

# Understanding the Emergence of Stock Exchanges: The Case of pre-WWI Stockholm.

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## Abstract

This paper describes and analyzes the emergence of the Stockholm Stock Exchange and its initial formation of ownership and governance. The exchange was initiated by private actors but became publicly owned because of current market regulation. The paper also sets out a coming research agenda for the exploration and evaluation of the early Nordic stock markets.

## 1 Introduction

Over the past ten years the increased rate of globalization and technological development have vastly changed the structure of stock exchange ownership and governance around the world. Automation of trading systems has turned exchanges from being floor-based trading venues contingent on the physical presence of traders and intermediaries into firms selling connections to a computerized matching algorithm (for an exposé, see Aggarwal (2002)). The globalized financial markets have also increased the competitive pressure on stock exchanges, forcing them to adjust their rules about membership, listing and trading fees. All these recent institutional innovations have spurred researchers to explore and build models of exchange ownership and governance.<sup>1</sup> What most of the studies lack, however, is a long-term perspective and a mapping of the initial conditions, which is crucial to any study

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<sup>1</sup> On the structure of ownership, Hart and Moore (1996) analyze the efficiency trade-offs of having a exchange organized as a non-profit members' cooperative or a for-profit firm owned by an outside owner,

of institutional change. As argued by, e.g., Economides (1993), history matters because the positive network externalities associated with the concentration of liquidity to a stock exchange generates institutional 'lock-ins' that constrain the choice set of decision makers.

History is also a powerful vehicle for comparative analysis, both across time and space. For example, the recent establishment of stock markets in Eastern Europe and the developing world may be informed by the experiences made by the "infant exchanges" of the Western countries a hundred years ago.<sup>2</sup> Similarly, the fundamental institutional shocks of the 19th century such as industrialization, the communication revolution (telegraphs and telephones), the emergence of corporate law, the first wave of globalized capital markets and so forth could assist our handling of today's globalization and technical change. Conducting comparative analyses also requires some degree of variation within the observations, and since today's world markets have undergone this recent convergence in organizational structure the historical evidence with their diverse range of observations may turn out to be more suited for that.

Despite all the virtues of analyzing historical stock exchanges, however, we know surprisingly little about them. Quantitative data on, e.g., market capitalization and firm-level prices hardly exists prior to World War II and qualitative evidence on exchange rules, membership and governance constitution, types of instruments or government regulation are even scarcer.<sup>3</sup> Notable exceptions do exist though, e.g., the studies by Lance Davis, Larry Neal and Eugene White (Neal (1990); Davis and Neal (1998); Neal and Quinn (2001); White (2003)), Richard Sylla (Smith and Sylla (1993); Rousseau and Sylla (1999)) and Ranald Michie (Michie (1986); Michie (2001)). These authors have primarily analyzed the origins and development of the large exchanges in London, New York and Paris, including some comparisons of microstructure arrangements and their effect on market performance. Much remains to be done, however, especially if one wants to draw statistically robust conclusions (so far, these are  $n = 3$  as for number of exchanges) above from certain within-exchange/country angles.

This paper increases the number of observations by 1 through supplementing the early history of the Stockholm Stock Exchange (SSE). The Swedish case is relevant to study for several reasons. First, Sweden was a small open economy and a late industrializer, which differs quite markedly with the countries whose exchanges are already studied. Moreover, the SSE was the sole exchange in the country and thereby is particularly suited to study in the context of economic growth.

Analyzing the Swedish case also facilitates the study of the three other Nordic financial markets in Copenhagen, Helsinki and Oslo. These Nordic countries were similar in many economic and historical respects but yet their stock exchanges differed in several ways, both regarding ownership and governance as well as of performance. To my knowledge, there is

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whereas Pirrong (1999) derives the organization determinants of member-owned exchanges due to member heterogeneity. Other papers analyze the market macrostructure like the effect of competition between exchanges (Di Noia (2001)) or between intermediaries and exchanges (Galetovic and Zurita (2002); Pirrong (2002)).

<sup>2</sup> For a recent attempts to do just this, see Pistor (2001).

<sup>3</sup> There are some ongoing efforts to alleviate this situation, however, such as Lyndon Moore at Northwestern University, who is currently compiling detailed price information from a large set of world stock markets during 1901-1920.

**Table 1:** Intermediaries on the Stockholm secondary stock market

Time Period	Intermediaries	
	Exchange	Off-exchange
–1863		AO
1863 – 1890	Brokers	
1890 – 1907	Brokers	Banks, Dealers
1907 – 1909	Brokers, Banks	Dealers
1909 – 1919	Brokers, Banks, Dealers	
1919–	Banks, Dealers	

no previous comparative economic research on the history of the Nordic stock exchanges.<sup>4</sup>

The paper focuses on the supply side of the market, i.e., the securities intermediaries active, between the 1850’s and the 1910’s. Their characteristics and interaction explain important parts of why the SSE emerged and later went through organizational change. I leave end the study before World War I although this was a highly formative period when the stock trading activity boomed which then led to profound regulatory reform. These events are, however, of slightly different nature than the foregoing foundation and reorganization and needs a more thorough treatment (which is left for subsequent analysis).

The rest of the paper contains an outline of the securities intermediaries followed by a narrative of the foundation and organizational development of the SSE and the market for brokerage. Thereafter, in section 4 some important theoretical dimensions are highlighted and section 5 sketches an analysis of the SSE history based on these dimensions. Section 6 summarizes and looks forward.

