Long-distance international trade from and to ports of Finland 1634–1853 - some time-series analyses (with French trade anatomized)

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Research goals

• Growth of international trade of Finland (...and economic growth, too)
  • trend; to get long time series; linking my preliminary analyses to the previous research

• Overall development of the Finnish shipping industry
  • and, different evolutions in different areas of Finland; market shares in Finnish trade

• Segmented growth; because of institutional changes?

• Effects (either transitory or permanent) of some institutional changes
  • on shipping industry
  • on development and structure of trade
  • which are not same because of
    • trade creation vs. trade diversion -> economy as whole vs. interests of some sectors
Outline

• The Sound Toll Registers Online from Finnish perspective, and some overall background historical information

• Developments of Finnish long-distance international trade and merchant shipping industry -> signs of underlying economic growth
  • compared to previous estimations of Finnish foreign trade (and growth accounting)

• AR1; Hodrick-Prescott filters/trends & finding/motivating possible break years due to institutional changes(?)

• Estimations of segmented linear trend models: effects of institutional changes
• Trend-stationarity vs. difference stationary tests

• Trade with France (as a curiosity)
• Conclusions
The Sound Toll Registers - and Finnish ports

• Levied by the King of Denmark: 1497-1857
• 1,8 million passages, and approximately 4 million registered cargo items (in database 2: 1634-)
• “Finland” much like an island! -> good case to use STRO

Finland, 1634-1856

• around 2,2 percentage sample of STRO
• from Finland: 20 212 passages and 55 893 cargoes
• to Finland: 11 879 passages and 35 425 cargoes
• total: 32 091 passages and 91 318 cargoes
• net “exports”: 8 333 passages and 20 468 cargoes (…many reasons to that)
• in domestic vessels: 13 867 passages (43,2 %) and 49 279 cargoes (54,0 %)
Some idiosyncrasies

- Early period: exports of tar and imports of salt via Stockholm 1648-1715 (but, little break in 1680’s)
  - however, not all according to STRO. But, export passages dropped to under half, and trend of number of passages with tar was moreover decreasing
  - incoming ships: almost all in ballast or having salt cargo. Destinations recorded only since 1667...
  - also, effects of The Great Nordic War (1700-21)

- Commodity ordinance (The Swedish Navigation Act) 1724->
- Only few staple towns until 1765, more staple towns gradually since
- High tolls in both imports and exports: semi-productive transport(?)
  - ballasts in incoming vessels, especially in foreign vessels
  - (due to these institutional restrictions, but also because of lack of purchasing power in Finland?)

- Finland vs. The Old Finland: Vyborg (under Russian rule 1721->) and Hamina (Fredrikshamn in Swedish, 1743->)
  - War of Hats (1741-43), War of Gustaf III (1788-90)

- The Napoleonic Wars (dummies for years of war, 1805-14)
- Crimean War (-> time-series analyses only to 1853)
Previous estimations of Finnish foreign trade
Hjerppe (1988): Finland 1860-1985, 1814=100
+ Schybergson (1973), 1814=100
Schybergson (1973) vs. STRO, exports (1814=100)
Schybergson (1973) vs. STRO, imports (1814=100)
STRO: ”Finland” 1634-1856, exports (1814=100)
STRO: ”Finland” 1634-1856, imports (1814=100)
About growth rates
Share of passages from and to Finland in the Sound
Share of passages from and to Finland in the Sound
Market shares in trade from and to Finland
Some basic information about Finnish international trade: by commodities and geographically
Exports from Finland, number of passages and cargoes

Vienti: rahdit ja matkat

[Graph showing the number of passages and cargoes from 1634 to 1850]
Imports to Finland, number of passages and cargoes

Tuonti: rahdit ja matkat

[Graph showing the number of passages and cargoes over time from 1634 to 1850]
All passages and **passages in ballast** (both ways)
Imports in ballast (passages) to Finland (Vyborg vs. other FIN)
Export passages by town (Vyborg vs. other FIN)
Import passages by town (Vyborg vs. other FIN)
Different types of exports (number of passages)
Different types of imports (number of passages)
Growth of exports and imports (with HP-filters)
Number of export passages from Finnish ports
Number of import passages to Finnish ports
Number of export passages in log scale using HP-filter ($\lambda=100$)
Number of import passages (in ballasts excluded) in log scale, HP-filter trends
Estimation of segmented linear trend models
Estimation of segmented linear trend models

• $x_t = \alpha + \beta t + \sum \theta_{T_i} D_{T_i,t} + u_t$

• where $D_{T_i,t} = t - T_i + 1634$, if $t > T_i$
  • $= 0$ , otherwise

• three breaks? => D1725, D1766 and D1815
• dummy variable (WAR) for 1805-1814
• parameter estimates will be additive cumulatively
• use of autoregressive least squares (AR1), too. Firstly by OLS.
Estimated equations and hypotheses

- Dependent variables: number of a) passages or b) cargoes of 1) exports, 2) imports, and 3) total trade. And, passages in ballast either included or excluded.
  - also, ratios of domestic vessels of all ships doing Finnish trade to analyse changes in market shares, and how are these seen in ratios of all ships (from other ports) navigating through The Sound
  - explanatory variables: constant, time trend + three additive time trends, and war dummy
  - using OLS and AR1

1. Are time trends segmented? Are segments trend-stationary processes?
2. Are effects of two institutional changes (1724 and 1765) statistically significant? What will be their signs? Same for both exports and imports...?
3. Do effects vary between domestic and all vessels?
4. Are effects different in Finland than in so called Old Finland?
Overall estimation results

