



UvA-DARE (Digital Academic Repository)

Stock exchange virtualisation and the decline of second tier financial centres: the cases of Amsterdam and Frankfurt

Engelen, E.; Grote, M.H.

DOI

[10.1093/jeg/lbp027](https://doi.org/10.1093/jeg/lbp027)

Publication date

2009

Document Version

Final published version

Published in

Journal of Economic Geography

[Link to publication](#)

Citation for published version (APA):

Engelen, E., & Grote, M. H. (2009). Stock exchange virtualisation and the decline of second tier financial centres: the cases of Amsterdam and Frankfurt. *Journal of Economic Geography*, 9(5), 679-696. <https://doi.org/10.1093/jeg/lbp027>

General rights

It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

UvA-DARE is a service provided by the library of the University of Amsterdam (<https://dare.uva.nl>)

Stock exchange virtualisation and the decline of second-tier financial centres—the cases of Amsterdam and Frankfurt

*Ewald Engelen** and *Michael H. Grote***

Abstract

International financial centres used to be stable economic clusters held together by the centripetal forces emanating from physical exchanges. However, given near complete ‘virtualisation’, these ‘anchors’ have gradually disappeared. As this article demonstrates, this has had telling consequences for second-tier financial centres like Amsterdam and Frankfurt. Empirically, the article adds cases of financial centre decline to the existing collection of case descriptions. Theoretically, the article assesses the explanatory capacity of the combination of two complementary theoretical perspectives, New Economic Geography and Comparative Political Economy, by determining to what extent they fit the two case studies.

Keywords: international financial centres, Amsterdam, Frankfurt, virtualisation, New Economic Geography, comparative political economy, theoretical pluralism

JEL classifications: R11, R12, F22

Date submitted: 13 February 2009 **Date accepted:** 1 May 2009

1. Introduction

During the age of financialisation (Epstein, 2005; Stockhammer, 2008) and ‘irrational exuberance’ (Shiller, 2000), the financial sector worldwide underwent rapid growth in terms of employment, firms as well as number and value of processed transactions, most notably in the leading financial centres London and New York. Paradoxically, second-tier centres in Europe simultaneously seem to be shrinking in most of these respects. We analyse this paradoxical observation on the basis of the developments in two continental centres that during the 1990s still clamoured for first tier status, namely Frankfurt and Amsterdam, which, however, saw their aspirations frustrated by relative and absolute decline in the 21st century. This is demonstrated by the drop in ranking of the two centres in the Global Financial Centres Index: Frankfurt slipped from sixth to eighth place in the March 2009 edition, and Amsterdam dropped one place from 23rd to 24th (Z/Yen, 2007, 2009).

While having completely different historical origins—Amsterdam being one of the oldest International Financial Centres (IFCs) (see Engelen, 2007), while Frankfurt is a product of WWII (see Grote, 2008)—both centres were strongly dependent on the need

*University of Amsterdam, AMIDSt, Nieuwe Prinsengracht 130, 1018 VZ Amsterdam, The Netherlands. *email* <e.r.engelen@uva.nl>

**Frankfurt School of Finance & Management, Finance Department, Sonnemannstraße 9-11, 60314 Frankfurt am Main, Germany. *email* <m.grote@frankfurt-school.de>

for physical proximity to their equity (and derivative) exchanges that were located in their respective city centres. During the 1990s, these exchanges have demutualised, merged with other exchanges (Euronext), and, crucially, have gone virtual. That meant the replacement of physical trading on a spatially circumscribed exchange floor by virtual trading through remote access ports that lack clear spatial coordinates. These developments have radically changed the spatial distribution of financial intermediaries such as banks, brokers and option houses that are implicated in exchange-based equity and derivative trade. While Deutsche Börse, the Frankfurt-based exchange operator, and Euronext, the Amsterdam-based operator, have undergone similar developments, and while both the financial centres of Amsterdam and Frankfurt have experienced quantitative decline, the patterns of dispersal in the two cases have been quite distinct suggesting that the causal mechanisms have been dissimilar too.