## 2 The Securities Intermediaries

The supply side of the Swedish, i.e., Stockholm stock market was during the 19th and 20th centuries dominated by three different types of intermediaries: brokers, dealers and commercial banks. An additional intermediary was the Auction Office, which enjoyed an auctioning monopoly in Stockholm before the 1860’s. Table 1 gives an overview of when and where these agents were active. Note that all on-exchange intermediaries could operate outside the exchange as well, but that this was not possible vice versa.

**The Auction Office:** The Auction Office (*Stockholms Auktionsverk*, AO) was a firm owned by the city of Stockholm with a regulated monopoly since the 17th century on all public auctions held in the city. It was controlled by the city’s Treasury (*Drätselkommissionen*) which appointed all its clerks and collected all its revenues, which represented roughly 2 percent of the city’s total revenues around 1860. According to Höjer (1953), most of this stemmed from commodities auctions and not from securities auctions.

<sup>4</sup> Lau Hansen (1999) conducts a highly interesting study of the securities legislation surrounding and affecting the Copenhagen Stock Exchange and make some comparisons with the SSE.

**Brokers:** Most brokerage in 19th century Stockholm concerned commodities, bills of exchange and shipping insurances. All brokers were authorized by a semi-public authority, the Trade Commission which was appointed by the city government and supervised the brokers according to the Brokerage Act (issued in 1853, 1893, 1901 and 1919).<sup>5</sup> In this act, brokers were prohibited from trading against their own account and charging commissions over a maximum fee specified by the law (0.5% of the value traded before 1853 and 0.4% thereafter).

The number of brokers specializing in securities intermediation were two between the 1860's and 1880's when two more joined them. At most they were seven (in 1902) and around 1920 they had all dissolved or turned into dealers.<sup>6</sup>

**Dealers:** In the early 1890's, various merchants, private bankers and firms (limited partnerships) appeared as securities dealers on the Stockholm market without the authorization of the Trade Commission. They were in fact broker-dealers as they both offered brokerage, sometimes supplemented by credit and deposit services, and also traded the assets themselves. An important contribution was that they acted as market makers offering investors quick deals over the telephone during most times of the day.<sup>7</sup> We know little about the extent of dealer activity in these years, but their significance may be concluded from a letter from the authorized exchange brokers to the exchange Board in 1902 with complaints about the competition coming from off-exchange dealers.<sup>8</sup> In 1909, the exchange Board opened up for dealers to become members of the exchange and less than ten years later they represented the majority of the members (see Figure 1).

**Banks:** The dominants of the Swedish capital and credit markets, the commercial banks, had since long been established bond dealers through their extensive bond underwriting business. In the 1890's they too started with stock brokerage but could not replicate the dealers as they were restricted by law from holding shares. Their brokerage departments soon became highly profitable, presumably thanks to their already large clientele network from the retail business and their possibility to bundle the brokerage with a host of other services.<sup>9</sup> In 1907, banks were allowed to become members of the SSE and they soon became its largest members in turns of intermediated volumes.<sup>10</sup>

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<sup>5</sup> In 1862, Sweden changed its municipality organization and many agencies changed name and structure. Accordingly, the Trade Commission was before the change called *Stockholms Handelsförening* and after *Stockholms Handels- och Sjöfartsnämnd*. In essence, however, the Commission remained a publicly appointed organ partly constituted by private merchants and bankers. Similarly, the city government changed name from *Magistraten* to *Stadsfullmäktige* and was given more formal power and legislative rights.

<sup>6</sup> See Algott (1963, p 124) and Belfrage (1917, pp 266-67.).

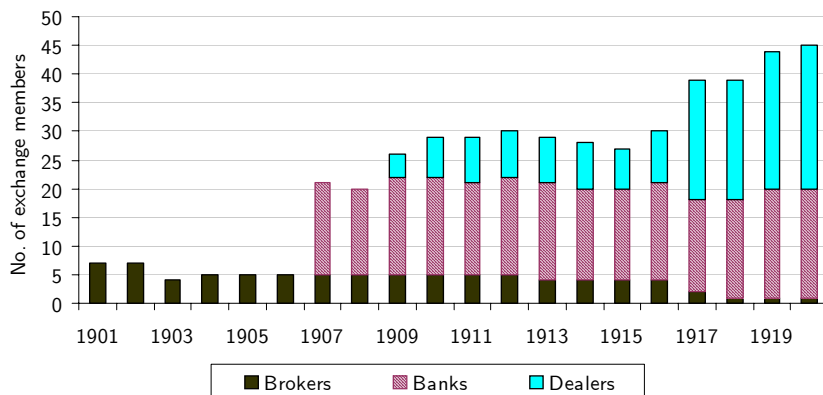
<sup>7</sup> On the crucial role of the telegraph and telephone to reduce transaction costs on financial markets, see Field (1998, 2000).

<sup>8</sup> See Algott (1963, p 46).

<sup>9</sup> The share of stock collateralized bank loans of total bank credit went from about 10 percent in the 1880s to 30-40 percent in the 1910s (Waldenström (2002)).

