The evolution of the banking cluster of Amsterdam 1850-1993: a survival analysis

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Abstract
There is little understanding of how clusters emerge, and where. Do clusters arise from scratch, or are there preconditions that sustain the rise and development of clusters? The aim of this chapter is to describe and explain the rise and dynamics of the banking cluster of Amsterdam since 1850. We take an evolutionary perspective, linking the Window of Locational Opportunity-concept with the Klepper literature on industrial dynamics. While dynamic analyses of cluster evolution hardly exist, this is even more so for spatial clustering of service industries. This analysis is based on an unique database of all entries and exits in the banking sector in the Netherlands during the period 1850-1993 collected by the authors. We will examine the extent to which spinoff dynamics, agglomeration economies and time of entry had a significant effect on the survival rate of banks during the last 150 years. Doing so, we provide an evolutionary explanation for why Amsterdam became the leading banking cluster of the Netherlands.

Introduction
A research challenge in economic geography is how clusters evolve over time (Audretsch and Feldman, 1996; Feldman and Schreuder, 1996; Maggioni, 2002; Brenner, 2004; Feldman and Francis, 2004; Visser and Boschma, 2004; Feldman et al., 2005; Iammarino and McCann, 2005; Menzel and Fornahl, 2007; Ter Wal and Boschma, 2008). While there is quite some understanding of how clusters develop once they are in place, there is yet still little understanding of how clusters emerge, and where. Do clusters arise from scratch, or are there preconditions that sustain the rise and development of clusters?

This chapter elaborates on the Window of Locational Opportunity concept developed in the 1990s (Storper and Walker, 1989, Boschma, 1997). This concept will be
integrated in the literature on Industrial Dynamics, especially with respect to ideas developed by Arthur (1994) and Klepper (2007). The key question is through which mechanisms these routines diffuse and cluster spatially when a new industry emerges and grows (Boschma and Frenken, 2003). Two mechanisms have drawn special attention in the literature, that is, spinoff dynamics and agglomeration economies. Both may act as vehicles through which knowledge and routines are created and diffused among a growing population of firms within a territory. Spinoff dynamics is considered a driving force behind the growth of industries in space, because it transfers and diffuses relevant knowledge from incumbent firms to new firms (Helfat and Lieberman, 2002). Once spatial clustering occurs, agglomeration economies may become manifest. Local knowledge spillovers will become increasingly available, which will cause a further spatial concentration of that industry. As such, both mechanisms provide (alternative or complementary) explanations for why an industry develops and concentrates in space.

These ideas have been tested on manufacturing industries, like the automobile and tyre industries (Boschma and Wenting, 2007; Klepper, 2007). Only a couple of studies have focused on non-manufacturing industries from an industry life cycle perspective (see e.g., Fein, 1998; Carree, 2003; Grote, 2007). One assumption in the industry life cycle literature is that in the early stages, product innovation is done more than process innovation, but in service industries the difference between product and process innovation is more difficult to be made. We investigate the evolution of a knowledge-intensive service sector, and see whether the same findings apply. To our knowledge, no study has investigated the spatial evolution of a service sector, a major exception being Wenting (2008) who investigated the long-term development of the fashion industry.

The aim of this paper is to describe and explain the rise of the banking cluster of Amsterdam since 1850 from an evolutionary perspective. This analysis is based on a unique database of all entries and exits of the banking sector in the Netherlands during the period 1850-1993 collected by the authors. We apply a hazard model to determine which factors explain the spatial formation of the Dutch banking industry. We examine the extent to which spinoff dynamics, agglomeration economies and time of entry had a significant effect on the survival rate of banks for a period of almost 150 years. Doing so, we provide an evolutionary explanation for why Amsterdam became the leading banking cluster of the Netherlands.

The paper is structured as follows. In the next section, we shortly outline the Window of Locational Opportunity approach, and link that approach to two types of explanations for the spatial evolution of a new industry. In Section 3, we explain which data sources have been used to describe the spatial formation of the Dutch banking sector during the period 1850-1993, and we present some descriptive results. In Section 4, we briefly explain the estimation techniques employed. Then, we present the empirical findings. Finally, some conclusions are drawn.

2. Spatial formation of industries from an evolutionary perspective

In Section 2.1, we set out the main outlines of the Window of Locational Opportunity (WLO) framework. This has been constructed in the early 1990s to provide an evolutionary explanation for the spatial formation of new industries. In Section 2.2, we will connect this WLO-approach to the literature of industrial dynamics, that applies a population perspective to the industry life cycle (Klepper, 1997). This literature is
interested in the mechanisms that drive the evolution of a population of firm-specific routines in an industry, and which make fitter routines more dominant in an industry (Nelson and Winter, 1982; Klepper, 2007). Following Arthur (1994), we distinguish between two mechanisms through which inter-organizational learning (i.e. the diffusion of ‘fitter’ routines from one firm to the other) may take place in space. The first is spinoff dynamics, in which the transfer of knowledge occurs between a parent firm and its spinoffs. The other one will be associated with agglomeration economies, in which knowledge spills over between firms that are geographically proximate.

