Sweet Trade and Old Habits: Privileges and Sugar Trade to Baltic Towns and the Effects of Political Uncertainty, 1650-1857[1]

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Abstract: A historically recent theory on international trade points to the importance of discrimination in trade agreements, see Viner (1950) or Bhagwati (1996). Discriminatory agreements on market access for specific countries constitute preferential trade agreements (PTA's). Such behavior is an "old habit" dating back in time, as exemplified by the discriminatory nature of the Sound Toll levied on cargoes passing the strait of "Øresund" from 1429 to 1857 by the Danish king. Following Degn (2010), trade from port towns in France, Scotland and England had no privileges, while trades from other ports were given privileges. Such discrimination in market access is analyzed focusing on "sweet trade" in sugar from 17 European trading hubs and colonial towns in the "New World" outside the Baltic Sea area to 17 Baltic Sea towns from 1650 to 1857. This is furthermore interestingly a period of large shocks and political uncertainty following the initiation of the French Revolution Wars. Based on a sample 23.745 cargoes of predominantly sugar, the paper estimates the long-run effects of preferential treatment on trade conditional on a major political shock. Results indicate that the mix of preferential treatment and large shocks affects trade patterns. I find that preferential treatment matters, as the effect of the French Revolutionary Wars is generally a reduction of around 65-70 for ports not receiving preferential treatment, but only 47 percent for ports given preferential treatment.

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1. Introduction

The importance of preferential trade agreements has been investigated in a number of contributions. Bhagwati and Panagariya (1996) review a number of stands including trade diversion/creation and whether such agreements are stumbling blocks or building blocks. Limao (2006) presents evidence on the extent to which such agreements represent stumbling blocks or building blocks. The development of preferential trade agreements under WTO is at center stage in Horn et al. (2010), which points to the importance of enforceability and obligations of the agreements. Shocks to trade relations is considered in Glick and Taylor (2010) arguing for the importance of wars and persistence of such effects on trade based on data of wars from 1870-1997. While these contributions in important aspects considers the effects of preferential treatment and uncertainties with respect to enforceability and the effects of uncertainties for trade related to wars among trading partners, they do not consider the importance of wars for the effects of preferential treatment on trade. This is what is pursued here. Does preferential treatment in trade affect trade flows and does political uncertainty from situations of war amplify or degrade the effects of preferential treatment. Wars may in general erode trade, as shown in Glick and Taylor (2010), while this paper tests if preferential treatment propels such effects or if they counter effects of wars. It therefore combines the contributions relating to effects of preferential treatment and relating to wars for international trade. The perspective is that French Revolutionary Wars follow the eruption of the French Revolution and therefore marks a major political shock throughout Europe. This is different from the focus on bilateral conflicts in Glick and Taylor (2010). The effect of preferential treatment conditional on such major political shocks is investigated using an elaborate dataset of trade flows to and from the Baltic Sea area for the period 1650-1857.

A major trading route in the world at that time was to the Baltic Sea passing through the strait of Øresund. This left the opportunity for the Danish King to impose a toll on passages of ships through the strait. The Sound Toll was first introduced by Danish King Erik VII in 1429 as a transit duty on ships and ended in 1857. During the period 1459-1857 a total of 1.8 million passages of cargo were subject to registration when passing through the strait and as of 1634 the registration recorded specific cargoes in calculating the toll. Gøbels (2010) concludes that the Sound Toll Register provides a fair picture of goods exchanged

between towns located at the Baltic Sea and the rest of the world. In addition, Dow (1964) comparing the Sound Toll Register with the Stockholm customs accounts and the Dundee shipping lists finds that cargoes escaping registration was sharply reduced as of 1614 when custom examination was intensified. Even so, an analysis based on the register may have to be delimited to certain types of cargoes by e.g. goods, origin and time period (Rönnebäck, 2010). The importance of the Sound Toll Register is emphasized by the inclusion in UNESCO "Memory of the World" listing, while the Dutch project "Sound Toll Register Online" has digitized the data. Importantly, the toll imposed by the Danish King was differentiated by country following Degn (2010), which arguably represents a structure of preferential treatment in trade agreements. As such, preferential treatment is an "old habit". This "old habit" is what is at the center stage here.

Notably, the period 1650-1857 includes the commencement of the French Revolutionary Wars in 1792 and their end in 1802. Having data from 1650 until 1792 should allow for a control of pretends. The period includes what has been labelled the "Industrious Revolution", see e.g. De Vries (1994). An increased focus on marketed-supply of goods may importantly create trends in trade of specific goods. As such, controlling for pretends from a long observable period prior to the effects major political uncertainties would be of importance for the period considered. Also, the period of observations does allow for the estimation the persistence of effects considering that data is available until 1857. Focusing on the French Revolutionary Wars is merited from the fact, that this is a major war in Europe for the time period. Importantly, the French Revolutionary Wars can be seen as a consequence of the French Revolution. The French Revolution of 1789 is on the other hand seen as a central political event for Europe building previously building on a "feudal" structure. This lead to dissatisfaction among: rich commoners such as merchants[2] and manufacturers, peasants that had become more affluent wanting to abolish last remains of "feudal" structures and a growing population demanding political participation. The French Revolution may therefore be considered an eruption of social and political tensions that was simmering many places in Europe. The French Revolution of 1789 and the adjacent French Revolutionary Wars may therefore be interpreted as a large political shock to the economic

[2] One may discuss if the Revolution and Revolutionary Wars can be considered an exogenous political shock throughout Europe, if e.g. merchants wanting political power emerged from international trade and particularly here trade in colonial goods.

system that had root causes which were exogenous to specific trade flows of colonial goods, but on the other hand did represent a considerable increase in political uncertainties in Europe.

The French Revolutionary wars were though clearly not the only conflict taking place in the period. Other major incidences of war are e.g. the Thirty Year's War, took place in the beginning of the current sample period from 1618-1648, the Franco-Spanish War 1648-1659, the Franco-Dutch War 1672-1678, the Nine Year's War 1688-1697, the War of the Spanish Succession 1701-1713 and the Seven Year's War 1756-1763. While not an exhaustive listing of all conflicts, this still renders an impression of a period of major and widespread conflicts in Europe. The focuses will here particularly be on the French Revolutionary Wars, albeit controls for other international and internal conflicts will also be included. The particular focus on the French Revolutionary Wars is motivated by the particular geography of the data available. Trade flows studied had to pass through the Strait of Øresund, which was at that time in Danish territory. Particularly for the French Revolutionary Wars and in general around 80 years prior to the Battle of Copenhagen in 1801 had achieved neutrality with respect to the many wars. Particularly, for the pretends period and the first half of the French Revolutionary Wars passing this maritime route from a navigational and securities point of view will have been uncomplicated. Wars at the strait obviously do not satisfy weak identification restriction of cargoes passing the strait without such local barriers. For the period prior to the Battle of Copenhagen, any effects of preferential treatment in terms of passing the strait does not depend on such major local shocks but on the effects of political uncertainty among the major trading partners in particular.

A challenge in terms of identification is the choice of goods to be included in the analysis. Given the nature of the data, trade in goods is observed in a Western or Eastern direction measured at the Toll Station in Helsingør at the Northern part of the Strait of Øresund. This circumvents the observation of trade among locations in the Baltic Sea area. One may observe the trade of agricultural products like wheat from and to a ports in the Baltic Sea, but this trade may originate from other ports in the Baltic Sea. As such, analyzing trade of products that would also be produced in the Baltic Sea area would allow for a considerable unobservability problem of e.g. the true origin of trade flows. Wheat traded out of Danzig

(Gdansk) may have a different origin within the Baltic Sea area, as the toll on which the data is collected only defines the origins of the cargo passing at Helsingør – a problem much alike the well know Rules of Origin Criteria in theories on Free Trade Areas. To avoid this problem and recalling that this is a period of what has been called the Industrious Revolution stressing demand for marketed products with other origins. New colonial products imported afar origins relative to the Baltic Sea areas will be in focus here. Specifically, all cargoes in ships that predominantly contain sugar are considered. These are all crops and goods that are not grown or produced in the Baltic Sea area due to climatic conditions. As such, there are no problems of rules of origin as discussed previously. Furthermore, any problem of substitution from local production that may influence trade flows is not an issue. The resulting dataset consists of 23.745 observations of skippers carrying cargoes of sugar through the Sound of Øresund in the period 1650 to 1857. The cargoes included have origins in 17 trading hubs in Europe and US outside the Baltic Sea area and to allow for direct trade from colonies or climates allowing for sugar growth additionally five such origins. In terms of destinations, these are 17 different Baltic towns. These origins of trade are categorized by the classification suggested by Degn (2010) to capture preferential treatment.