<sup>10</sup> Before the banks could become members, their formal right to act as stock brokers was granted by the Swedish Parliament in March the same year (Algott (1963, p 53)). The banks' right to hold shares was extended in 1911 but restricted in 1921 after the WWI-boom and completely prohibited in 1934 following upon the Kreuger default in 1932 (see, Larsson (1991, p 100))

**Figure 1:** Number and type of SSE-members, 1901-1920. *Source:* Belfrage (1917, pp 260f).



### 3 The Stockholm Stock Exchange

#### 3.1 The securities auctions, 1863-1901

The foundation of the SSE started with a letter of April 4, 1861 written by a group of brokers (signed by one of them, C.G. Hierzée) and sent to the Trade Commission of Stockholm, containing a proposal to set up a new venue for securities auctions, the Stockholm Stock Exchange. The proposal obviously challenged the auction monopoly which was evident from the fact that it explicitly offered reduced trading fees from the AO's >1% down to 0.2% (a commission fee of 0.1% and a municipal transaction tax of 0.1%) and quicker settlement from the AO's usual two weeks to the next business day or at most within one week. Furthermore, the brokers also added that only authorized brokers (i.e., themselves) should be allowed to arrange these auctions.

The Trade Commission forwarded the proposal to the Ministry of Public Administration, a part of the national government, which in turn redirected the matter to the local government of Stockholm. Before it would decide, however, it asked AO's principal, the city Treasury, for an opinion. The Treasury and the AO jointly responded by bluntly rejecting the proposal but nevertheless offered to reduce the AO's fees to 0.2%, i.e., the same level as proposed by the brokers. The city government now turned back to the Trade Commission for a reaction, and it answered by emphasizing the inefficiency of the AO as shown by its low securities turnover. Moreover, it submitted a list of formal rules for the new exchange. Having a modified proposal, the city government again asked the Treasury for its opinion, which it also gave after nine months. This time, however, it completely changed its standpoint and gave its approval to the breaking up of AO's securities auctioning monopoly (in spite of continued resistance from AO). Without any resistance left, the city government sanctioned the proposal and had the Ministry launch the official charter for the SSE on December 20, 1862.<sup>11</sup>

In the new charter it was stated that a public servant should supervise the exchange.

<sup>11</sup> This section is based on Algott (1963, pp 6f) and Højer (1953, pp 310f). It should be noted that the Trade Commission was actually two different, both both public, organizational bodies separated by the institutional change in the municipal organization of 1862.

After a couple of years with a single public inspector, the Trade Commission was in 1867 made SSE's principal and in 1871 the Trade Commission appointed five of its deputies to form a Board of the exchange to enable closer supervision.<sup>12</sup> In this way, the governance of the SSE was made public from the very beginning and thus clearly separated from the SSE "members", the brokers. As to the "ownership", the party sitting on the (residual claims of) control (following Hart and Moore (1996)) was clearly the Trade Commission and its Board. Adding to that the fact that all the money SSE needed for its running expenses came as annual grants directly from the city government. Hence, the SSE could well be characterized as a publicly (and definitely not a privately) owned exchange.<sup>13</sup>

The first auction at the exchange took place on February 20, 1863. In comparison with foreign contemporary exchanges, trading at the SSE auctions was difficult. First of all, the auctions only took place once a month until 1895 when they became weekly, naturally imposing large waiting costs on investors. Then there was no official list of traded companies (even if all traded securities had to first be approved by the Board), but instead the trading list was each time contingent on that sellers had notified the auctioneer (a broker) before the auction how many securities and to which limit price they wished to sell. At the auction, the broker announced each order one at a time starting from the limit price. If buyers were bidding, he would raise the price gradually until a deal was made, but if no buyers showed up the auction directly continued to the next security. The broker was responsible to arrange that payments and deliveries were executed in time according to the rules (see Table 3).

The assets that the Board accepted for trading during the 19th century were about 60 shares (industry, railroads, insurance) and 20 corporate bonds. Government bonds needed no approval but were sparsely traded. The first Companies Act was issued in 1848 (inspired by the French *Code de Commerce*) and during the first 25 years only 167 limited liability corporations were registered.<sup>14</sup> Table 2 shows preliminary estimations of some SSE market statistics based on published auction price lists. In 1880, the total book value was roughly 140 million Swedish kronors (about \$37 million at that time) with market value of 150 million kronors (\$40 million), which represented about 10 percent of the Swedish GDP. As a comparison, the London Stock Exchange had in 1880 a nominal value of listed shares of about £800 million (\$3.7 billion) representing roughly 60 percent of GDP (Grossman (2002)). From this one can tell that the SSE was quite insignificant in an international perspective.<sup>15</sup> In a national perspective, however, the SSE was practically the only exchange although the merchants in Gothenburg conducted regular securities auctions (of lesser volume) during these early years.

The trading volume at the SSE is depicted in Figure 2 as a share of GDP and the most apparent result is the increased trading activity of the late 1890's. This coincides with the initiatives coming from the Board to prepare for a reorganization of the SSE by its examination of organization of foreign stock exchanges. The main interest was directed

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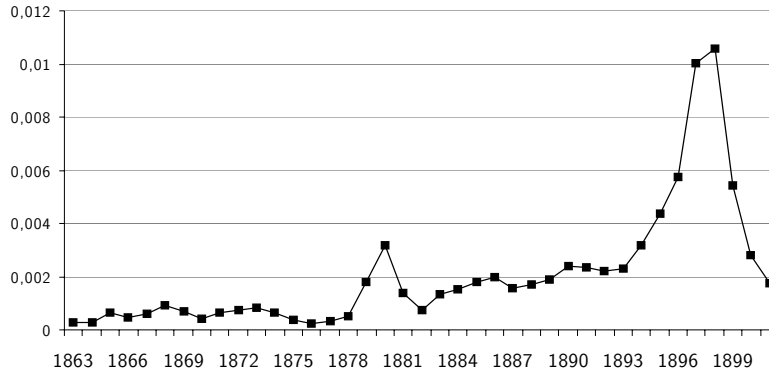
<sup>12</sup> These deputies were well-established Stockholm merchants and bankers who themselves had no stake in the securities trading. See Algott (1963, pp 24f) and Belfrage (1917, pp 253f) for a list of the deputies.