2.1 Windows of Locational Opportunity

In the 1980s, it was quite common to follow an industry life cycle approach in economic geography (see e.g. Markusen, 1985; Hall and Preston, 1988; Marshall, 1988; Scott, 1988). The ILC was used as a background to explain why new growth regions had emerged in the 1980s, like the Sunbelt states in the US (Norton, 1979). New industries developed in new regions, while old industries declined in regions that were once the main centres of economic growth. In order to explain why, the Window of Locational Opportunity framework was proposed by American scholars like Allen Scott, Michael Storper and Richard Walker (Scott and Storper, 1987; Storper and Walker, 1989).

The WLO concept explains why it is unpredictable where new industries will emerge and develop in space. New industries require new types of knowledge, skills, inputs and institutions which existing organizations and institutions cannot provide, since these are orientated towards old technologies and routines (Boschma and Lambooy, 1999). Therefore, new industries will invest in own research to develop new knowledge, their employees will acquire the necessary skills through on-the-job-learning, and they will accumulate their own capital because established capital suppliers cannot assess possible returns in markets that are unknown to them. As soon as a new industry reaches a critical mass in a region, growing demands will transform the region into a supportive local environment, with new institutions and organizations like research institutes, educational facilities, venture capitalists and specialized suppliers. The more firms in the new industry locate in a region, the more diversified the local labour market becomes, the more local suppliers can specialise, the higher local demand, the better the infrastructure, and the more attractive the region becomes for newcomers, leading to even more local firms, et cetera (Myrdal, 1957). This may set in motion a self-reinforcing and path-dependent process, sustained by Marshallian agglomeration economies. In other words, new industries produce their own space.

This is not to say that new industries can develop everywhere and the role of place is completely overlooked (Martin, 1999). Despite the newness, new industries will build on generic resources like knowledge and skills, that is, resources that are not yet specific to support the new industry, but may still favour their development (Boschma, 1997). This is especially relevant when new sectors grow out of related industries, like the automobile industry emerged out of cycle and coach making industries (Klepper and Simon, 2000). When some regions are well endowed with these generic resources, this may increase their probability to develop that new industry. Depending on how many regions have access to those generic resources, we can determine the extent to which the windows were open when a new industry emerges. Boschma (1997) has shown that this differs from industry to industry.

So there are good reasons to go beyond a static and deterministic approach, and instead employ a dynamic and evolutionary perspective to explain fully the spatial clustering of an industry (Brenner, 2004). As set out above, agglomeration economies
may come into being when a new industry concentrates in space, sustaining its further development. However, spinoff dynamics may be another driving force, which by itself may provide an alternative explanation. We will explain below why.

### 2.2 Spinoff dynamics and agglomeration economies

The spatial formation of a new industry can be described in terms of spinoff dynamics (Arthur, 1994). With spinoffs we mean new firms founded by former employees of incumbent firms in the same industry. There is increasing evidence that spinoffs play a crucial role in the spatial concentration of industries (Dahl et al. 2003; Koster, 2006).

In Arthur’s spinoff model, a new industry grows firm by firm, and each new entrant is a spinoff of an incumbent firm in the same sector. Since almost all spinoff firms locate in the same region as their parent company, the region that is lucky to generate many spinoffs at the early stage of the life cycle of the new industry, will most likely dominate the industry. This is because the probability to give birth to a new spinoff is dependent on the amount of firms that is already present in that region. In other words, the spatial emergence of an industry is a path-dependent process. Small events may be decisive, which are in this case the lucky occurrence of many spinoffs at a very early stage in a region, and not in other regions. These small events will be followed by positive feedbacks: the more spinoffs enter the region, the higher the probability to generate even more spinoffs. This spinoff model has been extended by Klepper (2007). Klepper views the spinoff process as a mechanism through which tacit knowledge is transferred or diffused from parent to offspring, and which positively affects the performance of spinoffs. Klepper claims that entrepreneurs with a techno-economic background in the same or related industries will perform better than entrants that lack that kind of experience. In addition, Klepper argues that success breeds success. Doing a study on the American car industry, he provided evidence that spinoff firms have a higher probability to survive when they originate from very successful parents.

The spinoff models of Arthur and Klepper assume that the spinoff process is basically a local phenomenon. In other words, spinoff dynamics in itself may be a sufficient evolutionary explanation for the spatial concentration of an industry. This means we can explain the spatial clustering of a new industry without referring to location-specific features. But in order to know for sure, we have to test at least whether this is true or not. Besides spinoff dynamics, the spatial clustering of an industry may be affected by agglomeration economies. It is common to distinguish between urbanization and localization economies. Urbanization economies are externalities available to local firms irrespective of the industry they belong to. Localization economies arise from a spatial clustering of firms in the same sector or related industries.