Testing the preferential treatment suggested by Degn (2010) through three different approaches of focusing on non-preferred, preferred and heterogeneity in preferential treatment, the result show that the outbreak of the French Revolutionary Wars in general lead to a reduction of trade flows by skippers of 65-70 percent, but for ports given preferential status by the Danish king, the reduction is only 47 percent. Similarly, in the approach focusing on preferred ports, trade between ports that were given preferential status outside the Baltic Sea are to ports that were given preferential status in the Baltic Sea area is around 65 percent higher than that of non-preferred origin-destinations. These results lends support to the importance of preferential treatment in the context of trade policy uncertainty and wars as pointed out respectively in Handley (2014) and Glick and Taylor (2010) and contributing by bringing these arguments together into one empirical framework. They furthermore extend the results of Glick and Taylor (2010) focusing on war and trade into a context of preferential treatment, war and trade.

Section 2 offers a short review on a selection of findings from an extensive literature on the effects of preferential trade agreements and free trade areas on trade flows. A description of data and empirical strategy can be found in Section 3, while Section 4 presents the first results on the importance of political uncertainty and wars on the effects of preferential treatment. In Section 5, the issue of heterogeneity in preferential treatment is considered and Section 6 offers some robustness results.

2. Preferential Trade Agreements and the Effects on Trade

Effects from preferential treatment in trade relations date back in time. The seminal contribution by Viner (1950) pointed to trade effects from customs unions pointing to trade creation and diversion and following welfare effects. It is worth noting that it was inspired by the Havana Charter proposed by John Maynard Keynes comprising the International Trade Organization in addition to the International Clearing Union and finalized in March 1948, but never ratified of by US Congress. It furthermore precedes the establishment of the European Free Trade Agreement in 1957. The aftermath of WW2 therefore carried efforts to create trade agreements, which resulted in GATT and eventually WTO on January 1 1995. Still, studying preferential treatment in trade remains an interesting issue in the long-run and prior to these efforts. A rich literature has followed in a number of dimensions of such issues. Of particular interest here are partly the effects on trade flows under political uncertainty and what types of preferential treatment in trade arrangements are considered. The literature on trade flows in trade flows relates to the current endeavor of estimating effects of political uncertainty under preferential treatment on trade flows in the long-run. Considering types of preferential treatment relates in that the Danish King levied tolls on ship passing the Strait of Øresund and reflecting on the type of preferential treatment this reflects should be considered.

Turning first to the issue of types of trade agreements and evolving nature of preferential trade agreements, PTA's are in general following Limão (2016) defined as:

"A PTA is an international treaty with restrictive membership and including any articles that (i) apply only to its members and (ii) aim to secure or increase their respective market access."

The requirements are that of a formal treaty with restrictive membership and that membership influences market access. This can take a number of different forms allowing for reciprocal or non-reciprocal regulations on specific or a wide set of goods. Traditional agreements moving beyond the immediate preferential treatment of trade includes types include free trade areas with reciprocal elimination of tariffs, customs unions with common external tariffs and common markets with mobility of goods, services, labor and capital. As such integrations schemes can move considerably beyond that of simple preferential treatment in trade flows. From a modern perspective of economic integration, clearly such different patterns will be important to observe, as they will influence the extent to which there are stumbling blocks or building blocks for trade implied. Also, this points to the importance of heterogeneity in preferential treatment with respect to trade and mobility. In the following section presenting data and empirical strategy, a discussion will be given on what features of preferential treatment in a more or less formalized form applies for the trade to the Baltic Sea area.

A note concerns the distinction of regional trade agreements versus preferential trade agreements. Under WTO regulations, regional trade agreements are "*reciprocal trade agreements between two or more partners. They include free trade agreements and customs unions*", while preferential trade agreements are "*unilateral trade preferences. They include Generalized System of Preferences schemes (under which developed countries grant preferential tariffs to imports from developing countries), as well as other non-reciprocal preferential schemes granted a waiver by the General Council*".[3] While for the period studied in this paper, any concerns about WTO regulations are obviously of less concern, it may be important for a general understanding of which applies here to maintain this distinction eminent when discussing the specifics of the toll of the Strait of Øresund in Section 3. Preferential trade in the understanding under WTO regulations may be unilateral,

[3] See https://www.wto.org/english/tratop_e/region_e/rta_pta_e.htm for a more elaborate presentation of WTO rules relating to RTA's versus PTA's.

which may be closer to that presented here. Heterogeneity in preferential treatment may continue to be of concern, which will be discussed.

Concerning the effects of trade agreements for trade flow, this relates to the general discussion if such are “stumbling blocks” or “building blocks” for trade, see e.g. Bhagwati (1991), Bhagwati and Panagariya (1996) or Limão (2006). Specifically, turning to the effects of preferential treatment on trade flows, often the literature has reverted to a gravity equation type of analysis. A large number contributions deal with various trade agreements, but particularly establishing the WTO on January 1 1995 and regulations on regional trade agreements has spurred on considerable efforts to determine effects of trade agreements and preferential treatment. The approach using gravity type of equations dates back to the contribution in Tinbergen (1962) testing the effects of membership of British Commonwealth and finding a 5 percent higher trade intensity. This has spurred on a sizeable literature prior to establishing the WTO. Some contributions focus on the establishment of the European Community. Aitken (1973) focusses on the European Economic Community (ECC) and European Free Trade Area (EFTA) using data for the period 1951-67 dealing particularly with integration processes from 1959. Importantly, country heterogeneity is also considered with respect to the effects of such integration efforts. Results show positive and significant effects of both integration efforts as off the early-mid 1960’s. The importance of exchange rate uncertainty is analyzed in Abrams (1980), focusing on the period following the breakdown of the Bretton Woods system in 1973. In doing so, the focus is particularly on the effects relating to trade integration in EEC and EFTA. In terms of potential trade diversion, Sapir (1981) offers evidence of the effects on trade for the period 1967-1978 of the EEC general system of preferences towards trade with 10 developing countries. The issue of divergence from the purchasing power parity considering export values, import values and GDP deflators is considered in Bergstrand (1985) with a focus on trade in EEC and EFTA. Particularly, the trade integration evolving in Europe has therefore been analyzed prior to the establishment of WTO and these contributions point to a number of issues in terms of e.g. heterogeneity in effects among countries and exchange rate uncertainty.

Broadening the perspective, Pelzmann (1977) considers the case of the Council of Mutual Economic Assistance (CMEA), which was instigated in 1949 to coordinate economic

development in Eastern European countries belonging to Soviet bloc. Using data for 1954-1970, the paper focuses on trade creation or diversion from the CMEA. Extending further to include a wider set of trade blocs, Frankel, Stein and Wei (1995) considering seven different trade arrangements in trade blocs across the world reflecting upon the importance of factor endowments and distinguishing between FTA and PTA at different regional levels. The focus on FTA's within the WTO framework has continued in more recent contributions. Rose (2004) considers the effect of WTO and its predecessor GATT using data from 1948 to 1999 for 175 countries and considering the different regional trade agreements prevailing over the period. The results show limited effects of one or both trading partners being members of GATT/WTO but find support for the General Systems of Preferences having positive effects on trade. Using extreme bounds Ghosh and Yamarik (2004) and along similar veins do not find support for regional trade agreements in data for 186 countries from 1970 to 1995 in five year intervals. Extending the definition of WTO membership, Tomz et al. (2007) finds more optimistic results on WTO and Rose (2005) also indicate effects considering heterogeneity in PTA's. Heterogeneity in the effects of WTO is at the center of Subramanian and Wei (2007) finding effects for industrialized countries by not developing countries. Eicher and Henn (2011) disentangles WTO and PTA's and finds positive effects of PTA accession for both WTO members and non-members, while WTO accession for existing PTA partners has generally limited effects. Arguing for the importance of zero observations, Kohl (2013) is also more optimistic on the importance of WTO membership. Based on data from 1955 to 2000 on RTA's, Vicard (2011) investigate the importance of country characteristics for trade integration and finds that RTA's increase trade if two countries are large and symmetric in GDP and others in the RTA are small and asymmetric.