<sup>13</sup> Evidence that the Board outruled the brokers are ample. For example, the brokers approached the Board repeatedly from the 1870s onwards demanding a change of the inefficient trading system, but the Board took no action until 1901, (Board minutes referrals in Algott (1963) and Belfrage (1917, pp 14ff)).

<sup>14</sup> During the period 1848-1881, however, 2048 companies in all sectors were registered.

<sup>15</sup> Unfortunately, I have encountered problems in trying to find similar data on the other stock exchanges around the world.

**Figure 2:** Exchange trading volume divided by GDP, 1863-1901.



**Table 2:** SSE market information (billions of kronor). Source: Own calculations.

	Stocks					Bonds	
	Book	Mkt	#cos	IPOs	SEOs	Book	%Gov.
<b>1880</b>	0.140	0.150	66	0.023	0.001	0.430	11
<b>1901</b>	0.593	0.703	165	0.059	0.006	0.880	30
<b>1913</b>	0.836	1.844	116	0.010	0.036	0.460	4
<b>1929</b>	2.277	3.985	100	0.102	0.453	4.740	34
<b>1938</b>	2.051	3.569	94	0.140	0.001	5.195	36
<b>1950</b>	2.650	5.901	90	0.052	0.042	12.890	56
<b>1960</b>	5.600	16.981	105	0.128	0.283	26.850	56
<b>1970</b>	11.900	23.970	106	0.050	0.024	76.860	9
<b>1980</b>	23.766	56.461	103	0.055	0.056	313.600	41

*Note:* *Book*, *Mkt* and *#cos* means total book and market value and number of listed companies, respectively. *%Gov* stands for share of listed bond value that is issued by the Swedish government.

towards the Copenhagen exchange with its floor-based order-driven agency-auction market and the Hamburg exchange with its floor-based order-driven market based on mutual dealer negotiations. After intense debate, the Copenhagen model was chosen (see Algott (1963, pp 32ff)). The first session of the new stock exchange took place on October 1, 1901.

### 3.2 The stock exchange (1901-)

With its new rules of 1901, the SSE had turned into a “normal” member-based floor-trading exchange. The Trade Commission remained in charge and hence maintained the SSE’s public status.<sup>16</sup> As partly shown by Table 3, the new rules stated that only authorized stock brokers could become members, that bids and asks should be recorded, if available, an increase in the

<sup>16</sup> The public “ownership” was in fact reinforced through an annual payment of 5000 kronors (about \$30,000 in today’s value) by the city government for the exchange’s running expenses.

**Table 3:** Overview of SSE-rules, 1862-1912. Source: Belfrage (1917, pp. 93ff)

Rules of	Members	Requirements on...		
		Trading	Listing	Settlement
<b>1862</b>	—	Trader-auction, Limit orders	—	Immediate or within a week
<b>1871</b>	—	”	Board-approved and Comp. Act compliance	”
<b>1901</b>	Brokers	Agency-auction Free pricing, Tick size Recording of all deals	” (extended), Two stock lists (dep. on frequency of trading)	Next business day, Broker writes receipt, Delivery rules
<b>1907</b>	Brokers, banks	” (Daily trading)	”	”
<b>1909</b>	Brokers, banks and dealers, Penalty rules	” Forward contracts,	”	” Specified rules for forward contracts
<b>1912</b>	” Member fees	”	” (only Swedish securities)	” Penalty rules

number of trading days (three time a week and after 1907 daily) and that the per-trade fees should come through the brokers' commissions rather than as an exchange fee. Despite the rule about quoting bid and ask prices, the Board did not push the publication of an official price list until 1912. Before that, publishing the SSE's prices was practically free open to anyone and non-member dealers were even allowed to join the auction sessions as listeners.<sup>17</sup> This price distribution policy differed from most other exchanges, e.g., London or New York (Michie (1986)), where the prices were in fact a crucial component of the value-creation of the exchange (as in Mulherin, Netter and Overdahl (1991)). In the context of private versus public exchange ownership, this could be a useful distinctive dimension where the SSE Board apparently viewed the prices as a public good that should immediately be made available to the public.

Despite these organizational changes, the off-exchange market continued to outnumber the SSE in terms of volume and the exchange trading furthermore malfunctioned because of its small number of members. The Board finally decided to invite banks (in 1907) and dealers (in 1909) to become members and 16 banks immediately accepted this invitation and dealers soon became the largest group of intermediaries at the SSE. Still, Belfrage (1917, pp 55,73) describes that the Board remained quite restrictive towards further entry during the lively 1910's.