This article looks at these mechanisms. While most geographical work has focused on continuous clustering of economic activities in specific locations, emphasizing the economic value added of co-location (Boschma and Kloosterman, 2005), the analysis of the two cases of IFC decline offers an opportunity to gain additional insights in the explanatory leverage of two distinct theoretical approaches in economic geography, that is, New Economic Geography (NEG) (Krugman, 1991) and Comparative Political Economy (CPE) (Hall and Soskice, 2001; Peck and Theodore, 2007; Gertler, 2008). From these approaches, we derive two explanatory hypotheses that are simply postulated here and further developed in the theoretical section of the article. NEG expects us to see more spatial concentration in Europe, that is, a rise of London at the cost of second-tier centres like Amsterdam and Frankfurt. This is primarily driven by declining transaction costs. CPE, on the other hand, expects us to see the patterns of dispersal in Amsterdam and Frankfurt being determined by the wider, national institutional framework. Given a lower degree of penetration of financial markets by foreign intermediaries and a much more regionally rooted economy in Germany, the lifting of functional reasons for co-locating in Frankfurt should result in a re-appearance of older regional linkages in the sphere of finance. In the Netherlands, on the other hand, well-developed linkages between the Dutch financial service sector and Anglo-American markets and intermediaries suggest outward bound movements of capital, intermediaries, people and knowledge.

Amsterdam and Frankfurt are well-established IFCs that offer the whole panoply of financial services. Hence, from an economic geographical perspective, they share most relevant starting conditions; a relatively large concentration of heterogeneous financial firms, a dedicated infrastructure, sufficient knowledge spillovers and a specialised labour market. Moreover, they are uncontested within their national economies, while being second-tier centres at the European scale. Nevertheless, they are embedded in different home countries and different institutional settings. A systematic, detail-rich comparison of their respective development paths offers insights into the combined explanatory power of NEG—that largely neglects institutional aspects—and CPE that covers them extensively without necessarily accounting for regional developments.

This article can be understood as an attempt to assess the explanatory value of the two literatures mentioned above. From a theoretical viewpoint, it is interesting to compare these two IFCs, since they are both representative of a wider population of declining second-tier universal financial centres, while the spatial dispersal they showcase is truly distinct. Our comparison is based on a ‘most similar’ case

study design. The aim is to determine the extent to which different theoretical perspectives are able to account for the differences between the two cases that cannot be accounted for by initial conditions (Gerring, 2007). As such, this article is not so much meant to give a final verdict over the value of either NEG or CPE, but rather to suggest new lines of research on the basis of a combination of the two literatures.

The next sections take up the empirical narrative of our two cases from the virtualisation of their respective exchanges in the late 1990s onward. Section 2, which presents some background information on the recent transformations of the exchange landscape, is followed by a more detailed description of Amsterdam and Frankfurt. After the empirical sections, the article starts a discussion of our cases on the basis of the theoretical approaches outlined above.

2. Anchors aweigh! Stock exchanges going virtual

Stock exchanges have traditionally been viewed as ‘anchors’ of financial centres (see Thrift, 1994; Cassis, 2007; Wójcik, 2007). Many stock exchanges occupy a central spot in their respective financial centres and have historically formed the backbone around which the financial community developed. Nigel Thrift, for instance, relates the anecdote that the Bank of England maintained a ruling that brokers, jobbers and other members of the London Stock Exchange had to be located within a square mile of the trading floor in order to allow end of trading day clearing and settlement (Thrift, 1994). This is true too for Amsterdam and Frankfurt, whose stock exchanges can be traced back to 1602 and 1585, respectively. The Amsterdam office of Euronext still occupies the former stock exchange, located at the so-called Beursplein or Exchange Square in the centre of Amsterdam, 500 metres from the Central Station and the former head office of the Dutch Central Bank. Moreover, the immediate surroundings of the ‘Exchange Square’ are still dominated by the buildings that once housed the Amsterdam financial community. London and New York provide even finer examples of the crystallizing effects of physical exchanges. The street where the New York Stock Exchange is located has become eponymous for US style capitalism, whereas the London City has evolved into the internationally recognised emblem of world class financial sophistication.

