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Abstract

This paper investigates the extent to which merger and acquisition activity contributed to the spatial clustering of the Dutch banking industry in Amsterdam. This analysis is based on a unique database of all banks in the Netherlands that existed in the period 1850-1993. We found that spatial clustering of the Dutch banking industry was not driven by the fact that banks performed better in the Amsterdam region: being located in Amsterdam decreased rather than increased the survival chance of banks. However, banks in Amsterdam were disproportionately active in acquiring other banks outside Amsterdam. Experience in M&As accumulated mainly in the Amsterdam region, which in turn had a positive impact on the survival chance of banks located there. Our findings suggest that M&A activity was a driving force behind the spatial clustering of the Dutch banking industry between 1850 and 1993.

Keywords: industrial dynamics, cluster, mergers and acquisitions, banking sector, evolutionary economic geography

JEL codes: o18, r00, r11

1. Introduction

For long, economic geographers have been preoccupied with the question of how to explain the spatial clustering of an industry. Following Marshall (1890), they have referred to the importance of localization economies, due to a pool of specialised labour, the presence of specialised input suppliers, and access to knowledge about the secrets of the respective trade. This Marshallian view has been challenged recently. Klepper (2007), among others, has claimed that the spatial concentration of an industry emerges through a self-reinforcing

spinoff process, in which incumbent firms give birth to new firms in the same location. In that case, the spatial concentration of an industry may emerge and persist even when localization economies are negative (Appold 1995; Sorenson and Audia 2000; Staber 2001; Stuart and Sorenson 2003; Boschma and Wenting 2007; Wenting 2008). However, little attention has been drawn to merger and acquisition (M&A) activity in this literature. In this paper, we argue that M&As may be regarded as an additional driver of spatial clustering of an industry. To our knowledge, this has not yet been investigated systematically with firm-level data over a long period of time.

This paper investigates the spatial evolution of the Dutch banking industry between 1850 and 1993. More in particular, we analyze the extent to which M&As within the industry have contributed to its spatial concentration in the Amsterdam region, where more than half of all banks in the Netherlands were located in 1993. The banking industry is a very interesting case. About half of all exits of banks in the Netherlands have been due to mergers with and acquisitions by other banks between 1850 and 1993. This number is much lower in other industries that have been investigated so far, where the number of exits due to M&As lies around 5% (e.g. Klepper 2002, 2007; Boschma and Wenting 2007). The banking industry is also interesting because it is a knowledge-intensive service industry as to where most studies in this literature have investigated the spatial evolution of manufacturing industries, exceptions being Fein (1998), Pratt (1998), Consoli (2005), Grote (2008), Wenting (2008), Heebels and Boschma (2011) and De Vaan et al. (2013). The analysis is based on a unique database of all entries and exits in the Dutch banking industry collected by the authors. We focus specifically on the M&A activity of Amsterdam banks between 1850 and 1993 to see whether they have been disproportionately active in M&As. By means of survival analysis, we test whether being located in Amsterdam as such and whether having experience in M&As have affected the survival chance of banks in the Netherlands.

The structure of the paper is as follows. Section 2 develops a perspective on the spatial evolution of industries when discussing M&A activity as a possible source of spatial clustering. Section 3 introduces the data on the Dutch banking industry between 1850 and 1993. Section 4 describes the evolution of the Dutch banking industry and its concentration in the Amsterdam region. Section 5 examines the extent to which M&As have contributed to the spatial clustering of the Dutch banking industry. Section 6 concludes and discusses the implications for future research.

2. M&A activity and the spatial clustering of an industry

Many studies have focused on localization economies and spinoff dynamics as explanations for the spatial clustering of an industry over time. Localization economies are about benefits firms accrue from being co-located with other firms in the same industry, due to a pool of specialized labour, the presence of specialized input suppliers, and access to knowledge about the secrets of the respective trade (see e.g. Malmberg and Maskell 1999; Asheim and Gertler 2005; Potter and Watts 2011). This primary focus on localization economies has been challenged though, as the local presence of many competitors may produce high costs, such as high labour costs and rents (see e.g. Appold 1995; Staber 2001), and high numbers of exits (Sorenson and Audia 2000; Buenstorf and Klepper 2009; Heebels and Boschma 2011). Other scholars have proposed that spinoff dynamics drives the spatial clustering of an industry (Arthur 1994; Cantner et al. 2006; Klepper 2007; Buenstorf and Klepper 2009). In this view, spatial clustering of an industry emerges because of the entry of successful spinoffs that give birth to other successful spinoffs in the same location, *et cetera* (Klepper 2007, 2010; Boschma and Wenting 2007; Heebels and Boschma 2011; De Vaan et al., 2013). This is because the more spinoffs enter the region, the higher the probability that more spinoffs are

generated (Arthur 1994), and because (tacit) knowledge is transferred from parents to spinoffs which positively affects their performance (Helfat and Lieberman 2002; Klepper 2007).

Little attention has been drawn to M&A activity as another possible explanation of spatial clustering of an industry (see e.g. Markusen 1985; Chapman 1991, 2003). This may be due to the fact that most empirical studies on spatial clustering have focused on industries in which very few M&As occurred over time. For example, the percentage of firm exits due to M&A activity was only 6% in the US automobile industry between 1895 and 1966 (Klepper 2002, 2007), 5% in the British automobile industry between 1895 and 1968 (Boschma and Wenting 2007), and 5% in the global fashion design industry between 1858 and 2005 (Wenting 2008). In the banking industry, this figure is much higher. In the Netherlands, about half of all exits in this industry between 1850 and 1993 have been due to M&As. Hence, M&As may have had a distinct influence on the spatial evolution of the banking industry.

There is a huge literature explaining why firms engage in M&As. In general, this literature shows that increasing market power, achieving economies of scale or scope, diversifying into new products or services, and replacing inefficient management are important motivations. The specific determinants of M&As are also strongly industry-specific (Yin and Shanley 2008). Regarding the banking industry, most studies have focused on the importance of bank-specific determinants (e.g. capital-asset ratio, liquidity, loan activity) and country-level determinants (e.g. liquidity regulation, deposit insurance schemes, disclosure requirements, disciplinary power of supervisory agencies), with mixed results so far (Pasiouras et al. 2011). When it comes to the study of spatial determinants of M&As, most studies have investigated whether spatial proximity between acquirers and possible targets increases the probability of M&As to take place (for an overview, see for example Ragozzino 2009). Few studies though (e.g. Markusen 1985; Chapman 1991, 2003) have yet investigated

the long-term spatial implications of M&As, specifically as to what extent M&A activity contributes to the spatial clustering of an industry over time.