Baier et al. (2014) considers economic integration agreements comprising on integration, one way PTA's, two way PTA's, FTA's, custom unions, common markets and economic unions using data from 1962 to 2000 for 149 countries. It furthermore extends in terms of considering extensive and intensive margins in a panel setup. Results show that intensive margins see an earlier effect than extensive margins. This offers new insights into the results of Baier and Bergstrand (2007) pointing to an overall doubling of trade from FTA's over 10 years. Bergstrand et al. (2015) considers the effects of economic integration agreements with a special focus on border effects and the "distance-elasticity puzzle" using an empirical

specification that included four dimensions of importance considering these aspects. Their results generally points to the importance of endogenous formation of economic integration agreements and heterogeneity in these. Anderson and Yotov (2016) based on an endowment general equilibrium model and using the gravity equation as the empirical vehicle of analysis finds that some countries gain over 5 percent in real manufacturing income and others lose 0.3 percent from the FTA's of the 1990´s. The importance of specific settings is also stressed by Baier et al. (2018), which using a theoretical model argues for the importance of "trade elasticities" to variable and fixed costs associated with economic integration agreements are heterogeneous and endogenous to country-level pairs and further provides empirical support for such based on data from 1965 to 2010 in five year intervals. Baier et al. (2019) furthermore offers a two-step method of analyzing heterogeneity in the effects of FTA's and find that most of the heterogeneity is found within a given FTA rather than across different FTA's. Finally, Oberhofer and Pfaffermayer (2018) take to the task of estimating the effect of BREXIT based on data from 1994 to 2000 in three year intervals finding that BREXIT would reduce exports of goods from UK to EU in the range of 7.2 to 45.7 percent depending on the type of trade agreement resulting from the BREXIT.

It is clearly troublesome to summarize the extensive literature on preferential trade agreements and forms of economic integration agreements in general. The above has focused on an initial emphasis on European developments and then extending this into a more global perspective of economic integration agreements. Other important contributions prevail focusing on integration schemes in other parts of the world. Afesorgbor (2017) offers a meta-analysis of African experiences with trade integration, while East Asian experiences has been analysed in e.g. Lee and Park (2005). Even so, the review of the literature above makes a number of aspects clear. Trade integration has predominantly been analysed based on data that at best dates back to the efforts to build international agreements after WWII, it stresses dynamic aspects of different kinds of trade agreements and preferential treatment and it points to the importance of heterogeneity in the effects of agreements. Here this is extended into a longer historical period before industrialization and in industrious times. The literature on the effects of trade agreements is essential to the current undertaking. Another important strand of the literature to the

current work is that of the effects of uncertainty associated with trade and trade arrangements. This is what we turn to next.

Vicard (2008) based on the setup of Alesina and Spolaore (2005) builds a model in a three-stage game with 1) RTA's being being decided upon, 2) defence spending is determined and finally 3) uncertainty is revealed concerning disputes and escalation probabilities and conflicts are solved. This offers a testable proposition, which is that gains from RTA's increases in insecurity if they reduce probability of escalation but insecurity reduces gains from RTA are otherwise. All RTA notifications under the XXIV article of GATT or the Enabling Clause for developing countries taking the form of PTA's, FTA's, customs unions or common market and being in force of at least one year from 1950 to 2000. Qualitative data on wars is compiled from different sources. Results show that more open countries and more subject to interstate conflict tend to institutionalize stronger in terms of the formation of customs unions and common markets. On the other hand, more soft institutions in the form of preferential trade agreements tend to prevail among countries that are more subject to international insecurity. The work by Vicard (2008) considers the effects of wars on the probability of RTA's and so is less concerned with the actual trade flows. Martin et al. (2008) considers the effects of conflicts and wars on trade, presenting theoretical modelling the escalation of conflicts and potential issues of asymmetric information and considering this in a multilateral context. Also, empirical evidence is presented based on data from 1950 to 2000, with a specification allowing for both anticipation effects (lagged of variable for conflict) and delay effects (lead of variable for conflict). Results indicate effects of 10-20 years. Furthermore, Martin et al. (2008) considers various specifications of the effects of trade on conflicts and particularly finds that multilateral trade openness decreases dependence of bilateral openness and therefore costs of bilateral conflicts. Especially for the current work, it is notable that Martin et al. (2008) in their conclusion points to the potential of future research attend the intersection of trade agreements and conflict, admittedly in a context of trade agreements fostering peace, as their results suggest. Here, the link between wars and trade flows conditional on preferential treatment is in focus, which is one aspect of their arguments on future research.

Glick and Taylor (2010) turns to trade flows and investigates the effects of wars on such flows for a longer time period than that of Martin et al. (2008). Considering the period 1870

to 1997, the costs of war is analysed in terms of disruption of trade flows taken from three different sources to arrive at the long time period. Conflict data is similar to Vicard (2008) taken from the COW project rendering a binary variable for country pairs being at war. Effects of war are allowed to be contemporaneous and to arrive with a ten years lag. Also, international cooperation is controlled for in terms of a binary variable for country pairs being in currency union after 1945 or adapting gold standard before 1945. As such, the focus is predominantly on the relationship between war and trade flows, while the issue of trade integration through preferential agreements is less predominant. Disruptive effects are general and not conditional on preferential trade agreements. Findings support large and persistent effects of wars on trade flows, income and welfare. Handley (2014) turns to the effects of policy uncertainty based on Australian exporter-product-year observation for 1991, 1993 and 1996-2001 and presenting evidence from both a reduced form and structural form approach to modelling policy uncertainty on tariffs. The gap between applied and binding tariffs commitments of WTO is a measure of policy uncertainty, as bindings reduces uncertainty for exports potentially entering export markets. Results show that binding commitments increases export-product variety and no commitment to remove tariffs would increase product growth. Heilmann (2016) also considers the effects of political conflict on trade, focusing on four specific events: Boycott of Danish goods by Muslim countries in 2005-2006, Chinese boycott of Japanese goods in 2012, US boycott of French goods in 2003 and Turkish boycott of Israeli goods in 2014. This is undertaken in a diff-in-diff approach with synthetic controls. Results particularly points to trade disruption for the boycott of Danish goods in 2005-2006 of nearly 19 percent average one year effect.

It should be mentioned, that while economists have had an interest in the effect of conflict of conflict, political uncertainty and wars on trade, political scientists along similar veins using gravity equations have found mixed results. Some have found that bilateral political relations, wars and conflicts has negative effects on trade (Pollins, 1989a; Pollins, 1989b; Mansfield and Bronson, 1997; Anderton and Carter, 2001; Kesht et al., 2004), while others find no statistical effect (Morrow et al. 1998; Morrow et al., 1999; Barbieri and Levy, 1999; Mansfield and Pevehouse, 2000). A series of other contributions point to the influence of trade arrangements on conflict and wars (Polachek, 1980; Polachek, 1997; Pollins, 1989a; Pollins, 1989b; Oneal et al., 1996; Oneal and Russett, 1997; Oneal and Russett, 1999; Oneal

and Russett, 2001; Mansfield and Pevehouse, 2000; Gartzke and Li, 2003; Oneal et al., 2003; Peterson, 2015). The latter suggest possible issues of simultaneity, which will be discussed in the following section along the lines suggested by Glick and Taylor (2010).

In conclusion, a rich literature have dealt with the issue of effects of trade arrangements and institutions influencing trade flows along the lines of thinking suggested by the seminal work of Viner (1950). Another strand of the literature has dealt with the importance of political uncertainty, conflict and wars on trade flows. Little effort has been instigated in analyzing the effects of trade arrangements in situations of political uncertainty, conflict and wars, with the possible exception of Peterson (2015), who though takes the opposite perspective in terms of trade arrangements and their distortions being conducive to conflict and wars. Also, the current work present evidence over a long period hitherto not considered in the literature. The period 1650-1857 arguably entails important transitions in terms of an evolving industrious society combined with the growth of colonial trade and evolving trading hubs in Europe. This is what is analysed here. We next turn to the data and empirical strategy to achieve this demanding task.