Historically, stock exchanges were organised as clubs or cooperatives that were owned by members—mainly local banks and brokers, and sometimes listed firms (Di Noia, 1998; Lütz, 1998; Posner, 2005; Grote, 2007). During the 1990s, most stock exchanges turned into for-profit organisations. Typically, former members were handed shares, often reflecting the amount of business they conducted and subsequently became the legal owners of the exchange. Simultaneously, many exchanges started to raise capital by private placements. In those cases, outside investors were given a chance at ownership too. Since the start of the new millennium, many exchanges have morphed into publicly listed companies, for example, Deutsche Börse AG in 2001, the Amsterdamse Effectenbeurs NV in 1996 and the LSE in 2001 (Aggarwal, 2002).

These changes have been triggered by a number of interdependent developments. Neither the general political climate of the 1990s that favoured privatisation nor simple organisational mimicry is sufficient to explain them. Other, more functional reasons were at work too, such as the internationalisation of the users of stock exchanges as well as technological developments. Especially the latter appear to have

been important. Advances in information and communication technology (ICT) delivered decreasing costs of communication and trading across space. In the increasingly competitive exchange landscape, these developments triggered costly investments in sophisticated ICT, in turn, enhancing the pressure on operators to find new sources of funding. Recent reports indicate that ICT accounts for almost 50% of operating expenses, compared to 22% for personnel costs (FT, 2009a).

Another key issue was legal deregulation (see Lütz, 1998; Posner, 2005, 2009; Majury, 2007). The introduction of the European Investment Services Directive in 1993 had a lasting impact, since members were no longer legally required to be physically present at the exchange. Thus, stock exchanges in different countries started to compete with each other for international order flow and firm listings (Hazarika, 2005). Grote (2007) reports that the for-profit governance structure allowed operators not only to expand their market reach but also to consider mergers and, even, relocations. This was because of the increasing virtualisation of trading: traders were no longer tied to a physical exchange floor but could enact transactions from behind computer screens that could be located anywhere (Steil, 2002). However, the predicted dispersal of traders over space along frontiers of costs did not occur (O'Brien, 1992; Cairncross, 1998), as has been demonstrated by the successes of old IFCs such as London and New York and new IFCs such as Dublin and Luxembourg.

Lo and Grote (2002) have shown that location is still eminently important for traders. Proximity allows for cheap and easy exchange of information with other traders, analysts and the sales force. On the trading floors of large banks too proximity is seen to matter (Beunza and Stark, 2004). The short-term trading on behalf of clients or for the banks' own accounts (prop trading) requires on the spot interpretation of ambiguous market information. Face-to-face contacts between traders with different specialties, backgrounds and heuristics is crucial for turning interpretations into transactions (Power, 2002; Bathelt et al., 2003; Storper and Venables, 2004). With the continuing integration of financial markets, banks were able to concentrate their traders in ever larger trading rooms to profit from better information exchange and more adequate interpretations of market movements. The advantages of being the largest international trading spots combined with other agglomeration forces, such as the construction and distribution of new ideas and techniques (Thrift, 1994), a thick and specialised labour market (Porteous, 1999), and the co-location of firms in complementary sectors (legal services, insurance, shipping and commodities). Heterogeneous effects in London's financial centre explain the continuing success of this congested and extremely expensive IFC (Clark, 2002).

Not all IFCs were subject to beneficial centripetal forces mentioned above at the same extent. Some, apparently, experienced lacklustre growth or even underwent decline. Figure 1 clearly demonstrates that London experienced rapid growth in financial service employment between 2001 and 2006. Amsterdam and Frankfurt, in contrast, experienced a gradual decline.