We expect M&A activity to contribute to the spatial clustering of an industry for two reasons. The first reason is that we expect that cluster firms are disproportionately more active than non-cluster firms in undertaking M&A activity¹. As M&As are a way for firms to expand and grow, firms in clusters have more opportunities to acquire other firms because there are more candidates around from the same industry. When the acquiring and the acquired firm share the same location, they are more likely to know each other well, with a reduction of uncertainty and an increased chance of an M&A to take place as a result. Geographical proximity has been shown to be an important driver of M&As between different industries within countries (e.g. Rodríguez-Pose and Zademach 2003), within places (Böckerman and Lehto 2006), as well as for M&As occurring within industries, as, for example, in the banking industry (Buch and DeLong 2004; Felici and Pagnini 2008; Wheelock and Wilson 2004; Hannan and Pilloff 2009). Furthermore, M&As might also be induced by strategies to enlarge a firm's market geographically, by acquiring distant firms in markets the acquiring firm is not yet active in. Clustered firms might have a strong incentive to acquire non-clustered firms, because the competitive pressure in clusters is likely to be high, and banks in more peripheral regions may be relatively cheap (Burgstaller 2013). Moreover, Colombo and Turati (2012) have argued that banks in the more developed areas with larger markets are also likely to be more efficient and profitable, and thus have more resources to finance the acquisition of other banks. This may be reinforced by that fact that clustering may lead to the local emergence of

¹ We will use the words 'cluster' and 'cluster firms' now and then to refer to the place where the industry concentrates in space, and to the firms in that industry that are located there, respectively. We do this for the sake of simplicity, although we are aware that the meaning of cluster may mean more than that and that its use in the literature has been far from unproblematic (see Martin and Sunley 2003).

specialized services like consultants and lawyers specialized in M&A activity, which may further boost M&As by cluster firms. As a result, we expect that cluster firms are disproportionately more active in acquiring other firms - both in their own region and outside their region - as compared to non-cluster firms.

The second reason why M&A activity may contribute to spatial clustering of an industry is that cluster firms are likely to perform better because of higher M&A experience. As firms in clusters are more likely to engage in M&As, cluster firms acquire more experience in M&As. This experience may enable cluster firms to reap the benefits from M&As more effectively, with a positive impact on their survival chance as a result. The benefits of having experience in M&As may be numerous. The acquisition of a firm can be considered a form of post-entry learning, in which acquiring firms get access to the knowledge of acquired firms, which may increase their own capabilities and improve their routines (Ahuja and Katila 2001; Piscitello 2004; Cassiman et al. 2005). An acquisition may also allow the acquiring firm to profit from internal economies of scale. Whether an acquirer is actually able to derive benefits from an acquisition depends on many factors, such as the level of integration, the degree of top management replacement, the extent of resource relatedness between the acquirer and the acquired firm, and the resource quality of the acquired firm (see e.g. Zollo and Singh 2004; Cartwright and Schoenberg 2006). In the long run, the ability of a firm to effectively cope with those factors depends on the experience it already has in M&As. This experience may be crucial in ensuring that an acquisition is well implemented and actually brings value to the acquiring firm. Therefore, we expect that having experience in M&As has a positive impact on a firm's survival chance. In turn, such experience in M&As accumulates mainly in clusters, as we expect that cluster firms are more likely to undertake M&As.

We expect both reasons to be more relevant at a later stage of the life cycle of an industry when M&A activity is known to be most intense (De Jong 1981; Markusen 1985; Klepper 1997). Once an industry has concentrated in space, we expect cluster firms to be more active in acquiring other firms, which results in a decreasing share of firms in that industry located outside the cluster. And as cluster firms acquire more experience in doing M&A activity, we expect them to have a higher survival chance than other firms in that industry. All this will contribute to the further spatial clustering of the industry. We test these theoretical expectations by focusing on M&A activity in the Dutch banking industry over a period of almost 150 years.

3. Data

As it is our aim to analyse the role of M&As in the spatial evolution of the Dutch banking industry and its spatial concentration in the Amsterdam region, we collected data on the years of entry and exit of each bank that entered the industry in the Netherlands during the period 1850-1993, the location of the head office, and data on M&A activity in the Dutch banking sector. These data have been obtained from a number of sources. We used the so-called *Nederlandse financiële instellingen in de twintigste eeuw: balansreeksen en naamlijst van handelsbanken* published by the Dutch Central Bank to compile a list of banks that were active between 1850 and 1993. This source lists every bank in the Netherlands for this period, the years they were in business, the location of their headquarters, changes in ownership structure and reorganisations. Other sources we used were the *Geschiedenis van de Algemene Banken in Nederland 1860-1914* (Kymmell 1992, 1996; Geljon 2005), *Geschiedenis van de Nederlandsche Bank* (De Jong 1967; De Vries 1989), the online databank on Dutch

entrepreneurs of the *Internationaal Instituut voor Sociale Geschiedenis*, trade journals and chronicles on the history of particular banks.

Our data sources cover the period 1850-1993. Hence, we do not analyse the full life cycle of the Dutch banking industry, which is much older and goes back to at least the seventeenth century when Amsterdam was a leading international financial centre (Israel 1995). Consequently, our study covers only part of the life cycle of the Dutch banking industry, but nevertheless the most interesting part from our perspective, as almost all M&As occurred in this period. Before 1860, a modern banking sector in the Netherlands was practically non-existent, although there was a money and stock market. This changed in the early 1860s, when the first banks with a juridical structure of a limited liability company were created. This meant that large sums of capital to invest became available, which was completely new to the Dutch banking system at that time.

Our database includes a total number of 718 banks that entered the Dutch banking industry between 1850 and 1993. We have information on the headquarters of these banks, not on their branches. Hence, we are dealing with the most knowledge-intensive part of this service industry where high-order firm-specific routines are formed. For 112 banks, we were unable to identify the year of entry. Of all banks, 611 banks exited the banking sector in the period 1850-1993, 107 banks were still active in 1993. Of those 611 exits, 322 exits were due to bankruptcy, closure, diversification into other activities than banking, and so on. The other 289 exits were caused by M&A activity, which is about half of all exits in the Dutch banking industry.