3. Data and Empirical Strategy

Estimating gravity equations is the standard approach in the literature to analyse trade integration. Bilateral trade depends on the mass of markets in the form of economic size of two trading partners and on the distance indicating trading costs between the two partners. The theoretical basis of this long-standing empirical approach has been developed in e.g. Anderson and van Wincoop (2003), which from a general equilibrium approach. Issues concerning the estimation of gravity models have been addressed in a number of contributions. Larch et al. (2019) summarizes these in three parts. A first concern relates to zero flows, as ignoring no trade between an origin and a destination and only considering those instances, where positive trade flows are observable introduces concerns about heteroscedasticity. Santos Silva and Tenreyro (2006) developed the Poison Pseudo-Maximum-Likelihood (PPML) estimator to allow for zero flows, which has recently been developed into a PPML estimator which is more convenient with high dimension fixed effects in terms of ensuring convergence (Correia et al., 2019a; Correia et al., 2019b). A

second issue is that of bilateral trade flows not only depending on bilateral relative prices and trade costs in a general equilibrium approach. Rather, multilateral conditions will have to be considered, which is pointed out by Anderson and van Wincoop (2003) under the context of multilateral resistance. The remedy for this is time varying destination fixed effects and time varying origin fixed effects. Finally, Bergstrand and Baier (2007) points to possible endogeneity in trade policy variables from time invariant bilateral unobservables, which can be resolved by the inclusion of time invariant origin-destination fixed effects. Following Larch et al. (2019), a first best practice in estimating trade integration would therefore prescribe including time varying origin fixed effects, time varying destination fixed effects, time invariant origin-destination fixed effects and using the PPML estimator.

I will here go some way to accommodate this best practice. Estimation results will be presented using the most recently developed PPML estimation procedure – ppmlhdfe[4] – and the specifications will include time invariant origin-destination fixed effects. In the first results, the inclusion of time varying origin fixed effects and time varying destination fixed effects will be absent. The motivation for this is that including this set of time varying origin and destination fixed effects respectively, will not allow for the inclusion of time varying observables by port of origin or port of destination. While including such wide set of fixed effects is an advantage, it give limited possibilities to assess, whether observable time varying variables by port of origin or destination renders plausible results. This would be important in a first analysis of trade nitration based on unique hitherto unused data.

Compared previous contributions mainly focusing on institutional aspects of trade integration with respect to currency unions and free trade areas, I will also consider the issue of political conflict and how this interacts with preferential treatment schemes. Glick and Taylor (2010) address potential simultaneity issues, as a literature in political science has debated this. Contemporaneous war are accordingly by Glick and Taylor (2010) instrumented by number of years since peace, major power status, alliance relationships and distance, estimating a linear probability model for contemporaneous war in the first stage. Note, that lagged war variables are not instrumented. Results concerning the effects of war are largely robust to such instrumenting to counter simultaneity. Note, that Martin et

[4] See Correia et al. (2019a) and Correia (2019b) for a description of the estimator and procedure for robust statistical separation and convergence.

al. (2008) along similar veins consider instrumenting, though their focus in instrumenting is on the effects of trade on conflict, and so they instrument trade in a first stage. This clearly renders different types of instruments. Unlike previous contributions, I do not consider the effects of bilateral conflict, but rather the effect of one large political shock with Europe wide political effects. As discussed earlier, this is conceivably unaffected by trade flows of colonial goods to the Baltic Sea area, which alleviates issues of simultaneity.

Using the gravity equation as a point of departure, the current approach is similar to previous contributions to identify a treatment effect of war and political uncertainty. The standard gravity defines bilateral trade flows as depending on distance between markets and market size. The literature on the effects of trade agreements and preferential treatment includes indicator variables for the existence of such between two trading partners. This indicator variable is then taken to measure the treatment effect. The literature on conflict considers the effect of conflict and war by including indicator variables for the prevalence of war among trading partners and more broadly. The gravity equation applied here includes both these two types of effects, but furthermore makes the effects of preferential treatment conditional upon the outbreak of a series of major conflicts embolden in the commencement of the French Revolutionary Wars in 1793. The expression for international trade from Anderson and van Wincoop (2003) adapted to the current context of trade in sugar and using panel structured data is:

$$Kilograms\ of\ sugar_{ijt} = \frac{Population\ in\ origin_{it} * Population\ in\ destination_{jt}}{Popolation\ worldwide_{t}} \left(\frac{\tau_{ijt}}{Price_{it} Price_{jt}}\right)^{1-\sigma} \quad (1)$$

where τ_{ijt} are transport costs indicatos from origin *i* to destination *j* at time *t*. Restating this expression into exponential form and adding an error term ε_{ijt} gives the form of the expression for PPML:

$$\begin{aligned} Kilograms\ of\ sugar_{ijt} = \exp(\ln(&Population\ in\ origin_{it} \\ &+ \ln\left(Population\ in\ destination_{jt} + \ln\left(\tau_{ijt}^{1-\sigma}\right) - \ln(Population\ worldwide_{t}) - \ln(P_{it}^{1-\sigma})\right. \\ &\left. - \ln\left(P_{jt}^{1-\sigma}\right)\right) + \varepsilon_{ijt} \end{aligned} \quad (2)$$

The trade costs are here set in the context of preferential treatment capturing the trade costs and specifying the effects of these trade costs as depending on major exogenous political uncertainty and wars like the French Revolutionary wars. The trade costs are

therefore modelled by an indicator variable for shipments seeing preferential treatment by the Danish King interacted with an indicator for the commencement of the French Revolutionary Wars in 1793. In additional trade costs are in general captured by a set of dummy variables for country of origin or destination ports being involved in internal or international conflict.

Different from previous contributions, I furthermore work with detailed micro data available on trade and will be able to include more unconventional controls related to trade costs. Often the importance of competences, networks and clusters is stressed. The controls in equation (1) will therefore include a variable controlling for the skippers maritime competences specifically navigating the routes to the Baltic Sea as measured by the number of passages for a given skipper. Furthermore networks of competences could be of importance of trade flows. For a given skipper with a home port in some given location, a measure for the number of skippers in this home port carrying cargoes to the Baltic Sea in a given year out of all skippers carrying cargoes to the Baltic Sea irrespective of home port in the same year is a measure of such network effects. As network effects may possibly be conditional on specific types of products carried in the cargo, a similar share of a skipper's home port is calculated for cargoes of sugar in a given year. As these are time varying variables specific to ports, these may possibly not be identifiable if including time varying origin fixed effects and time varying destination fixed effects, if skipper home port e.g. to a high extent corresponds to origins of the skippers cargoes. What is included in the specification is on the other hand time fixed effects unconditional on origin or destination, which controls for general shocks and time trends not conditional on the preferential treatment of the Danish King. Admittedly, the specification therefore only goes some way in controlling for the multilateral resistance terms $\ln(P_{it}^{1-\sigma})$ and $\ln\left(P_{jt}^{1-\sigma}\right)$ to the extent that these are time varying and not captured by other time varying observables for port of origin and port of destination. The term $\ln(Population\ worldwide_t)$ is controlled for by including time fixed effects. I note that the trade flows measured here are in volume and not value, as is conventional in the literature.

A challenge is to define preferential treatment or in equation (1), the term privileges given by the Danish King to trade flows from some origin-destination combination. Literature based on more recent data has the advantage of using reporting and classifications of

GATT/WTO into preferential treatment, currency unions and free trade areas according to these international regulations. This advantage is absent here. I will therefore use a taxonomy defined in Degn (2010), which states four classes of preferential treatment by the Danish King with respect to transporting goods to the Baltic Sea. These are defined by extent of privileges in descending orderr:

1. Denmark, Norway, Sweden no toll. "Vendiske ports"/"Vendiske stæder" (Lübeck, Hamburg, Rostock, Wismer, Stralsund, Lüneburg) were slightly less privileged.