In a context of rapidly growing numbers, sizes, values and types of financial transactions this is remarkable (see MGI, 2007). This raises the question why these centripetal forces were so much weaker in Amsterdam and Frankfurt than in other IFCs. While recently, a growing number of economic geographers have turned to the competition between IFCs to explain the transmutations in the European financial landscape (see Beaverstock et al., 2001; Faulconbridge, 2004; Engelen, 2007; Faulconbridge et al., 2007), a systematic comparison of the causal mechanisms

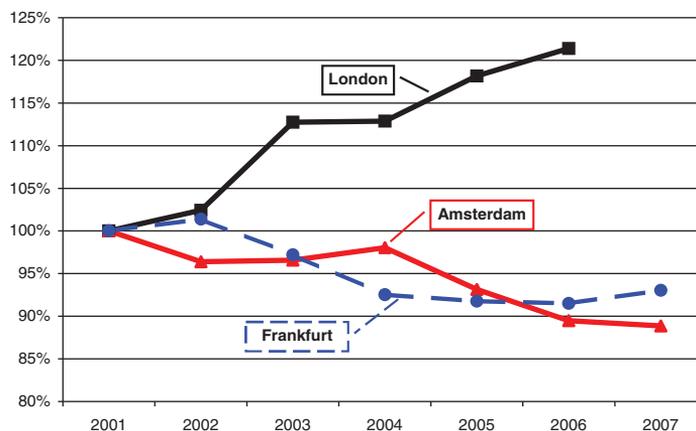


Figure 1. Employment in Finance and related business services in London, Amsterdam and Frankfurt. This figure appears in colour in the online version of the *Journal of Economic Geography*.

Source: City of London (various years); O + S (2008); Deutsche Bundesbank (2007b), own calculations.

behind IFC decline at the service of theory assessment has so far been lacking. Herein lies the value added of the following analysis. Below, we trace the developments in our two cases, using similar metrics related to employment, foreign banks and changes in their geographical distribution over time. Given the different historical roots of the two IFCs and their distinct institutional and organisational structures, the availability of empirical data on the two centres does not correlate perfectly. Nevertheless, we are able to illustrate both the similarities and the dissimilarities between our two cases, as befits a most similar comparative case study design (Gerring, 2007).

3. The case of Amsterdam—gradual transnationalisation

The Amsterdam stock exchange was one of the first to go ‘virtual’. The decision to do so was taken against the background of the developments described earlier. The worldwide liberalisation of capital flows increasingly opened up national financial markets to competition from more liquid foreign ones such as the financial markets ‘domiciled’ in Paris, Frankfurt, New York and, especially, London. The share of total trade of equities listed in Amsterdam that was in fact bought and sold in London and New York reached well over half of total turnover volume in the mid-1990s. In order to stop further leakages, the operator decided to enhance the accessibility of its platform and transform its cost structure through the introduction of remote access trading possibilities. The underlying rationale was that virtualisation would bring higher trading efficiency, foster market concentration and improve liquidity and would thus enhance the attractiveness of the Amsterdam trading platform for investors as well as share issuing firms.

As a result, turnover at the Amsterdam stock exchange increased hugely. While daily turnover reached levels of €66 billion at the beginning of the 1990s, in 1994, it had

increased to €143 billion, before reaching an all time high of €707 billion in 1997 (CBS, 2009). Moreover, the introduction of the so-called AIDA trading book in 1994 brought the share of trade that was processed in Amsterdam up to 60%, where it would remain throughout the 1990s, before rising to a little less than 80% in 2003. In terms of equity issues too, the 1990s saw a huge increase. Starting from a low of €326 million in 1988, the total value of shares issued at the Amsterdam Exchange reached €2.7 billion in 1994 and has since increased to €18.9 billion in 1999 (DNB, 2009). While these figures reflect the wider process of financialisation that most developed economies experienced during the 1990s (Epstein, 2005; Stockhammer, 2008), the increasing concentration of trade on the Amsterdam order book after virtualisation does suggest a facilitating role of virtualisation on liquidity.