When taking an evolutionary perspective, we have to make the impact of agglomeration economies more dynamic. Following Myrdal (1957), we claim the higher the number of local firms, the stronger the impact of agglomeration economies becomes. Like in the spinoff-model, we can then describe the spatial evolution of a new industry as a self-reinforcing and path-dependent process. Small events are associated with the fact that a region is just lucky to develop many new entrants at a very early stage of the life cycle of an industry. After having passed a critical threshold, increasing returns come into being, that is, the more entrants locate in the region, the stronger the impact of agglomeration economies becomes. Knowledge will accumulate and become increasingly available in a region through the formation of local networks as an industry grows. As a consequence, agglomeration economies can cause an industry to concentrate in a region.
Accordingly, spinoff dynamics and agglomeration economies provide different evolutionary explanations for the spatial clustering of an industry. However, both the spinoff mechanism and agglomeration economies may play a role simultaneously (Boschma and Frenken, 2003). A high rate of spinoff activity can increase the number of local firms, strengthening agglomeration forces, which, in turn, enhance spinoff creation and increase the survival rate of spinoff companies. Boschma and Wenting (2007) claim that both effects can play a role, but most likely in different stages of the life cycle of an industry. In the first stage of the life cycle of the British car industry, the spinoff mechanism did not play a role, which comes as no surprise, because at that stage, there is still not much to be learnt from the parent, due to the lack of a dominant design. Contrary to spinoffs, new entrants that had working experience in related industries did very well at this stage. In a later stage, spinoffs performed much better, however, because the pre-entry working experience in the same industry is of much higher value at that stage. Boschma and Wenting found that start-ups in the British car industry that were founded in regions with related industries in the first stage had a higher survival rate (see also Buenstorf and Klepper, 2004), while localization economies did not matter at that stage, as expected. While one would expect that localization economies had a positive effect at the later stage, Boschma and Wenting found the opposite result. The more spatially concentrated the industry became, the harder it was to survive for a new entrant in such an environment, probably due to more intense local competition.

In sum, since spinoff dynamics and agglomeration economies provide different explanations, the challenge for empirical research is to disentangle both mechanisms as to assess their importance. This will be done for the Dutch banking sector in the period 1850-1993.

3. Data and descriptives

The data we collected provide information on the year of entry, the year of exit, the location of the head office, and the pre-entry industrial background of the entrepreneur concerning every bank that entered the industry in the Netherlands during the period of 1850-1993.

First, we compiled a list of banks with the assistance of Nederlandse financiële instellingen in de twintigste eeuw: balansreeksen en naamlijst van handelsbanken published by the Dutch Central Bank. This list also contains firms that entered the industry before 1850 and diversified after this date. This source has been used for the most part to compile a list of every bank that existed in the period 1850 to 1993. This source claims to have listed about every bank in the Netherlands over the span of this period, the years they were in business, their location and any reorganizations or ownership changes the banks underwent. To complete the list on time of entry and year of exit, two other sources were particularly useful: the Nationale Vereniging van Banken, and the Nederlandsch Economisch-Historisch Archief.

To determine the pre-entry industrial background of the entrepreneurs, a multitude of sources has been used. The most important were Geschiedenis van de Algemene Banken in Nederland 1860-1914 (Kymell) and Geschiedenis van de Nederlandsche Bank (De Jong). Further information on pre-entry background was acquired from trade journals, regional and city archives, incorporation records and...
various other historical sources\(^1\). The online databank on Dutch entrepreneurs of the *Internationaal Instituut voor Sociale Geschiedenis* turned out to be very useful for finding relevant information on the backgrounds of the entrepreneurs.

Eventually all these sources have led to a database that contains up to 906 banks, of which both time of entry and year of exit are known. The location where the banks have been founded is known for all of them. We could trace the pre-entry economic background of the entrepreneur for 756 banks, which is an extremely high number for this kind of studies. This enables us to analyse 756 banks for which information is available concerning their time of entry, year of exit, the location of their head-office, and their entrepreneurial background over the period 1850 till 1993. Since our data sources contain data till 1993, we take that as the last year in our analysis.

Our starting year is 1850. Contrary to manufacturing sectors, it is often quite complicated to demarcate the date of birth of a service industry (Fein, 1998). This also applies to the banking sector, which, of course, already existed before 1850. What is interesting though, is that just after 1850, the Dutch banking sector underwent a total rebirth. Before 1860, there did not exist a real banking sector in the Netherlands, although there was a money and stock market. Following the example of the *Credit Mobilier* in France, a structural change in the Dutch banking sector occurred between the years 1861 and 1865: the first banks in the Netherlands emerged with a juridical structure of a limited liability company. These banks had as their main activity the supplying of credit for their own account and to take money in deposit and current account. They had large sums of starting capital, which was new to the Dutch banking system\(^2\). This new type of banks became the dominant design in that industry in the following decades. This was encouraged by two developments. In the first place, there was a rapidly increasing need for capital to invest in the Dutch colonies and new infrastructure like the railways and canals. In the second place, a new banking law came into effect in 1863, which obliged the Dutch Central Bank beside its head office in Amsterdam to start up a network of offices across the country (Kymmell, 1992). The purpose was to make the credit facilities of the Dutch Central Bank more directly available at a regional scale. The establishment of the office network in 1865 by opening an office in Rotterdam and twelve agencies in the provinces can be seen as the beginning of the banking industry in the Netherlands.

