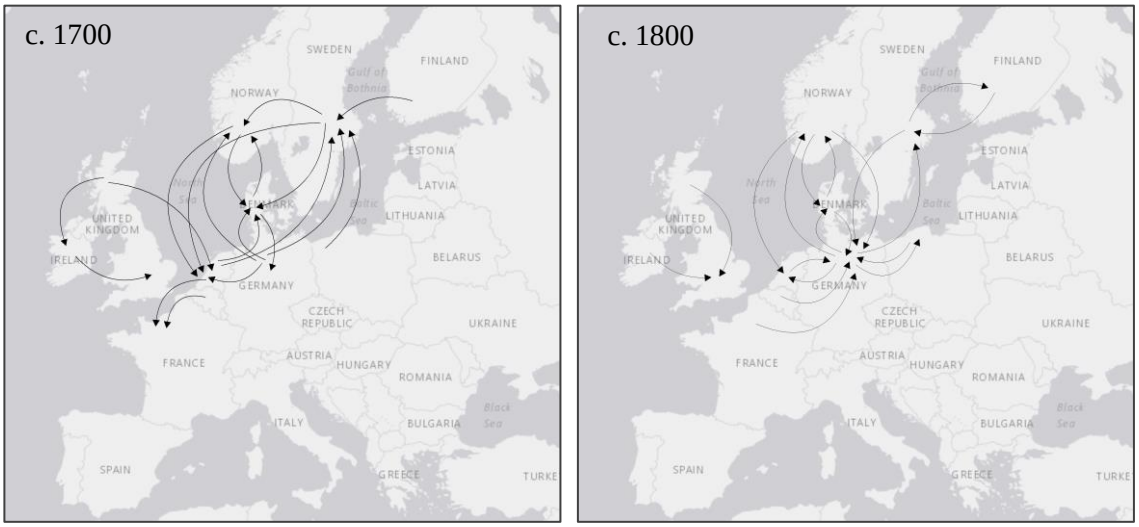

Figure 3: International Migration in 1700, Unconditional Correlations

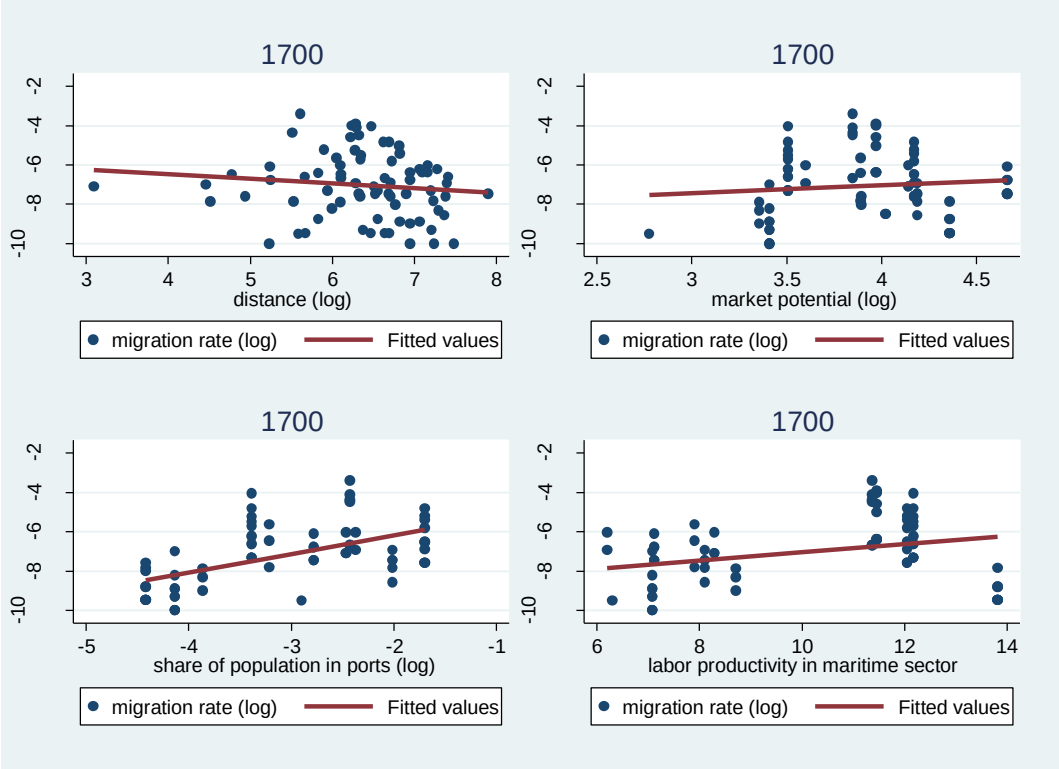

Figure 4: International Migration in 1800, Unconditional Correlations

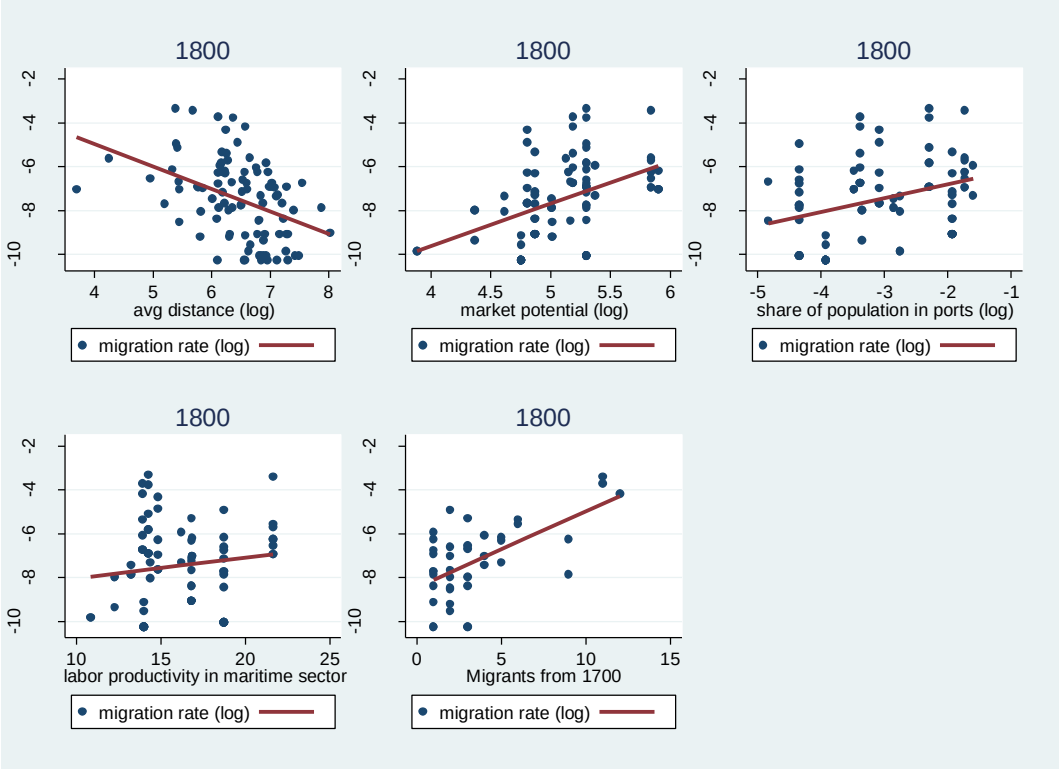

Table 1: Countries of origins of residents in the eighteenth-century Dutch Republic, based on the PPD and the Lucassen estimates

Country or countries of birth	***PPD***	***Lucassen estimates***
Belgium and France	1,7%	1,8%
Germany	13,4%	11,4%
England and Scotland	2,1%	0,4%
Other countries (chiefly Scandinavian countries)	6,6%	3,8%
Foreign-born residents	*23,8%*	*17,5%*
Native born	*76,2%*	*82,5%*

Sources: Prize Paper Dataset and Lucassen, 2002

Table 2. Description of variables

Variables	Definition
Geographical variables	
ln (distance)	log of average distance travelled by migrants
common border dummy	a dummy variable: 1 if common border, 0 otherwise
length of coast	length of coast in km
Population variables	
ln (share of port-city population)	log of (port city population/total population)
common language dummy	an indicator variable: 1 if common language, 0 otherwise
Market-related variables	
ln (market potential)	log of market potential
labour productivity of maritime sector	measured by ton/man ratio
Chain migration variable	
migrants in 1700	number of migrants in 1700
International conflict variable	