2. Eastern Hanse Cities ("Østerske hansestæder" – Hvidegaard, 2000) - seeing reduced tariffs (Gdansk, Kaliningrad, Riga, Szczecin, Reuel, Gripswold, Wolgast, Pernav, Meluing, Kolberg)

3. Western Hanse Cities ("Vesterske hansestæder" - Hvidegaard, 2000: Emden and Bremen) and Netherlands seeing less reduced tariffs

4. No priviliges – cargoes from France, Scotland and England

Even so, the intermediate cases with some privileges are at times less well defined. I will accordingly only consider the two limit cases of privileges in the first category and no privileges in the fourth category. This offers some advantages and some disadvantages. Concerning the fourth group of no privileges, it specified as a general rule for cargoes from ports in France, England and Scotland irrespective of destination. I will therefore consider a non-privilege indicator variable taking value one if cargoes have origins from ports in France, England and Scotland. This has the disadvantage of only comprising ports in nations that were directly involved in the French Revolutionary Wars in the first coalition and in fact in all of the seven coalitions emerging throughout the end of the Napoleonic Wars. To try to counter this, result are offered for a general indicator variable taking one for ports of origin in France, England and Scotland but results are also offered in a more flexible approach considering ports of origin in groups of nations presenting heterogeneity in effects of preferential treatment as a benchmark to the more general indicator variable based on the fourth defined type of preferential treatment by Degn (2010). The fourth type in Degns

taxonomy therefore offers the opportunity to assess the importance of having no privileges as the major shock in terms of the French Revolutionary Wars arrives in Europe.

An alternative approach is to consider the effects of being privileged, which is based on the first type of preferential treatment in Degns taxonomy. Furthermore this is closer to the typical analysis of currency unions in the literature if that is only a subset of origins and a subset of destinations that see privileges. Specifically, an indicator variable takes value 1 if ports of origin is Hamburg, Göteborg and St. Thomas included in my data and if ports of destination are Lübeck, Rostock, Stralsund, Stockholm, Copenhagen and Malmö, which is also included in my data. This renders an indicator variable for preferential treatment, which is only 1 for some origins and some destinations and zero for others. I note that this is different from the approach focusing on unprivileged ports of origin, as the indicator variable would here take value 1 if port of origin is in France, England or Scotland disregarding which port of destination the cargoes has. Concerning the definition of preferential treatment, uncertainties about the exact nature is acknowledged in the literature. Baier et al. (2019) introduces a two stage approach to allow for heterogeneities. I do not here implement a similar two stage approach, as the set of origin-destination combinations is considerably more limited in in the data used here, though the data here spans a much longer period.

Data limitation is an issue, when estimating long-run gravity equations over several centuries, as e.g. stated by Glick and Taylor (2010) pointing out that their work does not include a full set of time-varying multilateral resistance terms from the fact that their panel data is strongly unbalanced. The point of departure in terms of data is here the data in the Sound Toll Register. The Sound Toll Register contains a total of 1.8 million passages of cargo for the period 1634 to 1857 to Baltic towns from the rest of the world. This on the one hand offers unique opportunities of studying international trade flows in the period prior or at early stages of industrialization or what has been called the industrious period. Given these are not standardized trade data such as IMF Direction of Trade data, a number of choices have to be taken, when using and coding the data. Product types enter as a string variable in the data, while origins and destinations have been standardized by the Sound Toll Register

Online Project[5]. Even so, product categories are a challenge using the data. The approach here is to focus on sugar given the advantages of not having local effects on production, i.e. not crowding-out local production and trade in products that can be produced locally. As sugar is traded into Baltic Sea area, this does not change production structures of local goods and possible trade of such goods within the Baltic Sea area. This implies that it does not lead to trade creation or diversion in trade among towns in the Baltic Sea area, which are unobservable in the data given cargoes are only registered as they pass through the "Øresund" at the town Helsingør north of Copenhagen. It should be noticed that the period analysed does see the first experiments with sugar beet, as often ascribed to the German scientist Andreas Marggraf commencing in 1747. Initially, the production of sugar based on sugar beet was not competitive until the abolishment of slavery around the mid-1800's, as sugar cane was extensively dependent on slavery. Even so, the British blockade of cane sugar during the Napoleonic Wars leads to Frances to research and foster the growth of more efficient sugar beet. According to Hill and Langer (p. 197-199: 1991), the production of sugar from sugar beet only covered 5 percent of world production in 1840, but increased to 50 percent by 1880. I do though notice that in the process of the expansion of the production of sugar based on sugar beets, did during the early 1800's lead to the establishement of 40 sugar beet factories in predominantly Northern France, Germany, Denmark, Austria and Russia (Winner, 1993). In general, sugar beet does therefore seem to have achieved a no or very limited level of production in the Baltic Sea area and this only to the very end of the period studies. It must therefore be expected that the predominant share of sugar consumed in the Baltic Sea area has origins in sugar cane production not achievable locally around the Baltic Sea due to climatic reasons.

A concern is that cargoes may include a combination of goods. The convention followed here is to include all cargoes, where the string describing the cargo contains different spellings of sugar as the first word, assuming that the first type of good mentioned in the cargo dominates. This has two possible caveats. One is that goods quite different from sugar are included, as e.g. sugar could combine with grains in the same cargo. From inspection of the data, this appears to be less of an issue, as cargoes have some degree of homogeneity in terms of product types mostly combining sugar with candies or other similar. The second is

[5] See http://www.soundtoll.nl/index.php/en/over-het-project/str-online.

that of spelling. Customs officers over an about 200 year's period, where the Danes were under the influence of different foreign languages lead to a multitude of spelling types of sugar. A coding exercise has been undertaken to capture all possible types of spellings of sugar, so as not to exclude any cargoes relevant.

A second challenge is that of measurement of volume of cargoes. The dominant volume measure over the period is that of "Pund" or "Skibspund" being just less than one kilogram. Given the international nature of the data, volume measures from different parts of the world do though also occur. Examples are Arroba, Fustagier, Fad, Ladning, Læst, Oksehoveder, Piber og Tønder. In that respect, two challenges arrive. First to identify all possible spellings of these volume measures along similar considerations as that of naming product types. Spelling of volume measures constitutes a challenge similar to that of identifying good types and similar string routines have been applied to identify volume measures with different spelling structures. The other is to unify these measures into one volume measure. The approach is here to attempt to standardize the volume measures into kilograms. This though leaves an additional concern. Adding volume measures across different product types. Given earlier comments, the maintained assumption is that cargoes identified as described above predominantly consist of sugar. To provide some assessment if these coding routines provide plausible trade flows, some descriptive data will provided later this section.

To estimate the gravity equations, variables for market size is also required. Clearly, achieving income or GDP measures for towns around the world for the period 1650 to 1857 is infeasible. Instead, the current approach is to use population data as a measure of market size, which is an approach often implemented in the literature given scarcity of income or GDP data back in time and over the long-run. Even so, getting population data is also a challenge. A renowned source for population data is the Bairoch data, see Bairoch et al. (1988). This data only has observations only has information over long time intervals from 800 to 1800. A concern matching this data to the trade data of the Sound Toll Register are the long periods of no observations for this population data. Also, it should be noted that the Bairoch data uses interpolations in creating the dataset. In attempting to ensure a higher frequency of observations for the period from 1650 to 1857, data from the Baltic

Towns Project[6] will be used here. This offers more regular population data in shorter time intervals for towns in the Baltic Sea area, even if the data is not synchronized making some interpolation necessary to arrive at synchronized and match able data to the Sound Toll Register data. A measure of market size for towns outside the Baltic Sea area remains an issue. Population data will again be used for market size, and specifically the data from the Clio Infra Project on total urban population is applies[7]. This data has the weakness of having gaps in time without population observations, also requiring an interpolation exercise to arrive at higher frequencies of data. Clearly, having annual population data would be preferable, but this is not an option for the period considered. Accordingly, interpolated population data is used. This is a caveat, but the main focus of analysis is not on population development, but the population data serves to control for market size. Obviously, large deviations from tends over the periods of observational gaps though remains an issue. It may be noticed that including time varying origin and time varying destination fixed effects would alleviate the need for market town size, but observables will here be given priority, to assess if results from the data are plausible, which is motivated by the fact that the Sound Toll data has not before been used for this type of analysis.

Apart from considering the effect of the outbreak of the French Revolutionary Wars in 1793, controls for the general involvement in conflicts and wars of trading partners is called for. To achieve this, the conflict catalog of Peter Brecke available at the Center for Global Economic History[8] is used to count the number of conflicts a given trading partner is involved in around the world in a given year. Notice that unlike Glick and Taylor (2010), these controls are not only for bilateral involvement in conflict and wars, but count the number of internal or international conflicts or wars a given trading partner is involved in for a given year. This thereby controls for any conflicts that a trading partner may be involved in around the world, which may impede on its trade flows of sugar.