• Constant terms got negative signs, and they were always statistically significant
• Time trend estimates got positive signs, and they were always statistically significant (→ overall growth)
• Dummy for Napoleonic Wars got negative signs, and they were always statistically significant (→ negative shock)
• Additive time trend estimates of years after 1814 got positive signs, and they were always statistically significant (→ segmented time trend)
• Serious autocorrelation, but AR1 models gave usually same results of signs, but some estimates were not statistically significant anymore
• Concerning these four parameter estimates
  • effects did not vary between domestic and all vessels
  • effects were same in Finland than in so called Old Finland
Effects of Commodity ordinance (The Swedish Navigation Act) after 1724

- Estimates quite often statistically insignificant, at least in AR1 models, but when statistically significant, signs were systematically negative for both imports and exports, and done by all or domestic vessels
  - Act increased only ratio of domestic vessels in number of export cargoes, but not in AR1 model

- However, at the same time both imports and exports in Vyborg (part of Old Finland and not under Commodity ordinance) increased

- So, Finnish ports were substituted to other ports of The Baltic Sea (at least to Vyborg), and by all vessels excluding Finnish vessels -> trade diversion

- Commodity ordinance had negative effects to long-distance trade from and to towns of Finland(?).
Effects of increasing staple town rights in 1765

• Signs systematically positive and statistically significant (in OLS, in AR1 often insignificant) for both exports and imports. No difference between all and domestic vessels

• And, at the same time both imports and exports in Vyborg and Hamina (part of Old Finland) increased, also. Some import passages done by domestic vessels to Vyborg and Hamina were decreased (= moving back to ports of Finland?)

• Increasing staple town rights gave substantial boost in long-distance international trade to ports of Finland, and moreover incentives to do this trade using domestic vessels. Dutch dominance was phasing moreover to its end, at least in Finnish trade

• But, Commodity Ordinance was still in order, and lost its power by the mid-nineteenth century (share of domestic vessels in imports developed, and was much bigger than in exports)
How about trend-stationary processes?

• Complete time period: hypothesis of unit-root cannot be rejected!
  • generating processes are difference stationary -> all shocks would be permanent

• But, how about ADF unit-root tests for the segments?
  • then, if hypotheses of unit-roots are rejected, then trend-stationary process
  • -> shocks are typically transitory except at small number of break points, where trend shifts permanently
  • some evidence of this. However, not too many good AR1 least squares estimates...
Reservations

• data set and results could be sensitive for any mistakes when forming it
• in early period trading monopolies, and sequential wars during the whole time period
• lots of years when we have zeroes in variables which causes problems to use logarithms and indices
  • moving averages or Hodrick-Prescott trend time series
• autocorrelation problem of all the time series
  • results with AR1 least squares are much weaker than in ordinary least squares
  • contradicts too ponderous interpretations
  • interpretations of transitory vs. permanent effects

• even though we have seen some trade redirecting/diversion effects in the routes of vessels, it is very difficult to judge that the institutional changes have had neither too positive or negative effects without analyzing volumes and values of imports and exports
Long-distance trade with France, by sea
Passages of international trade with France

Trade with France, passages

- both
- exports
- imports
Cargoes of international trade with France
Imports from France, number of cargoes
Imports from France, by cargoes in passages
Imports from France, shares of different kind of passages
Imports from France (% of passages by cargoes)
CONCLUSIONS (1)

• This paper provides a time-series analysis of total Finnish long-distance international trade covering time period of 1634-1853. The contents of digitalized Sound Toll Register Online give a great opportunity to have a full sample of all passages and cargoes from or to ports in Finland, and which is around two percentage sample of all passages gone through The Sound in that period.

• The dataset obtained showed clear evidence of developments of both Finnish merchant shipping industry and international trade reflecting the overall economic growth of Finland in this period. For example, the share of passages gone through The Sound from or to Finland rose from under one percent to about four percent, and the share of passages done by domestic vessels were increased from about zero levels to some two and half percent during this time.
CONCLUSIONS (2)

• The time-series of numbers or shares of both passages and cargoes (imports, exports and total trade) done by either domestic or all vessels were firstly analyzed by fitting Hodrick-Prescott trends with smoothing parameters of either 100 or 10,000 to all time-series which revealed interesting features of them. Hodrick-Prescott trends were chosen for a preliminary analysis because they are known to be robust to the shifting regimes, and are comparable across the alternative series.

• Due to the Napoleonic Wars there were of course a huge drop in long-distance trade but afterwards trend growth of trade accelerated. On the other hand, before the 18th century there were very little amount of passages from or to Finland through the Sound since almost all imports of salt and exports of tar were directed via Stockholm. But, after regime shift there might have been couple of breaks, in 1724 and 1765, after when trend growths were changed. First year was when the Swedish Navigation Act (Commodity Ordinance) came into force, and second year when several Finnish towns got new staple rights to do international trade.
CONCLUSIONS (3)

• I’ve shown that growths of some variables can be regarded as segmented trend-stationary processes by estimating general linear segmented models with some break dates by OLS and autoregressive least squares. The effects of breaks were predictable: 1) some negative effects of 1724, and 2) the positive effect of 1765 for both import and export sectors, and finally 3) even accelerating trend growth after the Napoleonic Wars.

• Constant term, trend growth term and dummy variable of the Napoleonic Wars got statistically significant estimates of right signs. Estimated linear segmented time-series model also meant that different time period parameter estimates are cumulatively additive. Fits of regressed models were high, and autoregressive least squares corrected apparent autocorrelation problems.

• Finally, these segmented trend models estimated asserted some evidence in some cases that shocks have been typically transitory except at small number of break points where the trend shifted permanently.
Thank you!

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