However, given the small size of the Dutch economy, the pool of liquidity and hence the profitability of the Amsterdam Exchange as an independent operator was limited too. Moreover, the required investments in ICT were too high for a small operator like the Amsterdam Exchange Society to shoulder. As a result, the operator was on the lookout both for new sources of capital and new strategic partners to tap into foreign capital flows. In 1996, the Amsterdam Exchange became a publicly quoted limited liability corporation ('N.V.'). followed in 2000 by the announcement that the exchange would integrate its order book with those of the Paris and the Brussels Exchanges under the name of 'Euronext' and would adopt the Parisian 'Nouveau Système Cotation' in 2001 to pool liquidity. Euronext has since (in 2006) merged with NYSE and is currently the only truly integrated transnational exchange operator, sharing, as of January 2008, a single-order book.

The importance of pooled liquidity for the operational success of an exchange is linked to economies of scale. Liquidity, meaning the ability to buy and sell without affecting the price (Carruthers and Stinchcombe, 1999), clearly matters for investors. These 'indirect trading costs', for example, moving the price downward by a large sell-order, can be more important than the actual trading fees. Moreover, 'direct trading costs' decline with the amount of trading and the size of the capital pool. Size also feeds into the ability of operators to remain at the cutting edge of ICT developments, resulting in quicker processing and easier access, issues that matter hugely to the so-called quants that use automated trading and leverage to capitalise on small price movements and make up the majority of daily turnover. Finally, for issuers, size matters, because lack of liquidity means lacklustre trading and higher costs of financing, failing to offset the (high) costs of issuance and investor relations.

While the value of average daily trading of the combined exchanges of Euronext in 1990 added up to only \$170 billion, turning them into the eighth largest exchange worldwide, in 2006, a fortnight before the takeover by NYSE, Euronext had become the fifth largest exchange in terms of average daily turnover (after, respectively, NYSE, Nasdaq, LSE and Tokyo), the sixth largest exchange in terms of market capitalisation (after the NYSE, Tokyo, Nasdaq, LSE and Osaka), and the eighth largest in terms of number of listed firms (after Bombay, Toronto, Nasdaq, LSE, NYSE, Tokyo and Korea) (WFE, 2007). Since the NYSE takeover in 2006, the operator tops all three lists.

However, despite liquidity-enhancing effects, demutualisation, virtualisation and consolidation seem to have transformed the Amsterdam Exchange into a transnational station rather than a national champion. While this is described in some of the literature as a more general tendency (Michie, 2006), the available evidence suggests that the loss of spatial specificity is particularly strong in Amsterdam. Data from the Federation

of European Securities Exchanges (FESE) indicate that foreign stock ownership, which reached 90% in 2003, is the highest of all reporting exchanges, demonstrating the striking extent to which the Amsterdam exchange is penetrated by foreign investors (FESE, 2009). Second, no less than 58 of the 202 funds listed at Euronext Amsterdam have foreign ISIN codes, 20 of which are denominated in euro and 38 of which are denominated in other currencies, mostly British pounds and US dollars. This suggests that the Amsterdam Exchange is increasingly becoming a venue of choice for non-European firms wanting to tap into European capital formations from abroad.

Another piece of evidence for transnationalisation comes from the primary market. While a large number of big Dutch firms have disappeared because of bankruptcy, mergers, takeovers or LBOs, since 2005 they have been replaced by a growing number of foreign listings (see Figure 2 below). An increasing amount of these are so-called Special Purpose Acquisition Companies, empty investment vessels that take 2–3 years to fill up and find investment opportunities, as well as an increasing number of well-known hedge funds and private equity funds. According to industry insiders, Amsterdam is strategically targeting this niche by means of close cooperation between the operator, Dutch legal firms and the Dutch Financial Market Regulator by constructing a high-speed listing track for US dollar denominated funds that are domiciled in off shore centres such as Guernsey, Jersey and the Cayman Islands.