The data considered consists of trade in the aforementioned colonial goods from 17 harbor towns outside the Baltic Sea area to 17 port towns in the Baltic Sea area. The ports of origin

[6] See http://www.baltictowns.com/portal/e_index.html
[7] See https://clio-infra.eu/Indicators/TotalUrbanPopulation.html
[8] See http://www.cgeh.nl/sites/default/files/Conflict Catalog 18 vars.xls or for documentation http://www.cgeh.nl/sites/default/files/Notes about Conflict Catalog.pdf

are specifically: Amsterdam, Antwerp, Bordeaux, Nantes, Boston (USA), Bremen, Hamburg, Göteborg, Liverpool, London, Lisbon, Porto. To include origins in climates appropriate to grow colonial goods Bahia, Havana, Matanzas, Rio de Janeiro and St. Thomas will be included. The 17 ports of destination are Copenhagen, Malmö, Gdansk, Kaliningrad, Karlskrona, Klaipeda, Lübeck, Narva, Noorköping, Riga, Rostock, St. Petersburg, Stockholm, Stralsund, Szczecin, Tallinn and Visby. Similar to the string routines applied to identify type of goods and measure of volume, string routines have also been applied to capture possible spellings of these port names for the over 200 years period.

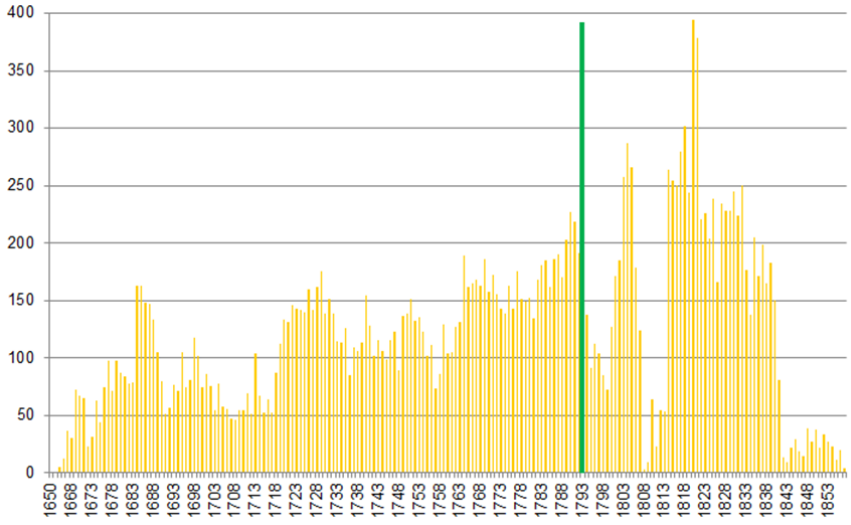
It should be noted that the Sound Toll data is in essence micro-data with information on individual cargoes on a given ship under command of a given skipper, which is by nature different from the aggregated trade flows usually used for this kind of analysis. This leaves me with three remaining issues: 1) aggregation, 2) value versus volume and 3) balancing the data for the PPML estimator. As concerns aggregation, one approach would be to aggregate the data by port of origin and port of destination. This would leave data similar to that used in the literature with the only different that trade flows would be between ports possible within the same country, while data used in the literature is trade flows aggregated to country level – not observing data for different ports within a country. I take a different approach. If a skipper in a given year transports several cargoes of sugar between the same port of origin and port of destination, this will be aggregated. Effectively, this renders skipper-origin-destination data each of the years from 1650 to 1857 for trade flows of sugar. Admittedly, this aggregates information on individual cargoes, but a count variable for the number of cargoes in a given skipper-origin-destination of a year is included as control in the data. The second issue is that of measuring trade flows in terms of value or volume. The traditional approach in the literature is to uses value measures including both price and volume changes, but the approach taken here is to use volume measures. One may discuss the advantages of either approach, but the approach taken here is real in terms of measuring trade flows in volume of kilograms, which could arguably be assessed closer to measuring market size in terms of population size, which is in essence also a "real" measure of market size. Finally, the third issue is that of balancing the data to allow for zero flows in the PPML estimator. The data has been balanced introducing zero flows in the skipper-

origin-destination dimension, which would allow for zero flows for a given skipper between any origin-destination combinations in a given year.

Given this is the first time the Sound Toll data has been used for the analysis of trade flows and given the series of string routines applied, it would be valuable to assess the plausibility of the arriving data. A first important insight is that of cargoes. How does the number of cargoes with sugar evolve over the long-run and what happens to the average size of cargoes? Figure 1 presents the number of cargoes with sugar over the period from 1650-1857.

The number of cargoes with sugar from 17 ports outside the Baltic Sear area to the 17 ports in the Baltic Sea area, has increased rather steadily from 1650 to around 1790, though with some periods of spikes and troughs. The vertical green line marks the outbreak of the French Revolutionary Wars, at which stage, is becomes clear, that the pattern changes with more volatility in number of cargoes and what may be seen as stagnation or downwards trend at least until the end of the Napoleonic wars around 1815. As off around 1840, the importance of sugar traded through the Sound Toll seem to diminish considerable in terms of number of cargoes, which may reflect the increasing importance of sugar beet grown locally becoming increasing important in the period from 1840 to 1880.

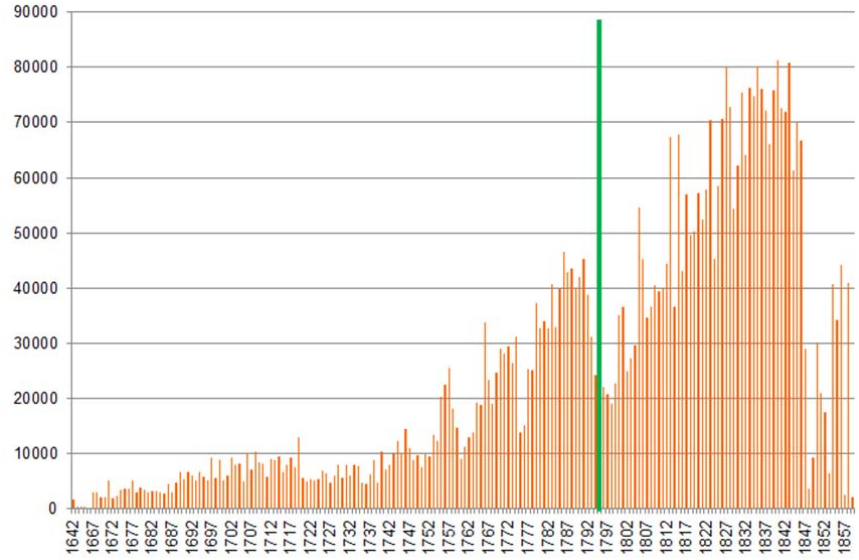
Figure 1: Number of cargoes with sugar from 1650-1857 between any origin-destination



Source: Sound Toll Register Online and own calculations

Apart from the number of cargoes, it would also be interesting to observe the average size of cargoes in kilograms, as this would give information about if such cargo sizes are plausible with the ship technology of the time. Figure 2 presents the average size of cargoes of sugar passing through the Sound Toll for the years 1650-1857.