Market capitalization grew from its 1880 level to 700 million kronors (30 percent of GDP)

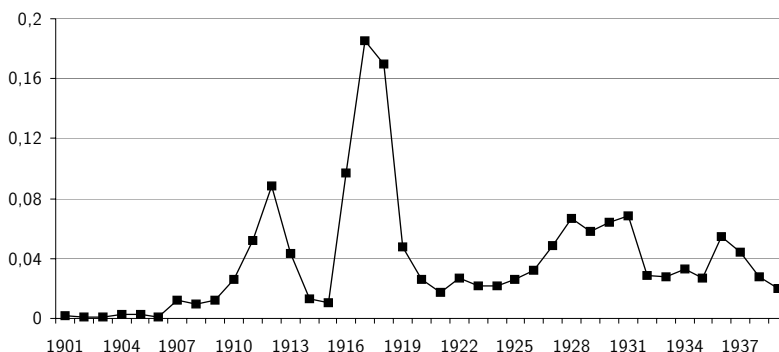
<sup>17</sup> See Algott (1963, pp 121ff) and Belfrage (1918, p 15).



in 1901 and 1.8 billion kronors (47 percent of GDP) in 1913.<sup>18</sup> The LSE, by comparison, had a nominal market capitalization of about £1.3 billion (\$6.3 billion) representing roughly 45 percent of GDP. In other words, the SSE had become relatively more significant internationally during the period. The decreased number of listed SSE firms from being 165 in 1901 to 115 in 1913, also shown in Table 2, was mainly a result of the delisting of thinly traded shares.

In the 1910’s, the SSE experienced a boom in stock trading activity with levels that would not be surpassed until the 1970’s. Following upon this surge, the Parliament launched new legislation of the stock exchange and the securities intermediaries, stating that the SSE now needed governmental approval and should be supervised by a new public inspection agency. Moreover, the Board was reconstituted with a government appointed chairman. Many microstructure rules were also refined. This intensive period will be described in future parts of this project.

**Figure 3:** Exchange trading volume divided by GDP, 1901-1939



## 4 Relevant dimensions to analyze

### 4.1 The demand for brokerage services

Understanding investors’ demand for brokerage services is central to understanding the emergence of stock exchanges. This paper does not model demand explicitly, but to consolidate the historical remarks made below I would like to stress the importance of investors’ preference for 1) liquidity and networks, 2) (legally) secure markets and 3) switching costs.

Liquidity is defined by Harris (2003) as “the ability to trade large size quickly, at low cost, when you want to trade” and is clearly liked by all traders. One thing that increases liquidity is the network size of traders, i.e., the amount of other investors willing to trade with you. When a trader enters a network it increases all traders’ willingness to pay for that network’s services, which hence becomes a positive network externality. Since traders decide

<sup>18</sup> All these figures are based on my calculations made for Rajan and Zingales (2003), where all the sources can be found.

where to trade based on their beliefs of where other traders choose to trade, liquidity is expectation-dependent and tends to make large networks larger and small networks smaller (see Pagano (1989)).

Investors also like secure markets where the instruments they hold yield what they promise and the other actors on the market will not cheat on the others. Historically, the riskiness of financial assets like stocks and the markets' actions to mitigate this risk explain much of the design and development of these markets (Baskin and Miranti (1997)). For example, financial markets have at times developed their own regulatory environments to restore investor confidence, including detailed listing requirements, payment and settlement rules and credible enforcement regimes (see, e.g., Stringham (2002)). At the other side, the legal system can also supply much of this safety network against fraud and other market malfunctions and thereby enhance the traders' evaluation of the market. Some legal systems (common law) rely on the practice of courts to make and enforce contracts *ex post* whereas other legal systems (civil law) rest on legal institutions and regulatory action by policymakers *ex ante* (Pistor and Xu (2002)). Whether these efforts, either private or public, generate positive externalities to the market or not remains unclear, however, especially since their marginal effect decreases as the quality of the overall regulatory system improves (see, e.g., Glaeser, Johnson and Shleifer (2001); .

Switching costs (see, e.g., Klemperer (1987)) could also shape the demand for brokerage and help to explain why sometimes do not choose the cheapest or most liquid intermediary. Investor may get "tied in" with an intermediary through past purchases or contracting agreements such as stock collateralized credit, subscribed market information services, or other soft-dollar based services. In these cases, it could become too costly to switch intermediary even if the direct trading fees are lower elsewhere.

## 4.2 Trading mechanisms

Trading mechanisms, i.e., the ways intermediaries match their buyers and sellers, differ across markets and intermediaries and may also lead to different outcomes on the market. According to Harris (2003), they can be described along the dimensions of continuous versus call markets and of auction versus dealership markets. In call markets, traders only meet whenever the market is called whereas traders on continuous markets can make deals all the time. Generally, call markets impose higher waiting costs due to their periodicity and also may have less informative prices due to the time it takes for new information to affect the prices. On the other hand, call markets are easier to operate and supervise by being concentrated in time and space.

Along the other dimension, auction markets let all traders meet (either directly or by way of an intermediary, an agency-auction) as opposed to dealership markets where the trader only meets its intermediary. Auction markets are normally considered to be more transparent than dealer markets whereas the latter are associated with lower fixed costs and hence has more free entry.<sup>19</sup> The SSE

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<sup>19</sup> Rust and Hall (2003) use a search model to show that the search costs associated with finding the best offered bids and asks make traders prefer dealers (their 'market makers'), who post their quotes publicly, to brokers (their 'middlemen') who requires a personal visit or call before their quotes are revealed.