We have data on the year of entry for 906 banks that entered the Dutch banking sector in the period 1850-1993\(^3\). For 112 banks, the year of entry is unknown. Of the these 906 banks, 779 banks had to exit the banking sector for some reason in the period 1850-1993, 119 banks survived that period, and for 8 banks, the year of exit is unknown\(^4\). Exits in the banking sector deserve special attention. This may be caused by two main

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\(^1\) Quite a lot of banks have published on their own history. Some of those publications have been used (see reference list).

\(^2\) There was only one large bank before 1863 that had given credit as their main activity and that was the Dutch Central Bank (De Nederlandsche Bank), which had been founded in 1814 as a limited liability company by King Willem I. The only shareholder was the Dutch state (De Jong, 1967).

\(^3\) We have also included in our database De Nederlandsche Bank and Algemeene Nederlandsche Maatschappij ter Bevordering van den Volksvlijt due to their prominent role in the Dutch banking sector, despite the fact that they entered the Dutch market before 1850 (1814 and 1822 respectively).

\(^4\) We did not include 56 banks that had entered before 1850, despite the fact that all of these 56 banks (except for 4 banks) exited the sector in the period 1850-1993. We did also not include in our analysis 88 banks for which no entry data and no exit data are available, and another 24 banks, for which data are available with respect to their year of exit, but their year of entry is unknown.
reason. Bank may close their doors for reasons like bankruptcy, closure, diversification into other activities than banking, etc. Out of 779 exits, 394 exits (51%) could be assigned to that category. Banks may also exit due to merger and acquisition activity. We counted a number of 385 exits (49%). On the one hand, these concern cases in which we were sure who took over whom. The about 320 banks that were taken over by other banks have been considered exits. On the other hand, these concern merger and acquisition activity, in which we could not identify who acquired whom. In that case, we simply counted each bank that was involved in the merger activity as exit. These concerned about 70 exits.

In Figure 1, we have depicted the number of entrants and exits in the Dutch banking sector for the period 1850-1993. As Figure 1 shows, entry levels remained relatively low till the 1890s. One of the reasons was that it was considered a sign of weakness to lend money from a bank. In the 1890s, this resistance for credits from banks started to disappear and relations with a bank was considered normal among a growing number of entrepreneurs (Nierop, 1972). As Figure 1 shows, since the 1890s, there is a sharp and steady increase in the number of entrants (with a peak of 25 in 1924), which remains high till 1930. In October 1929, the Great Depression caused entry to drop sharply. After 1934, only for two years there were more than five entrants. Since the 1970s, entrants are mainly foreign banks that established an office in the Netherlands.

Figure 1. The number of entrants and exits in the Dutch banking sector 1850-1993

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5 In the database, these concerned banks that were considered exits due to “opheffing, faillissement, liquidatie, en niet meer uitvoeren van bankactiviteiten”.

6 In the database, these concerned mergers that were referred to as “gefuseerd met, opgegaan in, samengegaan met, en voortzetting van”. For these exits, we could not identify who was the acquiring firm, and which firm was acquired. So, we could not determine which of the firms involved should be considered exits (the acquired firm), and which one the acquiring firm (the firm that survived).

7 One of those years was 1941. In this year, the Nazis influenced the entry total by starting three financial institutions (Van der Lugt, 1999). The other year was 1974 when six foreign banks entered the industry in the Netherlands.
As shown in Figure 1, the number of exits is extremely low in the period 1850-1900. Before 1900, most of the large banks never had deficits, despite two crises in 1880 and 1884. Only 17 banks that had entered in the period 1850-1900 closed their doors in that same period. After the turn of the century, the number of exits starts to increase, especially in the 1920s and early 1930s. Starting in 1911, the Rotterdamsche Bank employed an aggressive acquisition strategy. Other banks soon followed. The Algemeene Nederlandsche Centrale Middenstands-Creditbank took over most of the tradesmen’s banks in the country (Bosman, 1989). This merger and acquisition activity reached its peak in the years 1916-1919, and led to the rise of five large banks that would dominate the industry for the next decades: the Nederlandsche-Handelmaatschappij (1824), the Twentsche Bank (1861), the Rotterdamsche Bank (1863), the Amsterdamse Bank (1871) and the Incasso Bank (1891) (Kymmell, 1996). It heralded the beginning of the concentration in the Dutch banking industry.