Figure 2: Average size of cargoes with sugar in kilograms from 1650-1857 between any origin-destination

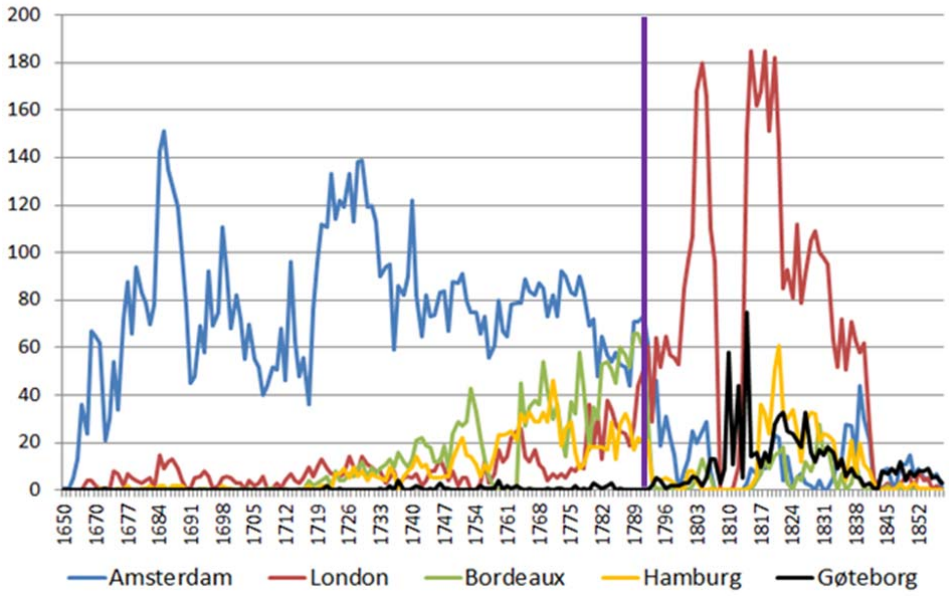


Source: Sound Toll Register Online and own calculations

The average size of cargoes of sugar transported through the Sound Toll has increased steadily during the period from 1650 to 1790 with a clear setback around the commencement of the French Revolutionary Wars. It is noticeable, that the average cargo size increases to a upper bound and 80.000 kilograms or 80 tons. Would this be a possible carriage for the ship technology of the time? French (1973) considers tonnage of ships based on West Indian shipping lists, which range from 60-400. This compares well with the data on tonnage for some of the ships carrying sugar through the Sound Toll, even if tonnage is not provided for all ships carrying cargoes. This indicates that some ships sailing with cargoes of sugar through the Sound Toll could carry around 300 tons, even if others carried smaller cargoes. As such, this renders some confidence in the data developed based on the Sound Toll register.

Over a two hundred years period, trading patterns can change markedly. To give some first indications of the structure of data Figure 1 presents the number of cargoes with colonial goods to the Baltic Sea area from the six largest ports of origin.

Figure 1: Number of cargoes with colonial goods from five most important ports of origin



Source: Sound Toll Register Online and own calculations

The data clearly reveals what is called the "Dutch Golden Age" arguably associated with the establishment of the Dutch East Indian Trading Company in 1602, which with monopoly powers in Asian trade over the 17th century would grow to the worlds largest commercial trading company. The strength of Amsterdam may be taken to reflect such strong institutions evolving in 17th, but continues to be strong in the 18th century. Before the turn of the 19th century, this ends, which seems closely associated with the arrival of the French Revolutionary Wars marked here vertical black solid line in the figure. This on the other hand renders a surge in other ports such as London and Göteborg, that had previously been of very moderate importance in terms of cargoes with colonial goods. London seems to see the surge rather immediately, while Göteborg gradually gains momentum and peaks after the wars had been terminated. Even if the relative collapse of Amsterdam appears timewise synchronous with the initiation of the French Revolutionary Wars, it is notable that another privileged ports – Göteborg experiences a surge in cargoes. The relationship between these

wars and a status of privileged by the Danish King therefore needs closer investigation in the gravity equation setup.

4. Estimation Results

Results are provided for three sets of speciation's concerning the preferential treatment based on the taxonomy of Degn (2010). These are the instances, where the indicator variable some trade flow for origin-destination combinations considers privileges as defined in either of the following:

a) Trade flows from $i \in \{\text{London}, \text{Liverpool}, \text{Bordeaux}, \text{Nantes}\}$ and any of the 17 destination ports in the Baltic Sea area

b) Trade flows allowing for heterogeneity in effects defining origins in groups from $i_1 \in \{\text{Bordeaux}, \text{Nantes}\}$, $i_2 \in \{\text{Liverpool}, \text{London}\}$, , $i_3 \in \{\text{Amsterdam}, \text{Antwerpen}\}$, $i_4 \in \{\text{Lisbon}, \text{Porto}\}$, $i_5 \in \{\text{Hamburg}, \text{Bremen}\}$ or $i_6 \in \{\text{St. Thomas}, \text{Göteborg}\}$ to any of the 17 ports in the Baltic Sea area. Note that the base category is trade flows from other overseas origins than St. Thomas to any of the 17 destination ports in the Baltic Sea area.

c) Trade flows for privileged ports as defined by the first groups in Degn (2010) or specifically trade flows from $i \in \{\text{St. Thomas}, \text{Göteborg}, \text{Hamburg}\}$ to $j \in \{\text{Lübeck}, \text{Rostock}, \text{Stralsund}, \text{Malmö}, \text{Copenhagen}, \text{Stockholm}, \text{Visby}\}$

I note that the groups of origin defined in point a) above are such that later groups of origin are more privileged, while earlier defined groups are less privileged according to Degn (2010).

Estimating equation (2) using the Poison Pseudo-Maximum-Likelihood estimator based on trade flows being given privileges by the Danish King as defined in point a) above renders the results shown in Table 1. Note that trade flows are here by skipper, as discussed in the previous section. The results for market size are as expected. Larger markets in the origin and destination trigger larger cargoes of sugar. The results on internal and international

conflicts are mixed. International and internal conflicts in origin triggers larger trade flows, which is difficult to interpret even if estimates are significant. Internal conflicts in destination is similarly hard to interpret, and may arguably point to problems of including such measures.

Relating to the measure of networks in home port of skipper and competences of skippers, it is clear that such factors matter by a large extent in economic terms and are significant. Particularly, the measure of general networks in the form of share of all cargoes through Sound Toll of any goods type in a given year appears of importance.

Table 1: The Danish Kings Toll and Trade Disintegration 1650-1857 – Toll by Origin in France, England and Scotland

Model	(1)	(2)	(3)	(4)	(5)
Population at origin	2.922*** (35.99)	3.990*** (36.38)	3.931*** (35.61)	3.996*** (35.73)	3,072*** (29.10)
Population at destination	0.760*** (11.17)	0.831*** (12.07)	0.822*** (11.55)	0.791*** (11.09)	0.712*** (10.02)
No Privilege* 1793 indicator		-1.822*** (-25.98)	-1.748*** (-24.74)	-1.772*** (-25.13)	-1.837*** (-21.95)
International Conflict in Destination			0.047 (0.89)	0.008 (0.15)	0.032 (0.51)
Internal Conflict in Destination				0.229*** (4.84)	0.357*** (6.78)
International Conflict in Origin			0.240*** (3.57)	0.242*** (3.58)	0.282*** (4.66)
Internal Conflict in Origin				0.103** (2.88)	0.085* (2.21)
No. Skipper same org-des					1.831*** (30.53)
Home harbors share of all shippings					39.35*** (32.36)
Home harbours share of all sugar shipping					7.287*** (10.19)

Note: All standard errors are robust to clustering by skipper.

For the effect of preferential treatment by the Danish king with the arrival of the French Revolutionary Wars is estimated to be -1.837 in the most general model, which corresponds to -0.84 (=$e^{-1.837}$-1) or a reduction of 84 percent in trade flows of sugar. One may reflect

upon, to which extent preferential treatment by the Danish king lead to very different effects as the French Revolutionary Wars broke out. To investigate this, heterogeneity in the origins are allowed as defined under point b) above. French ports were involved in the sense of first the French Revolution and then the French Revolutionary Wars took place in the country of these ports. The English ports are likely involved, as England was part of the two coalitions under the French Revolutionary Wars and five following coalitions of the Napoleonic Wars. The Dutch Republic and surrounding areas were likely influenced by the Flanders Campaign during the French Revolutionary Wars. Ports these geographies are likely sizeably affected by commencement of the French Revolutionary Wars. Some ports that were likely less influenced are those in Portugal and in the reminiscence of the Holy Roman Empire in what is now Germany. Finally, the least influenced ports of origin were those under the rule of the Danish king. The results, when allowing for such heterogeneities in the preferential treatment and effects associated with the French Revolutionary Ware are shown in Table 2.