Much of the current microstructure research aims at determining whether the trading mechanisms produce differences in terms of transparency, pricing stability or execution costs and it has been found to be the case (see, e.g., Christie and Huang (1994) and Pagano and Röell (1996)). In a comparison of implicit spreads across different governance regimes of the Paris Bourse in the late 18th and early 19th centuries, White (2003) finds that the differences could be of large magnitudes.<sup>20</sup> It should be emphasized, however, that comparing historical with today's markets may be hard as, e.g., auction markets existed in both times but are in essence completely different trading mechanisms. Hence, generalizations must be made with great care.

### 4.3 Revenues and costs of intermediation

Securities intermediaries throughout history has maximized profits exactly the same way as those of today, namely by making marginal revenues of intermediation exceed its marginal costs. The main sources of revenues differ between them depending on whether their business rested on brokerage or on dealing. Brokers earn money on commission fees whereas dealers rely on the bid-ask spread on the assets they hold and trade. The Swedish dealers of the 19th century were in effect broker-dealers and could hence earn money from both of these sources. Denoting intermediary-specific commission fee as  $k_i$  and the (market) bid-ask spread as  $s$ , the revenues  $R$  can be written as

$$R_i = \begin{cases} q_i k_i & \text{if } i = AO, Broker, Bank \\ q_i(k_i + s) & \text{if } i = Dealer \end{cases},$$

where  $q_i$  is intermediary type-specific trading volume (remains to be explicitly defined).

Costs of brokerage also differ between intermediaries. Basically, the costs are constituted by a fixed and a per unit part, as

$$C_i(F, c_i) = F + q_i c_i.$$

The motivation for making fixed costs explicit, note that any intermediary need initial resources to set up a functioning back and front office (fixtures, telephones, telegraphs etc.). Making marginal costs intermediary-specific is common in the literature (see, e.g., Pirrong (2000); Rust and Hall (2003); Galetovic and Zurita (2002)) and in the Swedish historical case quite reasonable as its intermediaries were rather heterogeneous. Banks could, for example, use their other branches for some parts of the back or front office and thereby cut back on the most significant variable cost, labor. As dealers and brokers were more alike in this respect, a one could then let (for B=Banks, D=Dealers, Br=Brokers)  $c_B < c_D = c_{Br}$ . Having a cost structure with increasing returns to scale captures the supply-side of the network externalities associated with the financial industry (see, e.g., Economides (1993, 1996)).

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<sup>20</sup> It should be noted, however, that auction market in the late 19th century differ quite much from one from the early 21st century and hence generalization in that respect can never be done.

## 5 Interpreting the course of events

### 5.1 The Emergence of the Stockholm Stock Exchange

As has been indicated in the previous sections, the market demand for brokerage services before the SSE in mid-19th century Stockholm was insignificant for mainly two reasons. First, the market was small, with few joint-stock companies and shareholders in the economy. Secondly, brokers were forced to match buyers and a sellers directly, which in practice imposed extreme waiting costs. For the brokers then to increase their profits, they would need to come up with some new market solution. This they did by proposing the formation of a new stock exchange where only brokers could organize the trading and the different broker clienteles were pooled together, creating a larger network and hence an increased demand for all brokers' services.

Since the brokers were specialized in securities, unlike the incumbent monopoly auctioneer the AO, they were probably the best suited to estimate the impact of the stock exchange in terms of transaction cost reductions and the demand for asset trading (i.e., whether  $k_{AO} > E[k_{Br|SSE}]$  implied  $q_{AO}(k_{AO}) < E[q_{Br|SSE}(k_{Br|SSE})]$  and  $\pi_{Br} < \pi_{Br|SSE}$ ). Arguably, the brokers' anticipation of increased profit opportunities was the major rationale for their proposal, which eventually resulted in the creation of the Stockholm Stock Exchange.

Still, however, founding an exchange rested on regulatory reform since the market was under monopoly regulation. Unfortunately for the entrants, the owner of the incumbent monopoly firm and its regulator were in effect the same body, the local government of Stockholm. One could then really wonder which motives the city government had for its subsequent decision to abrogate its own monopoly and to allow the new exchange to emerge. A possible explanation is given by Auriol and Laffont (1993) who describes situations when a (benevolent) regulator prefers a duopoly market to a (publicly regulated) monopoly, despite the duopoly's socially wasteful duplication of fixed costs. In particular, their model shows that if the expected efficiency gain of accepting a second firm to enter is large enough, then the duopoly is chosen. This is contingent on the likelihood of the second firm being sufficiently more efficient (i.e., having sufficiently lower marginal cost) than the prospective monopoly which then would exceed the duplicated fixed costs.

In the Stockholm context, the regulator (the city government) had to choose between having either a regulated monopoly (only the AO) or a duopoly market structure (the AO and the SSE). Despite the apparent economies of scale (by fixed costs and/or network externalities) and the duplication of fixed costs, the inefficiency of the AO was obvious. Its securities turnover was marginal and the fact that it instantly reduced its fees to the level of the brokers in order to deter entry should have sent a signal to the city government about significant past monopoly pricing and hence past inefficiencies. At the same time, the brokers sent low-cost (efficiency) signals not only by their lower fees but also by offering enhanced settlement schemes and specified trading rules applied for financial assets. Using the Auriol and Laffont (1993) framework, hence, the decision of the city government to allow the SSE to emerge was due to efficiency gain considerations.