4. Evolution of the Dutch banking industry

Figure 1 presents the evolution of the Dutch banking industry in terms of total numbers of entries, exits and firms in the period 1850-1993. The number of firms and number of exits are somewhat underestimated in the first decades after 1850 because we do not have information on banks that were founded before 1850. Figure 1 shows that, except for a short intermezzo during the First World War, the total number of banks increased till 1929. What is remarkable is that the number of exits was extremely low in the second half of the nineteenth century. Entry levels were a bit higher but also remained low till the 1890s. This has been attributed to, among other reasons, the low tendency of firms to lend money from banks, because in the second half of the nineteenth century, that was considered a sign of weakness (Nierop 1972). Since the 1890s, however, there has been a sharp and steady increase in the number of entrants, until the 1930s, when entry levels dropped sharply and remained low ever since. The number of exits also started to increase around the turn of the century, but especially in the 1920s and early 1930s which also led to the institutionalizing of formal supervision to prevent bank runs (Mooij and Prast 2003).

At the turn of the century, the industry was dominated by five banks: Nederlandsche-Handelmaatschappij, Twentsche Bank, Rotterdamsche Bank, Amsterdamsche Bank and Incasso Bank. In 1900, their total market share was 35%, which rose further to 48% in 1918, but fell down again to 38% in 1928. 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 had risen to 52% (Kymmell 1996). The declining trend in the number of firms decelerates in the 1970s. In the 1970s, there is a short increase of exit levels, after which the number of exits stabilizes at a low level. In 1993, there were 107 banks left. By that time, the Dutch banking industry had evolved into an oligopoly dominated by three banks (ABN-AMRO, ING Group and Rabobank), which had a total market share of 80% (Van der Lugt 1999; Bos 2004).

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

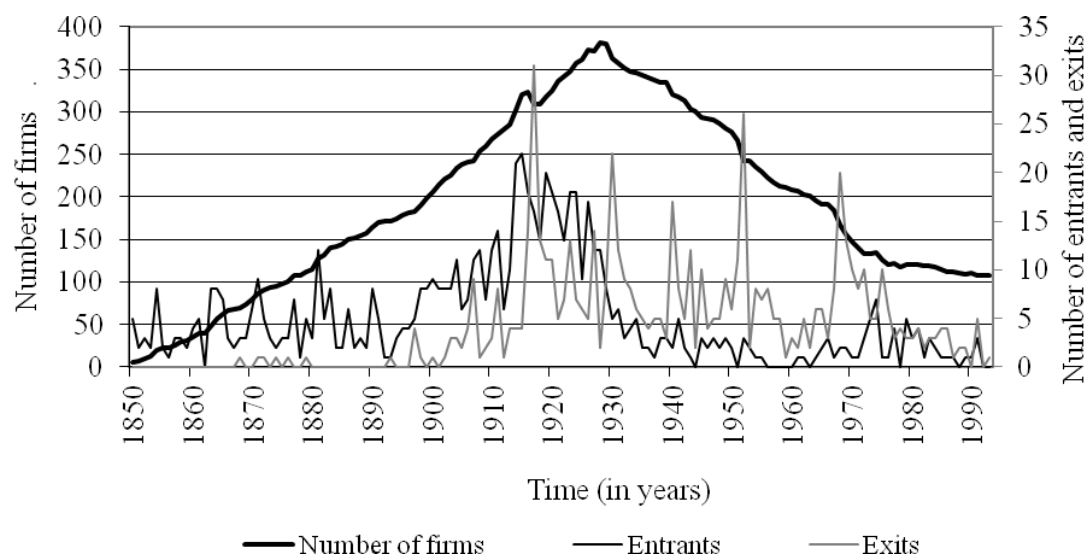
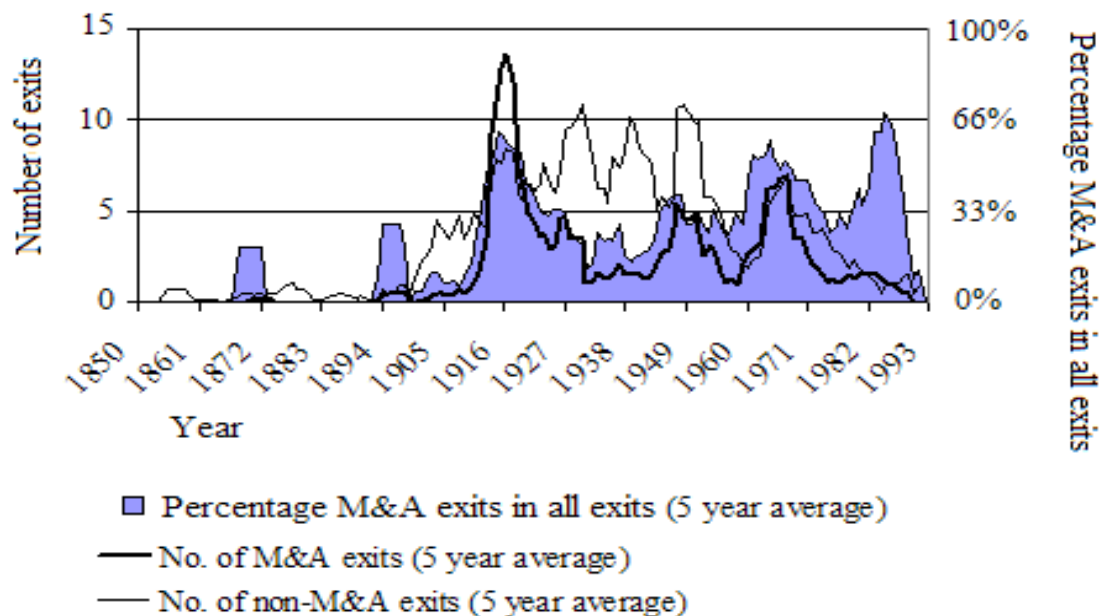


Figure 2 shows the number of exits due to M&A activity and their share in the total number of exits in the Dutch banking industry in the period 1850-1993. As explained earlier, about half of all exits were caused by M&As over this period, which is extremely high in comparison to other industries. M&A activity started around 1900, at a time when the industry was already well established in terms of number of banks, and accelerated from 1920 onwards. In the early expanding phase of the industry from 1850 until 1910 hardly any M&As took place. M&A activity was highest in the period 1914-1929, during which numerous small, mostly regional banks were acquired (Bosman 1989). M&A activity slowed down after that, until a second wave of M&As occurred in the 1960s. From 1930 onwards, M&A activity resulted in a sharp decrease of the total number of banks, as the annual number of exits of banks exceeded the number of entries. ABN-AMRO became the largest bank of the Netherlands when ABN bank (itself a merger of *Nederlandsche Handelmaatschappij* and *Twentsche Bank* in 1964) and Amro Bank (a merger of *Amsterdamsche Bank* and *Rotterdamsche Bank* in 1964) merged in 1990 (De Vries et al. 1999; Jonker 2003).