Table 2: The Danish Kings Toll and Trade Disintegration 1650-1857 – Toll by Origin in Groups

Model	(1)	(2)	(3)	(4)
DKSE*1793 indicator	-0.270 (-0.88)	-0.295 (-0.96)	-0.276 (-0.90)	-0.637* (-2.35)
FR*1793 indicator	-4.887*** (-27.65)	-4.912*** (-27.97)	-4.954*** (-28.38)	-4.043*** (-23.02)
UK*1793 indicator	-1.074*** (-7.41)	-1.068*** (-7.40)	-1.076*** (-7.48)	-1.134*** (-7.88)
NLBE*1793 indicator	-2.408*** (-14.96)	-2.408*** (-15.10)	-2.441*** (-15.40)	-1.162*** (-7.19)
Holy-Roman-Empire*1793 indicator	-1.343*** (-8.42)	-1.328*** (-8.38)	-1.306*** (-8.27)	-1.054*** (-6.61)
Not reported controls	Population in origin and destination	Population in origin and destination + international conflict	Population in origin and destination + international conflict + internal conflict	Population in origin and destination + international conflict + internal conflict + skipper and harbor variables

Note: All standard errors are robust to clustering by skipper. DKSE: St. Thomas and Göteborg; FR: Bordeaux and Nantes; UK: London and Liverpool; NLBE: Amsterdam and Antwerpen; Holy-Roman-Empire: Hamburg and Bremen. Other controls than the interaction of the $I_{Privileges\ i,j}$ and I_{1793} have been suppressed as indicated by the last row of Table 2.

The effect of preferential treatment through the Sound Toll payments as triggered by the French Revolutionary Wars are diverse. As expected the ports receiving preferential treatment – St. Thomas and Göteborg – see no significant effect except for the most general model (5). Here the effect is 47 percent ($=e^{-0.637}-1$) and it is notable that not taking into account skipper experience and network effects in the skippers home port would lead to the conclusion of no significant effects. This hints at the importance of considering such experiences and networks, when assessing the effects of preferential treatment. The largest significant effect takes place for the French ports, where it results in a reduction in trade flows of sugar by at least 98 percent ($=e^{-4.043}-1$). The second largest reduction is experienced by UK, though here the effect in the most general model is a reduction of 67 percent ($=e^{-1.134}-1$). About the same effects are seen for the Dutch Republic and surroundings at marginally larger reduction of 69 percent ($=e^{-1.162}-1$), while the effect is smaller for ports in the Holy Roman Empire with a reduction of 65 percent ($=e^{-1.054}-1$). Overall, the effect seems to be in the vicinity of 65-70 percent, with the exception of French ports seen a reduction by 98 percent, while ports under the Danish king at worst sees a reduction of 47 percent. As trade flows passing the waters around England and France to arrive at the Baltic Sea area, it is still remarkable that reduction in trade flows of sugar depends heavily on the reign or nation of the port of origin.

A final test of the importance of preferential treatment under political uncertainty and conflict applies the last approach to specifying privileges for trade flows by origin-destination combination defined under point c) above. The results of this approach, which is arguably closer to the usual definition of customs unions in the literature, can be found in Table 3.

The results show that the privileges in the first group of the taxonomy of Degn (2010) concerning preferential treatment by the Danish king did indeed see stronger trade flows of sugar associated with the commencement of the French Revolutionary War. The effects of trading from one of St. Thomas, Göteborg or Hamburg to one of Lübeck, Rostock, Stralsund, Malmö, Copenhagen, Stockholm or Visby is an increase on trade flow by 65 percent ($=e^{0.506}-1$). Being privileged therefore clearly matters for the trade flows size of skippers transporting sugar between these ports that were privileged by the Danish king.

Table 3: The Danish Kings Toll and Trade Disintegration 1650-1857 – The Preferred

Model	(1)	(2)	(3)	(4)	(5)
Population at origin	2.922*** (35.99)	2.922*** (36.38)	2.884*** (35.39)	2.895*** (35.57)	2,104*** (27.40)
Population at destination	0.760*** (11.17)	0.792*** (11.31)	0.742*** (10.62)	0.708*** (10.14)	0.683*** (9.79)
Bilateral by port privileges* 1793 indicator		1.104*** (5.85)	1.116*** (5.94)	1.127*** (6.01)	0.506** (2.´78)
International Conflict in Destination			0.205*** (3.61)	0.167** (2.88)	0.174** (2.69)
Internal Conflict in Destination				0.214*** (4.56)	0.498*** (8.40)
International Conflict in Origin			0.494*** (7.52)	0.491*** (7.41)	0.346*** (6.70)
Internal Conflict in Origin				0.029 (0.79)	0.049 (1.26)
No. Skipper same org-des					1.779*** (27.39)
Home harbors share of all shippings					40.06*** (33.70)
Home harbours share of all sugar shipping					6.997*** (10.10)

Note: All standard errors are robust to clustering by skipper.

The evidence provided points the importance of preferential treatment being important under times of political uncertainty and that this may be highly heterogeneous. While the results focusing on being non-privileged by origin as defined in points a) above could relate to the direct involvement of ports of origin into the French Revolutionary War. The heterogeneity in effects, when focusing on unprivileged ports in point b) above does render some insights into which this applies. Clearly, direct involvement by French ports is detrimental, but comparing ports in under other reigns and nations, there is a difference in effects among those under the Danish king and others from around 65-70 percent reduction to around 47 percent. Also, turning the preferred ports as defined under point c) above, the importance of being preferred by the Danish king is around a 65 percent higher trade flow by skipper. In this sense the preferential treatment by the Danish king stands as an example of preferential treatment in long-run trade flows having effects.

5. Conclusion

A rich literature has particularly focused on the effects of preferential treatment, customs unions and free trade areas since WWII. This has contributed importantly on the understanding of such arrangements and to the development of elaborate methods to analyze trade flows and trade integration. Less prominent in the literature has been attempts to undertaken analysis of preferential treatment in the longer run back in history. This paper is a first step in this direction. It focuses on the effects of preferential treatment in trade at early times of industrialization and in what has been labelled the industrious period. The data used has hitherto not been used for such analysis of trade integration and preferential treatment. Some descriptive aspects of the data reveal that patterns of trade flows of sugar appears plausible even is arriving at data for estimation requires some coding exercises for such historical microdata, which is not required for more recent data on trade flows, as this has already been harmonized and coded accordingly.

The paper focuses extensively on the effect of preferential status given by the Danish king as of the offset of the French Revolutionary Wars in 1793. Results are provided using three types of coding of preferential treatment. The more general coding of French, English and Scottish ports being unprivileged following the taxonomy of Degn (2010) shows clear results of reducing trade flows from these ports. Considering the possible heterogeneity in such effects among five groups of ports, particularly French ports see reduced trade flows by skippers, but other ports see a reduction of about 65-70 percent apart from ports under the Danish king seeing reductions of only around 47 percent. This is an indication that preferential treatment matters in times of political uncertainty, as most ports of origin see larger reductions than that of ports of origin under the Danish king. In that respect it is furthermore noticeable that including measures for skipper experience and skipper home port networks matters for the significance of effects of the preferred ports under the Danish king. The importance of preferential treatment is also seen when turning to those bilateral origin-destination combinations of ports, that according to Degn (2010) were given free passages or nearly so through the Sound Toll, which see an increase in trade flow sizes of skippers of 65 percent.

This constitutes a first step in the direction of using historical data spanning a long time period for the analysis of trade integration and Vinerian effects. A number of issues remains for future research. One is to include a full set of time varying origin port and destination port fixed effects. This will admittedly obliterate measures of market size in the analysis, but will on the other hand control for other time varying unobservables for each port of origin and each port of destination. Another piece of future research refers to the use of skipper-origin-destination data in the current context. An obvious next step is to turn to origin-destination data, as is often used in the literature. Admittedly, this removes the option to use clustering by skipper in the analysis, but on the other hand has advantages. One is that the current analysis sheds light on the cargo size of skippers carried from one origin-destination combination. Preferential treatment should expectedly have effects at such a micro-level and has the advantage of being able to control for skipper characteristics, which may otherwise be omitted. On the other hand, the literature thinks of trade flows in origin-destination terms and this furthermore has the advantage of making it possible to break down the change in total flows into number of cargoes and average size of cargoes. It will accordingly be possible to analyze at which "margin" preferential treatment matters the most. Another important aspect for future research concerns the timing of effects of political uncertainty and of preferential treatment. It has become customary in the literature to allow for phasing in and phasing out of the effects of preferential treatment – in some examples of up to 5 years. In the current approach, it is the outbreak of the French Revolutionary Wars that is at heart. Clearly, the current analysis could be extended into a more dynamic analysis of such effects allowing for phasing-in and phasing-out effects. A final step for future research would be to experiment with particularly the definition of good types. Would a more strict definition of sugar trade matter? And are trades in sugar influenced differently from trade in other types of goods from the preferential treatment given by the Danish king? These are essential question, but this is left for future research.

6. References

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