Major process innovations (like the development of telephone line network after 1900, the Giro transfer system in 1914, or the possibility of telegraphic transfers in 1890) occurred in the banking sector in the early twentieth century, and these required a minimal scale of operation. Smaller banks and late entrants had higher average costs, and therefore often became easy targets for take-overs (Kymmell, 1996). In the first half of the twenties, economic tides changed again: numerous small, mostly regional banks could not overcome the bank crisis on their own and they let themselves be acquired by one of the larger banks. At the end of the 1920s, the merger and acquisition activity reached a new peak. 1930 was the first year in which the total number of banks started to decline. The underlying reason for this turnaround was the Great Depression (Van der Lugt, 1999). After 1931, the merger and acquisition activity slowed down for two decades, and most exiting banks were liquidated or quitted offering services. In the 1950s and 1960s, the level of exits goes down again. In 1948, the Incasso-bank was acquired by the Amsterdamse Bank. Another large bank, Twentsche Bank, started to take over some of the larger banks in the provinces. In 1958, Pierson & Co’s and Heldring & Pierson merged into the new bank Pierson, Heldring & Pierson. In 1964, only two large banks were left after the merger of the Rotterdamsche Bank with Amsterdamse Bank into the Amsterdam-Rotterdam Bank (AMRO Bank), and the merger of the Nederlandsche Handel-Maatschappij with Twentsche Bank into the Algemene Bank Nederland (ABN). A lot of smaller banks joined a large bank. Two new banks emerged as major players through their merger activities. The Rabobank was the result of the merger of the cooperative rural central banks, the Raiffeisen-Bank and the Eindhovense Boerenleenbank in 1972. In the 1970s, there is some increase, but only for a short period, after which the number of exits stabilizes at a very low level. In 1986, the Postbank was the result of the merger of the Rijkspostspaarbank and the Postcheque- en Girodienst, and in 1989 the Postbank merged with the Nederlandsche Middenstandsbank into the NMB Postbank, which became later ING Postbank. Finally, in 1991 the ABN and the AMRO Bank merged into the ABN-AMRO Bank. This meant that the big five that existed in the early twentieth century had come together in one corporation (Van der Lugt, 1999).

In Figure 2, we show the evolution of the number of banks over the period 1850-1993, which is derived from the number of entries and exits. The evolution of the Dutch banking sector shows a very clear pattern. Besides a small dip caused by the First World War (the year 1917 had actually the highest exit rate of all years: 41 banks, of which 38 were acquired by other banks), the total number of banks kept increasing till 1929 when it reached the maximum of 478 banks. From the turn of the century onwards, the industry
was dominated by five large banks, of which four were based in Amsterdam\(^8\). In 1900, this group of five banks had a market share of 35 percent. The following years, the market share began to rise: in 1918 it was already 48 percent. In the 1920's, the market share became slightly less, because of a lot of new banks entering the industry\(^9\). In 1930, the number of exits overtook the number of entrants and the shakeout of the industry started. In 1940, the market share of the big five was up to 52 percent (Kymmell, 1996). The declining trend in the number of firms decelerates in the 1970s. In 1991, there were only 119 banks left, still a considerable number. By that time, the Dutch banking sector had evolved into an oligopoly dominated by three large banks (ABN-AMRO, ING Group and Rabobank), which had a national market share of roughly 80% (Bos, 2004).

Figure 2. The number of firms in the Dutch banking sector 1850-1993

How about geography, and how about the spatial clustering of the banking sector in the Amsterdam region? For almost all banks over the period 1850-1993, we have been capable of determining their location (municipality), and we have allocated these to the 40 labour markets (COROP regions) of the Netherlands. Our analysis concentrates on headquarters of banks, being a knowledge-intensive service activity. So we have not accounted for the development of branch offices that took off in the early twentieth century (Bosman, 1989). In Figures 3 and 4, we have depicted the number of banks in the Amsterdam region and its share in the national total in the period 1850-1993. The Amsterdam region has been defined as COROP Groot-Amsterdam. This region consist out of more than the city Amsterdam alone: it also contains municipalities like Aalsmeer, Amstelveen, Diemen, Edam-Volendam, Haarlemmermeer, Purmerend and Uithoorn.