Figure 2. The number of exits due to M&As in the Dutch banking industry, 1850-1993



In order to sketch the spatial evolution of the Dutch banking industry, we assigned the location (municipality) of all banks' headquarters to one of the 40 labour markets (COROP regions) in the Netherlands. In the very exceptional case that a bank moved from one region to another, we assigned the bank to the region where it had been active for most of the time. In Figure 3, we have depicted the evolution of the number of Amsterdam-based banks and banks located outside the Amsterdam region for the period 1850-1993. In Figure 4, we show the share of the four major bank regions of the Netherlands (i.e. the Amsterdam, Rotterdam, Utrecht and The Hague regions)² in the national total for that same period.

Figure 3. Number of banks in and outside Amsterdam, 1850-1993

² Regions are so-called COROP regions which correspond to labour market areas in the Netherlands. For instance, COROP region Groot-Amsterdam includes the city of Amsterdam and surrounding municipalities like Aalsmeer, Amstelveen, Diemen, Edam-Volendam, Haarlemmermeer, Purmerend and Uithoorn.

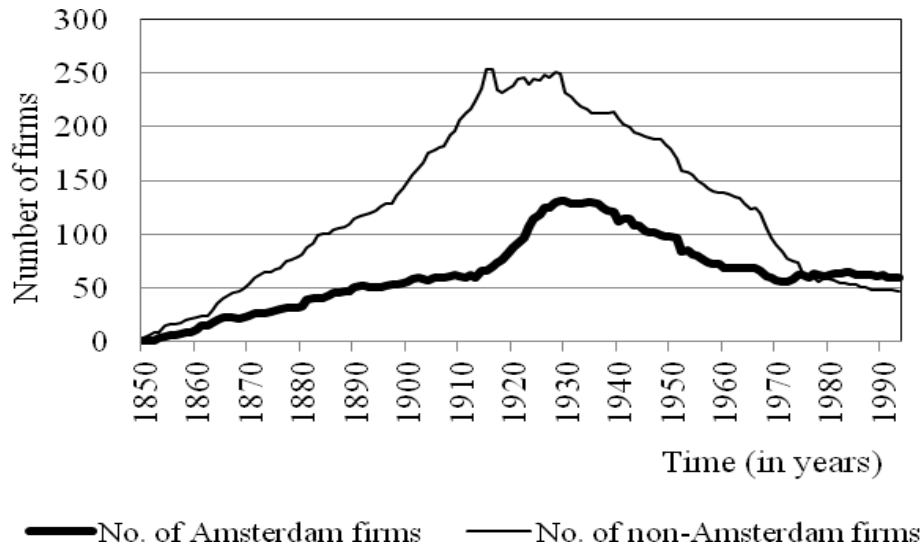
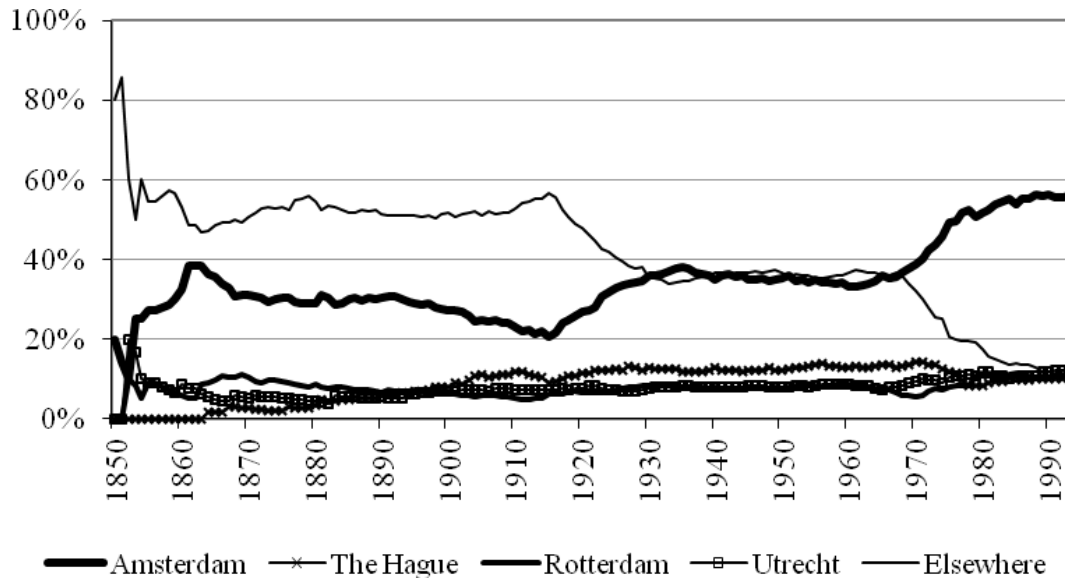


Figure 4. Shares of the four major urban Dutch regions in total number of banks, 1850-1993



As mentioned before, both figures include only banks that entered only after 1850, so the findings in the first decade after 1850 should be treated with caution. Figure 3 shows a steady increase of the number of banks in the Amsterdam region. Around 1900, as mentioned before, the Dutch banking industry was dominated by five large banks, of which four were based in

the Amsterdam region. The increase in the number of banks in Amsterdam accelerated in the 1920s. After reaching a peak in 1930, 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, as shown in Figure 4, the share of the Amsterdam region in the total number of banks dropped from 38% in the early 1860s to a mere 19% in 1915. This was not so much caused by exits of banks in Amsterdam, but by a relative increase of the shares of the Rotterdam region (in the late 1860s) and The Hague region (in the 1900s). Till far in the 1910s, the majority of banks was still located outside the 4 major urban areas of the Netherlands. This picture changed after 1915, when 116 banks were founded in the Amsterdam region in just a period of 15 years, which increased its share to almost 35 percent in 1930. This share stabilized for almost forty years, till foreign banks started to enter. In combination with exits that occurred mainly in the rest of the Netherlands, Amsterdam increased its share in the number of banks to around 56% in 1993. In terms of market share and corporate power, the concentration of bank activity in the Amsterdam region was much higher than that (Sluyterman et al. 1998). In the next section, we investigate the extent to which M&As within the industry contributed to the spatial clustering of the Dutch banking industry in Amsterdam.