An alternative story could be proposed in which the assumption of a utilitarian regulator is replaced by a self-interested regulator that makes rules on the basis of outside pressure from competing private interest groups. In the historical Stockholm case, however, there

little reason to believe why an incumbent public monopoly, the AO, with support from a centrally located public agency, the Treasury, should loose out to a couple of private actors, the brokers, supported by a semi-public group of merchants, the Trade Commission. The sudden change-over by the Treasury is though hard to fit in with the Auriol and Laffont (1993) model. Algott (1963) instead suggests that this move was made in order to secure AO's monopoly over the commodity auctions, which were the significant bulk of its turnover. This could otherwise have been threatened as well if the Treasury kept resisting the apparently efficient regulatory reform. Hence, that would suggest the presence of slack-maximizing behavior among 19th century public servants in Stockholm. As the official documentation seem quiet on these issues, this last point remains speculative although fairly likely.

## 5.2 The market structure and reorganization of 1901

Following the start of the SSE, the authorized brokers dominated the Swedish secondary stock market for decades. Their dominance at the SSE auctions is obvious, but why so few other intermediaries appeared outside the exchange must be explained by the factors deciding the profitability of entry: expected flow of profits, fixed costs of starting a brokerage firm and expected market share given commission charged (i.e., marginal costs). Without a specified demand or sufficient quantitative data I cannot be more specified than this, but the limited market size surely mattered as did the network externalities of the SSE. The latter barrier to entry has been emphasized by Economides (1993) as one of the main reasons why historical analysis helps explaining the structure of financial markets.<sup>21</sup>

When market activity started to increase in the 1890's, entry became more profitable. The new actors, dealers and banks, supplied to the market with immediacy by the opportunity to carry out trades in between of the weekly SSE auctions. Moreover, they offered to bundle the trading with other services that increased the demand for their brokerage. I cannot estimate the effect on demand by their entry, but the anecdotal evidence (letters from the brokers to the exchange Board) suggest it to have been significant.

The Board's reorganization of the exchange in 1901 came late. Years of signals from the market actors about the SSE's inefficiencies passed unheard. This governance behavior is difficult to explain, using the previous models of exchange governance of Pirrong (1999, 2000, 2002), Hart and More (1996) or Galetovic and Zurita (2002), primarily because they do not model public outside owners that maximize some efficiency apart from profits. What these models suggest, however, is that increased external competition may set off organizational change by stock exchanges (see, e.g., Di Noia (2001)). In the Stockholm case, the temporal correlation between the increased external competitive pressure from the sizable off-exchange dealers and banks and the Board's initiatives to start the since long requested reorganization, is striking. This could thus suggest that the Board maximized the SSE's market share rather than its volume in absolute numbers, indicating some sore of control-maximization. Anyway, the Board did not seem interested in boosting the profits of its members.

When comparing these policies with the ones conducted by other outside stock exchange owners, some interesting differences appear. For example, the private shareholders of the

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<sup>21</sup> The SSE issued trading rules in 1863, 1871, 1879, 1901, 1907, 1909 and 1919. Listing requirements (§3) was never harder than the corresponding law. Rules governing intermediaries was somewhat more specified than the law, primarily after 1901.

London Stock Exchange, the Proprietors, virtually maximized the number of paying members and thereby boosted membership to thousands (given the legal constraint dictating free entry). Regarding the Paris Bourse and its owner the French state, the number of floor-brokers was restricted to a specified number, 60. The pecuniary objectives of the LSE owners are relatively straightforward but the French policy goes contrary to the SSE case, where the number of members fluctuated both according to economic conditions and the Board's policy.

The intermediary composition at the SSE changed after 1901. After liberalizing entry in 1907 and 1909, the old dominants, the brokers, were replaced by the dealers. The underlying reason for this was that the dealers income from both commissions and the spread (i.e.,  $R_D = k_D + s$ ) allowed them to undercut the brokers' fees by up to  $s$  or just make constant positive profits given competitive fees (i.e.,  $\pi_D - \pi_{Br} = s$  for  $k_D = k_{Br}$ ). Interestingly enough, the Copenhagen Stock Exchange experienced the same development after securities dealers entered that exchange in the 1880's and within a couple of decades had crowded out the traditionally dominating brokers.<sup>22</sup> In London and New York, by contrast, the different types of intermediaries (brokers and jobbers at the LSE and brokers and specialists at the NYSE) represented a division of market segments whereby direct competition between them was not so common. Within these groups, the competition was evident at the LSE whereas the NYSE was founded on a commission fee cartel which impeded competition.

## 6 Concluding remarks

This paper has shown that the SSE emerged from a private initiative, a stock broker proposal, driven by profit-maximizing objectives through proposing a trading venue where reduced transaction costs would expand the demand for brokerage and eventually brokers' profits. Since the "market for markets" in Stockholm was already monopolized through regulation, a necessary condition for the creation of the SSE regulatory approval. The decision process was led by Stockholm's city government and although it eventually granted the formation of the SSE, it made itself the *de facto* owner of the exchange by appointing its board and funding its working expenses. The SSE thus became publicly "owned" from its beginning.

There is no previous models of stock exchange governance and ownership neglect applied to the case of public outside ownership, why a stringent analysis of the actions of the SSE Board is only tentatively explained. Its adjustment of the obviously inefficient trading rules some thirty years after the brokers first had started complaining loudly about them, is puzzling. One possible explanation is that the simultaneous increase in competition from the off-exchange market drove this decision, as one could infer from the timing of events. Also unclear is why the Board conducted a entry policy as a mix of openness and restrictions, in particular as it had no formal ties to the incumbent members unlike, e.g., the NYSE Board.<sup>23</sup> It could suggest that the SSE Board, being a representative of the public, maximized its control over the entire market and hence worked to increase the market share of the SSE but not its volume traded in absolute numbers:

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<sup>22</sup> See Lau Hansen (1999, ch 2).