\(^8\) ‘Nederlandsche Handel-Maatschappij’ (Amsterdam) ‘Rotterdamsche bank’ (Rotterdam) ‘Amsterdamsche bank’ (Amsterdam) ‘Twentsche bankvereeniging’ (Amsterdam) ‘Incasso-bank’ (Amsterdam)

\(^9\) The market share of the five large banks reached its low in 1928 with 38 percent
One should remind that Figures 3 and 4 only include those banks that entered after 1850. As shown in Figure 3, the number of firms in the Amsterdam region has steadily increased since the 1850s. Amsterdam experienced a steep increase in mainly the 1920s, reaching its peak in 1930. After that, a decline set in until the late 1950s, after which the number of banks stabilized at a level of about 60-80 banks till 1993. In relative terms, the share of the Amsterdam region in the total number of banks increased sharply in the 1850s, up to 38 per cent in the early 1860s. Then, it started to drop till 1915 when it was a mere 19,5 percent. This was not so much caused by exits of banks located in Amsterdam, but due to a relative increase of the shares of the Rotterdam region and the Hague region. This changed after 1915 when more and more banks located in Amsterdam. In only 15 years, 116 banks entered the sector in the Amsterdam region. As a result, the percentage of Amsterdam banks rose again, to almost 35 percent in 1930. This share stayed more or less the same for almost forty years, till foreign banks started to enter the Netherlands. In
combination with exits that occurred mainly outside the Amsterdam region, Amsterdam increased its share even more: in 1991, around 53 percent of all banks in the Netherlands were located in the Amsterdam region. In terms of market share, the concentration of bank activity around Amsterdam was much higher than that (Sluyterman et al., 1998).

4. Survival analysis

Following others, we will employ a hazard model in order to determine which factors can explain the spatial evolution of the Dutch banking sector (Klein and Moeschberg, 1997). More in particular, we will estimate Cox regressions to assess the effects of location (being located in the Amsterdam cluster), time of entry, and pre-entry background of the entrepreneur (spinoffs, experienced and inexperienced firms) on the survival rates of banks. Doing so, we will assess whether being located in the Amsterdam region actually benefits the performance of banks, as assumed by large parts of the cluster literature.

The dependent variable is the age of each bank, as is common in survival analysis. Of course, we would have preferred better economic indicators, like sales, turnover or market shares, but these data are not available over such a long period. We measure the age of each bank by counting the number of years between the first (entry) and last year of commercial activity (exit). As explained above, we know the year of entry for 906 banks: we left out 112 banks for which the year of entry is unknown. For 8 banks out of these 906, the year of exit is unknown. In the case of mergers and acquisitions, we treat banks as exits when they are taken over by another bank. In about 70 cases, we could not identify who was taken over by whom. In that case, all banks concerned were considered exits, and the newly formed bank was treated as a new entrant. Banks that continued to exist after 1993 were treated as censored cases, as is common in Cox regressions.

The first set of independent variables concerns the location of banks. For all banks, we have information on their location (municipality). In the very exceptional case that a bank had moved from one region to another, we assigned the bank to the region where it had been active for most of its time. In order to test whether the location in the Amsterdam region affects positively the survival of banks, we constructed a dummy variable. We explained earlier how we defined the Amsterdam region.

The second set of independent variables concerns the pre-entry background of entrepreneurs. Above, we set out that entrepreneurial background of entrants is essential for survival, because they refer to the capabilities and routines of the parent banks that are taken to the new bank. For the 906 entrants of which the year of entry is known, we could find information on the pre-entry background of the founder for 736 banks. Unfortunately, for 170 banks, no information on the entrepreneurial background could be found. This group of entrants with an unknown entrepreneurial background is relatively small, in comparison to other survival studies. This group of entrants has been excluded from the analyses\(^\text{10}\). Following Klepper, we distinguish between three types of banks. Spinoffs have been defined as entrants that are founded by former employees working in the same banking sector. Employees of existing banks are assumed to learn from their experience, which they can exploit when they start up their own bank. New entrants were classified as spinoffs if at least one of the founders had worked for and/or had founded a bank. When a founder had worked for several firms in the past, the last firm worked for was considered the parent of the spinoff. Some spinoffs had multiple

\(^{10}\) A lot of entrants that are part of this group had a shorter life span than the entrants with a known background. This makes sense, because banks that existed only for a few years, some of them even one year, less information is available.
founders that had worked for different firms. If this was the case, than the parent of the spinoff was determined based on the founder that was described as the most influential in the new spinoff company. Of all 906 entrants that entered the banking sector in the period 1850-1993, 191 firms were defined as spinoff entrants.

We have defined entrants as experienced firms when they had prior experience in related activities before entering the banking industry. As explained before, we expect that entrants with backgrounds in one of these related occupations to have better capabilities than entrants that lack such experience. At the beginning of the banking industry, these related activities concerned cashiers, bankers and stock-brokers (Kymmell, 1992, pp. 73-95). Cash could be obtained from a cashier, banker or stock-broker through the selling of not-due claims of bills of exchange and/or promissory notes or through making a loan with securities or personal properties. None of these three occupations had as their main activity the providing of credit. Cashiers were mainly occupied with collecting, keeping and paying money to their clients and with the brokerage in bills of exchange, thus with payments. Also they bought bills of exchange as temporary interest paying investments and they gave loans. Stock-brokers traded in shares in principle on behalf of their clients and sometimes they gave credit for the purchasing of stock against the security of stock. Bankers did the same, but besides that they were mainly active in the issuing of stock and the international bill-broking (Kymmell, 1992, pp. 14-15). In the nineteenth century, these occupations were practised by one-man firms or sometimes with one or more partners, who were most of the time family members. We counted a total of 316 experienced firms that entered the banking sector in the period 1850-1993. On the one hand, these concern entrants that remained active in those related activities while diversifying into the banking sector\textsuperscript{11}. There were a total number of so-called 75 diversifiers. On the other hand, these concern 241 entrants that set up \textit{de novo} banks founded by heads of firms in related activities (Klepper, 2007). Banks were classified into this category when at least one of their founders was identified as the head of a firm that was active or had recently been sold\textsuperscript{12}. The third type of entrants concerns 229 inexperienced entrepreneurs. These entrants had no prior experience in the banking sector and related industries.