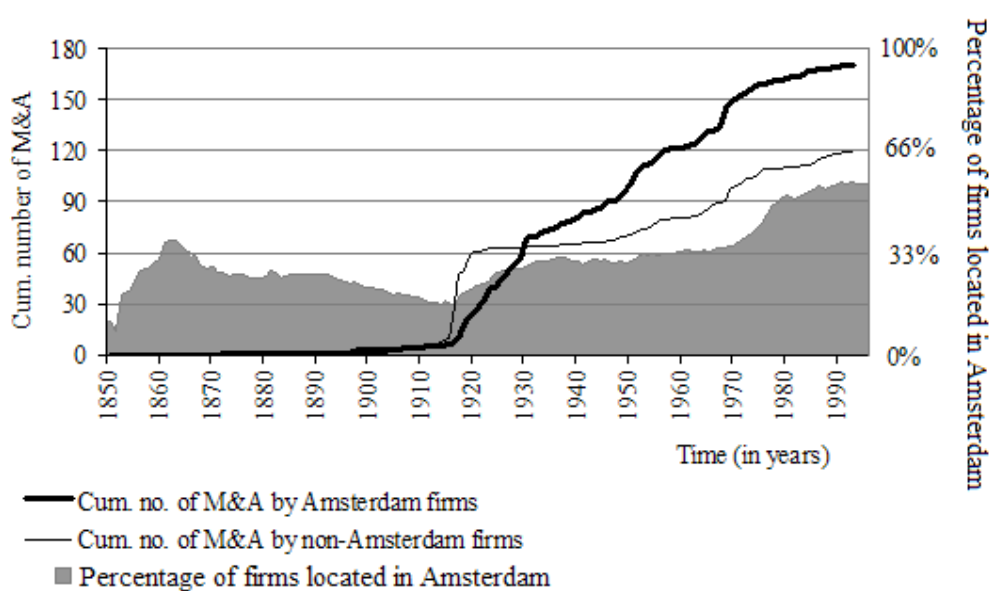
5. Empirical findings on M&A activity and spatial clustering

5.1 are cluster firms more active in acquiring other firms?

To investigate whether cluster firms are more active in M&As, we focus on the M&A activity of banks in the Amsterdam cluster between 1850 and 1993. The first indication that M&A activity has contributed to the spatial concentration of Dutch banking in the Amsterdam region is shown in Figure 5, where the cumulative number of M&As by Amsterdam banks, as compared to non-Amsterdam banks, is presented. The share of the Amsterdam region in the

total number of banks in the Netherlands increased rapidly in especially the 1920s and the 1970s, from about 16% to 30%, and from 35% to about 50%, respectively. As shown in Figure 5, these two major jumps coincided with a tremendous increase of M&A activity undertaken by Amsterdam banks.

Figure 5. The cumulative number of M&As by Amsterdam banks and non-Amsterdam banks, and the share of banks located in the Amsterdam region



Another finding was that banks in the Amsterdam cluster were disproportionately more active in acquiring other banks from Amsterdam as well as in acquiring banks from outside Amsterdam. 57% of all M&As has been initiated by Amsterdam banks in the period 1850-1993, while only 33% of all entrants was located in the Amsterdam region during that period. As Table 1 shows, of all acquisitions done within a COROP-region (that is, the acquired and the acquiring bank belonging to the same region), 64,5% of those intra-regional acquisitions had been done within the Amsterdam region. Having said that, most of the acquisitions by Amsterdam-banks (i.e. 76%) are acquisitions of other banks outside the Amsterdam region.

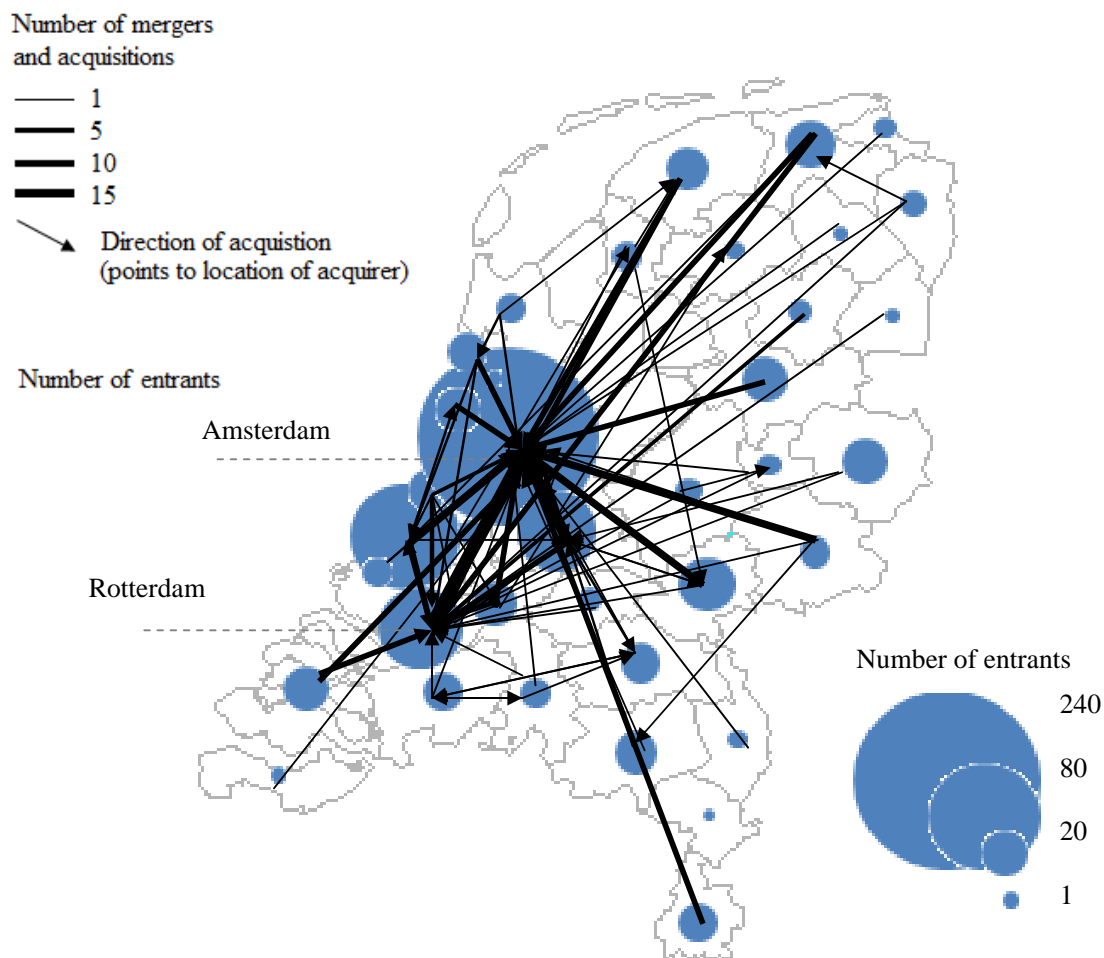
Out of all acquisitions crossing borders of COROP regions (i.e. a bank acquiring a bank in another region), Amsterdam-based banks were again especially active: 55% of all inter-regional acquisitions were initiated by Amsterdam banks during the period 1850-1993.