<sup>23</sup> The restrictivity towards dealers at the exchange could though be explained by the wish to avoid 'front-running' and other deceptive practices that dual trading opens up for.

As a forward-looking purpose of this paper, it sets out a coming research agenda to thoroughly explore and evaluate the origins and evolution of early stock markets in the four Nordic countries Denmark, Finland, Norway, and Sweden. In the Appendix, I give a brief description of these exchanges, their history and the current data availability situation. As I have mentioned, there does not exist any comparative work on these Nordic market and hardly any on the individual exchanges themselves. Hence, there exists a gap in our knowledge on the role of external finance for the development of economic growth and industrialization for these countries.

Apart from inter-Nordic comparisons, the new findings on the London, New York and Paris stock exchanges also open up for comparative work. For example, why were some (e.g., NYSE, LSE, SSE, Helsinki) founded from scratch by private actors in order to serve an increasing market demand for brokerage whereas other emanated from already established commodities exchange institutions (e.g., Copenhagen and Oslo). The notable variation in ownership and governance structure among these exchanges also suggests analysis of their determinants and eventual differential performance. Given that exchange output increases in the number of trading members (as has been argued), why did most of the exchanges, even those with outside owners (the Paris Bourse, SSE, Copenhagen after 1919), restrict membership? One could also wonder why some countries had only one single stock exchange while others housed a number of them, sometimes fiercely competing with each other. Of course, some of these questions inform broader topics like the choice of legal and regulatory action (as in Pistor and Xu (2002)) or whether regulatory interference through corporate or brokerage legislation yield better outcomes than self-regulation by the stock exchange and market actors (e.g., Glaeser et al. (2001)). With an increasing number of historical cases, new sophisticated inference-based analyses of performance and even immediate tests of formal governance models can be conducted (e.g., Hasan, Malkamäki and Schmiedel (2003)).

Altogether, given the large number of research questions and the fact that most of today's developed countries have not had their historical stock exchanges (markets) analyzed, there is a potentially high-yield future research agenda in this field of *historical finance*, with obvious relevance to the fields of asset pricing, corporate finance, industrial organization and law and finance.

## Appendix: New quantitative and qualitative Nordic evidence

**Stockholm Stock Exchange:** As of today there is no company price data from the SSE before the 1970s and no reliable industry indices prior to the 1910s.<sup>24</sup> Because of this, I am in the process of building a new database consisting of weekly stock prices of all companies listed on the SSE, including bid, ask and deal prices, dividends and registered capital starting from 1901. Additional firm balance sheet information (e.g., outstanding debt, reported earnings) and the full set of the Stockholm securities auctions carried out between 1862 and 1901 will also be included. Practically all data are already collected and most also inserted into computers. Data on the nationwide number of joint-stock companies is tricky but is being assembled.

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<sup>24</sup> Waldenström (2003, Essay I) uses a composite stock price index going back to 1907.

**Copenhagen Stock Exchange:** The Copenhagen Stock Exchange (CSE) emanated from the old bourse sometime in the mid-19th century and considered, as opposed to the SSE, the quotation and distribution of stock prices as its main task (see Gejl (1989); Parum (1997); Lau Hansen (1999)). Until 1919 it was privately owned, by the Merchants Guild before the 1880's and thereafter by the securities brokers and dealers. In 1919, the Danish government “nationalized” the exchange by taking over the control of governance and rulemaking. The dealers were enough numerous (unlike the SSE dealers) to maintain trading volumes while keeping the Danish commercial banks outside the exchange using the lawmakers. As for quantitative data on firm-level stock prices, these are located. Other data on company balance sheets, qualitative exchange issues are partly located. The first Danish Companies Act came in 1917 and there is little information of the total number of joint-stock companies.

**Helsinki Stock Exchange:** The Helsinki Stock Exchange (HEX) emanated in 1912 as a privately governed organization, run by the Merchants Guild and the banks and the brokers (see Tiderman (1937)). Membership was despite this quite open in a sense that resembled the London exchange, where anyone who could pay their way in to the exchange was welcome. The Finnish stock market suffered from the turbulent Finnish war experiences of the 20th century but HEX remained private and member-owned until 1995 when it demutualized as the second stock exchange in the world (next to the SSE). As for quantitative data, there are previously collected stock prices from the early years, but most likely much remains to be collected. The qualitative data availability is also quite limited. The first Finnish Companies Act came in 1864.

**Oslo Stock Exchange:** When the Norwegian-Danish political union dissolved in the early 19th century, the Norwegian (and Swedish) King founded the Oslo Exchange (Oslo Børs) in 1818 partly due to the complete absence of Norwegian secondary markets (see Ramm (1969)). Commodities and shipping businesses dominate its first century but after 1881, monthly stock quotation sessions were held. Brokerage was open to anyone but during the trading boom of WWI the exchange reintroduced member requirements to retain public confidence. Banks also were invited to become members. Despite these efforts, a new stock exchange law came in 1931. Historical price statistics from the OSE should be recoverable from the 1880's but volumes were recorded since the mid-1910's. The data status of other company statistics is unknown. Qualitative data on intermediaries and the internal exchange affairs also remains to be examined. Norway's first Companies Act came in 1910.

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