The third set of independent variables involves the time of entry. According to Klepper (2007), early entrants in a new industry will outperform later entrants because of weaker selection and lower entry barriers. Consequently, we expect early entrants will have a lower hazard rate at ever\textsuperscript{13} age. All entrants of which we have information on the pre-entry entrepreneurial background (736 banks) and their years of entry and exit (3 banks less) have been assigned to three cohorts. The first cohort concerns the period 1850-1900, a period in which smallness was a key feature. 220 firms have been assigned

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\textsuperscript{11} B.W. Blijdenstein Jr. founded in 1861 in Amsterdam the \textit{Twentsche Bankvereeniging}. After finishing Law school, Blijdenstein started a notary’s office in his home town Enschede. Because of his appointment as a curator in the bankruptcy of a small local cashier in 1841, he got insight for the first time in the cashier business. In 1844, already two third of the profits came from the cashier business. At the end of the 1850s, almost every textile manufacturer in the region around Enschede was a client of the Blijdenstein’s cashier’s office. When the \textit{Twentsche Bankvereeniging} was established in 1861, the cashier’s office was continued. Therefore, we consider this entrance as a diversifier into the banking sector (De Graaf et al. 1996).

\textsuperscript{12} In the first decades, a few prominent bankers were involved with the founding of several banks. These prominent bankers in most cases had a lot to say, or even made important decisions about how business was done (Kymmell, 1996). Therefore, these banks were seen as having experienced entrepreneurs.

\textsuperscript{13} As explained above, we had data on the pre-entry entrepreneurial background for 736 banks. On 3 of these 736 banks, data on the year of exit were missing.
to that period. The second cohort concerns 377 entrants that emerged in the expansion period 1901-1929 during which economies of scale grew in importance and entry barriers increased. The third cohort includes 136 firms that entered the Dutch banking sector in the period 1930-1993.

We have estimated Cox regressions for a total of 733 banks on which we had information on their year of entry and exit, the pre-entry working experience of the entrepreneur, and their location. The estimates are based on maximum likelihood, adding more variables in each model. The main findings are presented in Table 1.

Table 1. Estimation results of the Cox regressions (standard errors in parentheses)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amsterdam</td>
<td>-0.159*</td>
<td>-0.132</td>
<td>-0.009</td>
</tr>
<tr>
<td></td>
<td>(0.087)</td>
<td>(0.088)</td>
<td>(0.094)</td>
</tr>
<tr>
<td>Cohort 1</td>
<td>-0.900***</td>
<td>-1.091***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.153)</td>
<td>(0.156)</td>
<td></td>
</tr>
<tr>
<td>Cohort 2</td>
<td>0.154</td>
<td>-0.036</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.135)</td>
<td>(0.138)</td>
<td></td>
</tr>
<tr>
<td>Spinoffs</td>
<td>-0.651***</td>
<td></td>
<td>-0.895***</td>
</tr>
<tr>
<td></td>
<td>(0.116)</td>
<td></td>
<td>(0.095)</td>
</tr>
<tr>
<td>Experienced</td>
<td></td>
<td></td>
<td>-0.895***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.095)</td>
</tr>
<tr>
<td>Chi-square</td>
<td>3.303</td>
<td>124.185</td>
<td>217.899</td>
</tr>
<tr>
<td>-2LogLikelihood</td>
<td>7125.736</td>
<td>7000.788</td>
<td>6915.407</td>
</tr>
</tbody>
</table>

* significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level
n=733

In the first model, we estimated the effect of the Amsterdam region on the hazard rates of banks. This has been done in its most simple manner, including a dummy variable, measuring all possible effects of the Amsterdam region. A major finding of model 1 is that being located in the Amsterdam region does indeed matter. In line with the cluster literature, the location of the Amsterdam region lowers the hazard rate of banks, and thus increases their survival rate.

However, if we include other variables in the model, this cluster effect tends to disappear. In model 2, we have included the time of entry variables. We have made two dummy variables, one for cohort 1 (including all entrants in the period 1850-1900), and one for cohort 2 (entrants in period 1901-1929), with cohort 3 as the omitted reference group. As model 2 shows, the coefficient estimates of cohort 1 is negative and significant. As expected, earlier entrants show indeed a lower hazard rate. This is, however, not true for cohort 2. This crucial effect of early entry has been confirmed by other studies (Cantner et al., 2006; Klepper, 2007).