Table 1. Intra- and inter-regional acquisitions: numbers and shares

	No. of M&As	Share of M&As
M&As within the region	61	21.4%
- by Amsterdam banks	40	64.5%
- by other banks	21	35.5%
M&As between regions	228	78.6%
- by Amsterdam banks	126	55.3%
- by other banks	102	44.7%
Total	289	100.0%

These results are further illustrated in Figure 6 which shows the number of entrants in the 40 Dutch COROP regions and the number of M&As (as depicted by the thickness of acquisition links) between those regions in the period 1850-1993. We see that M&As were mainly executed by banks in the Amsterdam region. The figure also shows that banks in more peripheral areas of the Netherlands were more likely to be victim rather than initiator of acquisitions. In sum, because of the disproportional amount of acquisitions by Amsterdam-based firms, we find strong evidence that cluster firms are indeed disproportionately more active in acquiring other firms (both in their own region and outside), as compared to non-cluster firms. As set out earlier, this may be due to the fact that cluster firms have more opportunities to acquire other local firms, as compared to non-cluster firms. And cluster firms might be subject to stronger competitive pressures, and therefore have a greater incentive to acquire firms outside their region in order to enlarge their market.

Figure 6. Spatial distribution of M&As in Dutch banking industry, 1850-1993



At the firm level, we examined which banks have been most active in doing acquisitions. When we rank each bank in the Netherlands by the number of acquisitions in the period 1850-1993, the top seven was responsible for 57% of all acquisitions in the Dutch banking industry, and six of these banks were located in the Amsterdam region. In Table 2, we ranked the top five of banks with respect to the number of direct and indirect acquisitions in the period 1850-1993. Direct acquisitions concern the number of banks acquired, while indirect acquisitions are the number of banks acquired by another bank before this latter bank was acquired. As Table 2 shows, the top three banks are all located in the Amsterdam region, and they have been responsible for 87% of all M&A activities in our research period. This seems to suggest that a cumulative mechanism in M&A activity is operating at the firm level. As M&As are complex processes, experience in M&As may have been beneficial as it may have enabled

these banks to derive more effectively the benefits of M&As, with a positive impact on their survival chance as a result. We investigate this issue in the next section.

Table 2. Top 5 banks in The Netherlands: share of total number of direct and indirect acquisitions

Rank	Name of bank	Share of M&A	Location
1	ABN AMRO	58.5%	Amsterdam
2	Fortis Nederland	15.7%	Amsterdam
3	ING Bank	12.5%	Amsterdam
4	Rabobank	3.0%	Utrecht
5	SNS Bank	1.2%	Utrecht

5.2 do firms with more experience in M&As have a higher survival chance?

To investigate whether experience in M&As positively affects the survival chance of firms, we employed survival analysis to estimate the probability of failure of banks. A duration variable was used which measures the length of time from the year of entry of the bank to the year of exit. Hence, the survival time is measured in years, and it is right-censored for banks that have survived until 1993. Each year a bank exists is considered as an observation (at time period t), and we estimate the probability the bank survives the next year (at time period $t+1$), based on characteristics of the bank and its location at time period t . We include a number of control variables (age of the bank, whether a bank is foreign or not, time of entry) and allow them to vary during the time period of observation. We estimate a competing risk model to distinguish exit due to failure from exit due to acquisition (survival is the reference category). Because of the discrete nature of the survival time in our data, we apply the discrete-time method by Allison (1982) and extended by Jenkins (1995; 2005) to estimate the parameters of the model. This method approaches each type of event as taking place in continuous time between discrete observations, with specific hazard rates that remain constant within intervals.

Jenkins (2005) shows that the multinomial logit model represents an accurate approximation in discrete time of a duration model (see e.g. Cefis and Marsili 2011).

To measure experience in M&As, we took the number of M&As done by each bank per year. For each year a bank exists, we counted the number of banks it acquired, including all banks it acquired in previous years. This cumulative number was transformed on a logarithmic scale to take into account diminishing returns to scale (Ln_cumM\&A). We control for factors that are included in other duration studies on the evolution of industries (e.g. Klepper 2007). Those are the location of a bank in the Amsterdam cluster (Amsterdam), the age of a bank (ln_t), whether a bank is foreign (FOREIGN), and the time at which a bank enters the industry. Time of entry has been defined according to four entry cohorts. COHORT 1 covers all banks entering the period 1850-1913, which was a period when the Dutch banking sector was characterized by smallness and low levels of competition, which allowed banks to grow and expand. COHORT 2 concerns firms that entered during a very turbulent period in the Dutch banking sector in the period 1914-1929, during which scale economies grew in importance, entry barriers rose, and M&A activity was very intense. COHORT 3 captures banks that entered during the Great Depression and World War II (1930-1945). COHORT 4 covers entrants in the post-WWII period, and is treated as the reference category. We run the estimations with 712 banks for which we had information on all those variables. Because we have a large number of banks with a high average age, the total number of observations is 27,222.

The results of the survival analysis are presented in Table 3. Having experience in M&As lowers the chance of failure for banks. As expected, the coefficient of the cumulative number of M&As is negative and significant. However, our findings show no effect of having experience in M&As on the probability to be acquired. Another interesting finding is that the cluster effect (as proxied by the Amsterdam dummy) is positive and significant for the

probability to fail but negative and significant for the probability to be acquired. Apparently, being located in the Amsterdam region increases the chance of failure for banks but decreases the probability to be acquired. This finding tends to indicate that the spatial clustering of the Dutch banking industry was not driven by the fact that banks performed better in the Amsterdam cluster. Rather the contrary, the Amsterdam turned out to be a very selective environment. Instead, as we showed earlier, clustering is a result of the fact that banks in Amsterdam have been disproportionately active in acquiring banks from other regions.