presence of international conflict	an indicator variable for the presence of international conflict: 1 if there was a conflict, 0 otherwise

Sources: see text

Note: all variables are defined for the destination countries

Table 3. International Maritime Migration in 1700, Regression Analysis.

Variables	I	II	III	IV	V	VI	VII
Geography							
ln (distance)	-0.90***	-0.90***	-0.85***	-0.85***	-0.85***	-0.85***	-0.85***
	[0.240]	[0.240]	[0.246]	[0.251]	[0.251]	[0.251]	[0.251]
common border dummy	-0.42*	-0.42*	-0.34	-0.34	-0.34	-0.34	-0.34
	[0.249]	[0.249]	[0.320]	[0.351]	[0.351]	[0.350]	[0.350]
length of coast		0.0001 ***	-.00002	0.00002	0.000006	0.00001	0.00001
		[.0001]	[.00002]	[0.00002]	[0.00003]	[0.00003]	[0.00002]
Population and linguistic characteristics							
ln (share of port-city population)			0.59***	0.59***	1.08***	1.03***	1.11***
			[0.139]	[0.143]	[0.181]	[0.167]	[0.186]
common language dummy				0.03	0.03	0.02	0.02
				[0.397]	[0.397]	[0.396]	[0.396]
Market characteristics							
ln (market potential)					1.57***		1.43***
					[0.289]		[0.310]
labour prod. maritime sector						0.07	0.04
						[0.076]	[0.061]
Constant	-3.85**	-2.21	0.17	0.15	-5.60**	-1.71	-7.22***
	[1.646]	[1.806]	[1.760]	[1.820]	[2.169]	[1.667]	[1.891]
Origin and Destination Country FE	YES	YES	YES	YES	YES	YES	YES
Observations	77	77	70	70	70	68	68
R-squared	0.868	0.868	0.863	0.863	0.863	0.862	0.862