In model 3, we have added the possible effects of the pre-entry background of the entrepreneur. We defined two dummies that are equal to 1 for spinoffs and experienced firms. The group of inexperienced firms has been treated as the reference group. As expected, being a spinoff company and being an experienced firm have very strong

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14 We also found that a location in the major urban area of the Netherlands (defined as the regions of Amsterdam, Utrecht, Rotterdam and the Hague) did positively impact on the survival of banks. This suggests an urbanization economies effect.
negative impacts on the hazard rate of banks. This is in line with the evolutionary argument that new firms inherit routines from their parents. If the founder has acquired experience in the same or related industries, it will increase the performance of the new entrants: the more close this pre-entry working experience is to the sector, the better the new firms will perform. The banking sector is no exception to that rule.

Thus, we observe an extreme clustering of this sector in the Amsterdam region (housing more than half of the Dutch banks), but the location of Amsterdam itself did not appear to have a significant impact on the survival of the banking firms. Rather, early entry and the industrial background of the entrepreneurs mattered. This suggests that Amsterdam was just lucky to have many start-ups with pre-entry experience in the banking and related sectors, and that is why the Amsterdam region did well. In fact, the Amsterdam region had a disproportionate number of spinoffs in the banking sector: about 54 percent of the spinoff entrants in the Netherlands located in the Amsterdam region, which is much higher than its share of 32 per cent in the total number of entrants.

However, when we investigate more in detail the effect of the Amsterdam cluster on the survival of different types of banks, location seems to matter though. In Figure 5, we have drawn the survival curves of spinoffs in the Amsterdam region and spinoffs outside that region. Survival curves indicate the percentage of firms that survive at each age. The vertical axis shows this percentage plotted on a logarithmic scale. This figure shows that up to about the age of 35, the survival curves of spinoffs in the Amsterdam region and outside are almost identical. After that, spinoffs in the Amsterdam region outperform the spinoffs outside the Amsterdam region, suggesting a positive impact of the Amsterdam cluster, in addition to the effect of being a spinoff. Apparently, spinoff companies do well in their first years of existence irrespective of their location, but they benefit from being part of the Amsterdam cluster only at later ages. In Figure 6, we see a similar pattern for experienced firms, although the difference between experienced firms inside and outside the Amsterdam region is less pronounced than for spinoff companies.

Figure 5. Survival curves by spinoffs inside and outside the Amsterdam region

![Survival curves](image)

15 The share of Amsterdam in experienced firms is just above that average (35 per cent).
The only group that was underrepresented in the Amsterdam cluster were the inexperienced entrepreneurs. This latter group also showed lower survival rates at higher ages in Amsterdam than inexperienced firms located elsewhere. This outcome suggests that no positive spillover effects occurred from successful to inexperienced banks in the Amsterdam region. On the contrary, inexperienced firms suffered disproportionally from being located in the Amsterdam region, probably due to higher relative location costs.

5. Conclusions

A key finding of our study is that mainly through spinoff dynamics Amsterdam became the leading banking cluster in the Netherlands. Although the banking sector concentrated in the Amsterdam region, and Amsterdam was home to the national stock exchange, this did not increase the performance of banks in the Amsterdam region in general. Apparently, the Windows of Locational Opportunity were quite open in the mid-nineteenth century, although most likely restricted to the main urban area of the Netherlands. After some time, the Windows of Locational Opportunity closed, but not because of local externalities in the Amsterdam region, but because the spinoff process made Amsterdam the leading region. This result questions the cluster literature that almost takes for granted the positive effects of spatial clustering. Our study shows how important it is to control for other firm-specific features when assessing the economic effects of clusters. Spinoff firms and experienced firms did benefit from being part of the Amsterdam cluster though, although at later ages. Overall, these results concerning a knowledge-intensive service sector are very much in line with earlier findings in studies on manufacturing industries.

There are, of course, many questions for future research to be taken up. We briefly mention some of these. One challenge is to investigate more in detail the effects of exits through merger and acquisition activity. In the Dutch banking sector, about 50% of
all exits are caused by mergers and acquisitions, which is extremely high in comparison to the automobile industry, for instance. Another possible explanation for why Amsterdam did so well is that banks in Amsterdam were also active in taking over banks in more peripheral regions. Another issue is that exits cannot always be directly associated with failure when exits are primarily caused by mergers and acquisitions. We certainly need more in-depth research in this direction (Fein, 1998). Another challenge is to assess the cluster effect more in detail. What makes the banking sector a special case is that big banks own an extensive network of branch offices all over the Netherlands. For this reason, it is not always straightforward to link the performance of banks to the location of their headquarters. This also complicates the picture when assessing the effect of local competition, which cannot be done with our data the way it has been done for manufacturing industries in other studies.

Bibliography