Table 3: Estimates of probability to exit due to failure and due to acquisition for banks in the Netherlands, 1850-1993 (“survival” is the reference category)

	Dependent variable: Probability to exit due to failure	Dependent variable: Probability to exit due to acquisition
Ln_cumM&A	-0,689* (0,271)	0,168 (0,118)
Amsterdam	0,330* (0,135)	-0,682** (0,182)
ln(t)	-0,129* (0,057)	0,250** (0,068)
Foreign	-1,255* (0,509)	-0,140 (0,363)
Cohort 1 (1850-1913)	-1,151** (0,217)	-2,874** (0,463)
Cohort 2 (1914-1929)	-0,610** (0,211)	0,525** (0,154)
Cohort 3 (1930-1945)	0,018 (0,139)	-0,780** (0,194)
Amsterdam *Cohort 1	-0,626 (0,402)	-1,787 (0,633)
Amsterdam *Cohort 2	-0,538 (0,372)	-1,091* (0,432)
Constant	-3,698** (0,229)	-4,845** (0,277)
LR chi2	340,96**	
Log likelihood	-3149.3694	
N	27,222	

** significant at 0.01 level

* significant at 0.05 level

Our findings also showed that younger banks were more likely to fail, while older banks were more likely to be acquired. And foreign banks showed a lower probability to fail. Early entrants outperformed late entrants, which is as expected, as far as COHORT 1 is concerned, because this period 1850-1913 was a period of relatively weak selection. Banks belonging to COHORT 2 were more likely to be acquired though, as they entered during a period with a high intensity of M&A activity. We also interacted the Amsterdam dummy with the Cohort 1 and 2 dummies. Interestingly, while Cohort 1 and Cohort 2 banks had a lower probability to fail in general, this negative effect disappeared for Cohort 1 and 2 banks located in the Amsterdam cluster.

In the analyses above, we have not controlled directly for the size of banks (e.g. total assets), as those data are not available for all banks over time. The cumulative number of M&As variable may partly capture a size-effect, as it reflects an increase in size of banks due to previous acquisitions. The results of previous empirical studies on banks that did measure size are ambiguous regarding its effect on the probability of exit due to failure or acquisition. Wheelock and Wilson (2000) found no robustly significant relationship between size and the probability of failure of US banks between 1984 and 1993. As for exit due to acquisition, they found that smaller banks are more likely to be acquired than larger banks. Lanine and Vennet (2007), on the contrary, found in the case of cross-European deals between 1995 and 2002 that larger banks are more likely to be acquired than smaller banks. Hannan and Pillof (2009) found a similar result in the case of US banks between 1996 and 2005, except when only acquisitions by small banks are taken into account. A reason for these differing results may be that on the one hand, smaller banks are more attractive acquisition targets as they are less expensive to acquire and can be more easily integrated into the acquiring bank, and the

acquisition of smaller banks may raise fewer concerns by anti-trust authorities. On the other hand, larger banks may be more attractive when one seeks economies of scale or market power, which is likely to be achieved at a lower cost by acquiring one large bank than a number of small banks. Hence, size may play a role in M&A activity of banks, but there seems to be no univocal relation between the two.

6. Conclusion

This paper has investigated the extent to which M&As contributed to the spatial clustering of an industry. We analysed the spatial evolution of the Dutch banking industry and its spatial concentration in Amsterdam for a period of almost 150 years. One could argue that the leading role of the Amsterdam banking cluster was a continuation of what has happened long before, as Amsterdam has been part of a very long-term development that goes well back into the seventeenth century when financial services in Amsterdam were world-leading (Israel 1995). Having said that, we have seen a further spatial concentration of the Dutch banking industry in the twentieth century, which calls for further clarifications.

Our study showed that M&A activity played an important role in the spatial clustering of the Dutch banking industry in the Amsterdam region during the twentieth century. Banks in Amsterdam have been extremely active (disproportionally so) in acquiring other banks not only in their own region but also outside their region, as compared to non-cluster firms. Amsterdam banks had more opportunities to acquire other local banks for sure. At the same time, due to stronger competitive pressure in the cluster, Amsterdam banks might have had greater incentives to acquire banks outside their region, in order to expand and enlarge their markets. The Amsterdam location may have contributed to this disproportionate M&A activity because of the local presence of services specialized in M&As and other financial organizations like the Dutch Central Bank. We also observed that only a small number of

banks was responsible for the lion share of all acquisitions, and those banks were almost entirely Amsterdam-based. In other words, those banks accumulated much experience in M&As over time. As M&As are complex processes, this experience may have been beneficial as it may have enabled them to derive benefits from M&As more effectively. The survival analysis provided indeed some evidence for this: the more experience a bank had in acquiring other banks, the lower its failure rate. By contrast, we found that being located in the Amsterdam banking cluster did not lower, but, instead, increased the failure rates of banks. Overall, these findings tend to suggest that the spatial clustering of the Dutch banking industry was not driven by the fact that banks on average performed better in the Amsterdam cluster. Instead, what contributed to the further spatial concentration of the Dutch banking industry was the fact that banks in Amsterdam acquired a disproportionate amount of banks elsewhere in the Netherlands. Moreover, the accumulation of experience in M&As took place mainly in Amsterdam, which in turn had a positive impact on the survival chance of banks located there.

As any other study, these findings open up a number of new research challenges. First, there is a need to replicate this study in other countries, especially where banking is spatially concentrated, like the US (New York), the UK (London) and Germany (Frankfurt). It could be that different regulation and governance structures have different effects on the spatial implications of M&As. In this context, one could also account for the internationalization of the banking sector, and how that has affected the evolution of the Amsterdam banking cluster (see e.g. Engelen and Grote 2009). In this study, foreign banks showed higher survival rates, and Amsterdam was blessed with a strong presence of foreign firms. This could be further explored in future research.

Second, it is worth investigating the extent to which changes in the banking system as a whole drive the spatial evolution of the industry. Dow (1999), for example, argues that

regional banking systems go through different stages of development, ranging from an early stage in which banks serve mainly as financial intermediaries (lending out savings) to a late stage in which banks focus mainly on securitisation and off-balance sheet activities – roughly a gradual shift from retail to investment banking. At an early stage, the focus on intermediation may imply that banks mainly serve local communities and hence are dispersed, whereas at a later stage the focus on liquidity and services rather than credit may imply that banks need good knowledge of potential (large) borrowers, which may result in the spatial concentration of the industry in large cities. Hence, it is worth investigating whether such changes of activities of individual banks, related to the banking system in general, have an effect on the spatial evolution of the industry.

Third, we need to investigate to what extent, and how, M&As act as transfer mechanisms of routines between firms, as this has remained a black box so far. It might be that M&A activity in the banking industry is much less driven by getting access to successful routines of other firms, as in high-tech sectors, but much more by conquering market shares from competitors. This may also help in unfolding the specific benefits that firms derive from having experience in acquisitions, which we found to have a positive impact on their survival.