Sources: see text. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1

Table 4. International Migration in 1800, Regression Analysis.

Variables	I	II	III	IV	V	VI	VII	VIII	IX
					Geography				
ln (distance)	-0.68***	-0.67**	-0.67***	-0.61**	-0.61**	-0.61**	-0.61**	-0.78	-0.78
	[0.241]	[0.249]	[0.246]	[0.243]	[0.243]	[0.241]	[0.241]	[0.607]	[0.601]
common border dummy	0.42	0.47	0.47	0.45	0.45	0.45	0.45	0.3	0.3
	[0.404]	[0.440]	[0.435]	[0.444]	[0.444]	[0.446]	[0.446]	[0.460]	[0.462]
length of coast		0.00004*	0.00007***	0.0001***	0.0001***	0.0002***	0.0001***	0.00008***	0.0001**
		[0.00002]	[0.00002]	[0.00003]	[0.00002]	[0.00003]	[0.00003]	[0.00002]	[0.00005]
					Population and Linguistic Characteristics				
ln (share of port-city population)			0.82***	-0.06	0.39***	0.36*	0.35*	0.60**	0.29
			[0.155]	[0.302]	[0.137]	[0.198]	[0.197]	[0.282]	[0.242]
common language dummy				0.49	0.49	0.49	0.49	0.5	0.5
				[0.308]	[0.308]	[0.308]	[0.308]	[0.489]	[0.486]
					Market Characteristics				
ln (market potential)					2.00***		0.75	0.63	
					[0.356]		[0.490]	[0.832]	
labour productivity of maritime sector						0.42***	0.26**		0.23
						[0.078]	[0.117]		[0.175]
					Chain Migration				
migrants in 1700								0.09**	0.09**
								[0.032]	[0.033]
Constant	-3.38	-4.15**	-0.89	-6.05**	-14.21***	-12.99***	-14.02***	-5.75	-7.59
	[2.044]	[1.897]	[1.955]	[2.437]	[2.679]	[2.513]	[2.704]	[8.912]	[5.170]
Origin and Destination Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	94	88	86	86	86	84	84	50	48
R-squared	0.824	0.817	0.815	0.819	0.819	0.818	0.818	0.929	0.928

Sources: see text; *** p<0.01, ** p<0.05, * p<0.1

Table 5. Standardized Beta Coefficients, International Migration in 1700.

Variables	I	II	III	IV	V	VI	VII
ln (distance)	*-0.44*	*-0.44*	*-0.44*	*-0.44*	*-0.44*	*-0.44*	*-0.44*
common border dummy	-0.12	-0.12	-0.1	-0.11	-0.11	-0.1	-0.1
length of coast		0.52	-0.05	-0.05	0.02	0.04	0.04
ln (share of port-city population)			*0.34*	*0.34*	*0.63*	*0.58*	*0.63*
common language dummy				0.01	0.01	0.01	0.01
ln (market potential)					*0.42*		*0.38*
labour productivity of maritime sector						0.11	0.07
Observations	77	77	70	70	70	68	68
R-squared	0.868	0.868	0.863	0.863	0.863	0.862	0.862

Sources: see text

Table 6. Standardized Beta Coefficients, International Migration in 1800

Variables	I	II	III	IV	V	VI	VII	VIII	IX
ln (distance)	*-0.27*	*-0.26*	*-0.25*	*-0.23*	*-0.23*	*-0.22*	*-0.22*	*-0.29*	*-0.28*
common border dummy	0.12	0.13	0.13	0.12	0.12	0.12	0.12	0.09	0.09
length of coast		*0.15*	*0.29*	*0.48*	*0.37*	*0.65*	*0.54*	*0.29*	*0.41*
ln (share of port-city population)			*0.44*	-0.03	*0.21*	*0.19*	*0.18*	*0.32*	0.14
common language dummy				0.12	0.12	0.12	0.12	0.11	0.11
ln (market potential)					*0.47*		0.18	0.14	
labour productivity of maritime sector						*0.61*	*0.39*		0.34
migrants in 1700								*0.28*	*0.28*
Observations	94	88	86	86	86	84	84	50	48
R-squared	0.824	0.817	0.815	0.819	0.819	0.818	0.818	0.929	0.928

Sources: see text

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