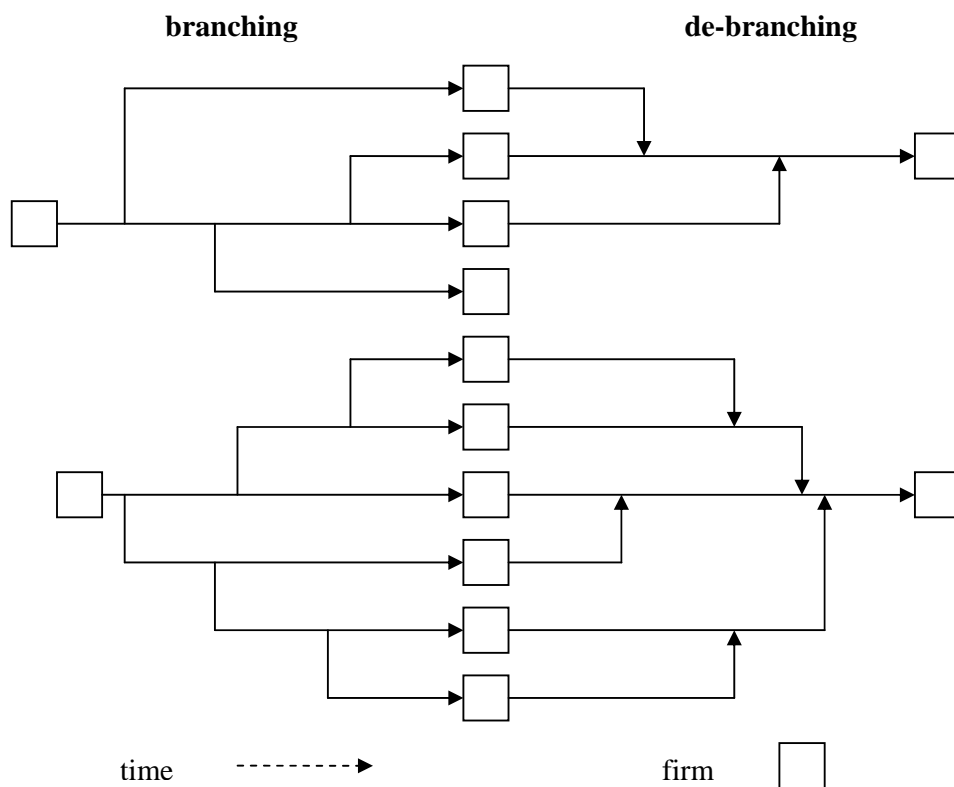
Fourth, it would be interesting to include networks as determinants of the survival chance of banks. Directorship interlocks between banks may be important determinants of acquisition decisions of banks, especially within regions where these networks are more likely to occur, and these networks may also affect the long-term survival of banks. Okazaki and Sawada (2011) found evidence that the quality of their network decreased the failure rate of banks. Such a network approach would add to our understanding of the spatial evolution of industries and clusters from an evolutionary perspective (Ter Wal and Boschma 2011).

Fifth, this paper has focused on M&A activity, while other studies have concentrated on the spinoff process, or on agglomeration externalities, to explain spatial clustering of

industries. We need to develop a comprehensive theoretical model that incorporates and combines the role of cluster dynamics, network dynamics, spinoff activity and M&A dynamics. From an industry life cycle perspective, we claim that when M&As act as transfer mechanisms of knowledge and routines, M&A activity can be viewed as a de-branching process in which the routines of various firms come together and merge, which leads to a decrease in the number of firm-specific routines in the industry over time. This is depicted on the right side of Figure 7. Through M&A activity, a lineage structure between firm-specific routines across space is formed as time goes by, as knowledge and routines are transferred from acquired to acquiring firms. The spinoff process also contributes to the evolution of this lineage structure, as shown on the left side of Figure 7. However, the spinoff process sets into motion a branching process in which routines are transferred from parents to spinoff firms, and which makes the number of firm-specific routines within the industry to increase over time. Both knowledge transfer mechanisms are likely to contribute to the spatial concentration of an industry. This is because the spinoff process is a self-reinforcing and path-dependent process that occurs at the regional level, in which a relatively small number of parent organisations give birth to a relatively large number of (successful) spinoffs. With respect to M&A activity, this is because intra-regional M&As will primarily occur within clusters, while inter-regional M&As will concern mainly cluster firms that acquire non-cluster firms. Spatial clustering is further reinforced by the fact that only a small number of cluster firms will do most of the acquisitions because of the experience in M&As they acquire with cumulative learning and further internal economies of scale as a result. In that respect, M&A activity delineates a lineage structure between firms that crosses regional boundaries and lowers the number of firms in an industry over time. This process leads to a further consolidation of the industry as market power is dispersed among fewer firms, and market power is also likely to be concentrated among cluster firms. Hence, consolidation may have an aspect of spatial

concentration to it. This is opposite to the lineage structure caused by the spinoff process, which is mainly intra-regional and leads to an increasing number of firms over time, and which also adds to spatial clustering.

Figure 7. Branching (through spinoff process) and de-branching (through M&A activity) of organizational routines



Another theoretical challenge is to investigate whether spinoffs are more likely to be initiator or victim of acquisitions, especially with respect to the parent firm. Are parents more inclined to acquire their spinoff firms, or do spinoff firms more often acquire their parent? Both could be expected because of high degrees of social and geographical proximity between the two. This could also play a role in the de-branching process outlined above. That is, while many

spinoffs are generated by only a small number of successful parents, those successful parents may also have the tendency to acquire their spinoffs at a later stage. If that occurs, a perfect mirror image would arise between the branching and de-branching process.

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Table A1. Descriptive statistics of variables used in the survival analysis.

	Mean	Std.Dev.	Min	Max
Amsterdam	0.333	0.471	0	1
Foreign	0.031	0.173	0	1
Cohort 1	0.294	0.456	0	1
Cohort 2	0.197	0.398	0	1
Cohort 3	0.198	0.399	0	1
Ln_cumM&A	0.078	0.373	0	3.664
ln(t)	3.024	1.092	0	4.963

Table A2. Correlation matrix of independent variables

	Amsterdam	Foreign	Cohort 1	Cohort 2	Cohort 3	Ln_cumM&A	ln(t)
Amsterdam	1.000						
Foreign	0.035	1.000					
Cohort 1	-0.074	-0.045	1.000				
Cohort 2	-0.058	-0.034	-0.319	1.000			
Cohort 3	0.032	-0.026	-0.321	-0.246	1.000		
Ln_cumM&A	0.125	-0.004	-0.122	-0.028	-0.013	1.000	
ln(t)	0.027	-0.057	-0.245	-0.171	0.030	0.203	1.000