Other signs of transnationalisation can be traced in recent surveys from the Dutch Central Bank. These indicate that the largest Dutch banks and institutional investors have increasingly moved their more sophisticated financial trading desks and units—M&A, prop trading, prime brokerage, asset management, FX-trading, derivative trading and securitisation—to London, where they have either set up large trading floors (ABN AMRO at 250 Bishopsgate) or hire these services from London-based intermediaries. According to the Central Bank, Amsterdam based turnover in FX and derivative trade has declined with 60% since 2003 (DNB, 2007). Finally, large Dutch pension funds have increasingly shifted their asset management mandates to Anglo-American asset managers such as Goldman Sachs, JP Morgan, State Street

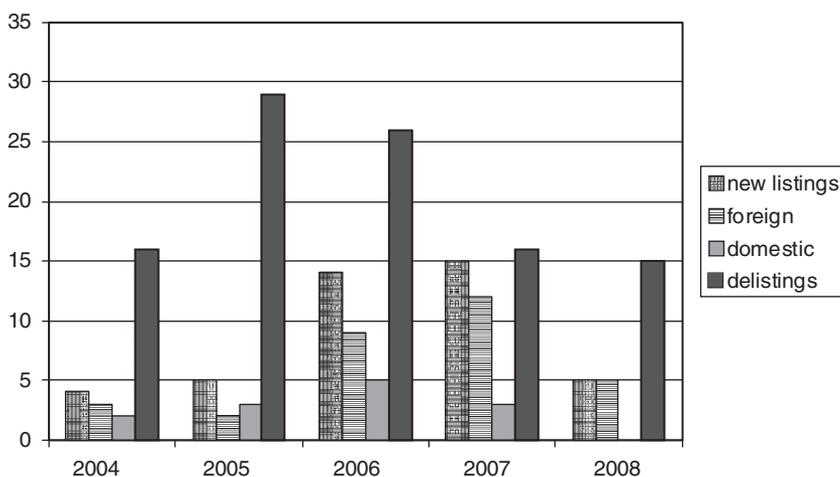


Figure 2. Listings and delistings on the Amsterdam Stock Exchange, 2004–2008. *Source:* Euronext factbook (various years).

and Barclays that conduct their business mainly from out of the City of London (Bureau Bosch, 2007).

Transnationalisation has been matched by a radical transformation of the spatial articulation of the Amsterdam IFC. Since virtualisation has made establishments in multiple IFCs redundant, many foreign financial intermediaries in the 21st century have closed their Amsterdam doors and have concentrated activities elsewhere. An increasing share of trade is hence conducted from outside the Netherlands. Of the current 230 members of the Euronext cash equity market, only 60 are located in the Netherlands, 46 of which in Amsterdam (NIBE-SVV, 2008/9). In 2002, these figures read: 246 members, 83 of which were located in the Netherlands and 57 in Amsterdam (NIBE-SVV, 2002/3). Moreover, the Amsterdam-based members of Euronext have increasingly moved from the inner city to the outskirts. While well over 80% of the Amsterdam brokers (46) was located in the historical centre in 2002 vis-à-vis merely 20% (7) at the outskirts of Amsterdam, 6 years later the inner city share had declined to less than 60% (31), while the periphery accounted for 40% (15) of all Amsterdam-based Euronext members.

This has had notable consequences for financial service employment in Amsterdam. As Figure 1 indicates (see above), the Amsterdam IFC reached its zenith in 2001 at the height of the ICT-bubble. At that time, over 45,000 workers were employed in the financial services, more than 8000 of which were working in exchange-related activities. After a slight increase in 2004, employment in the Amsterdam IFC has continued to decline to well below 90% of its 2001 size in 2007. In absolute terms, this is equal to a little over 40,000 workers. While the sharpest decline occurred in the field of pension management and insurance (reflecting the shift of mandates to London), the next biggest loser was exchange-related activities. Since 2000, employment in this sector has dropped with approximately 2000 jobs (O + S, 2008).

This decline in employment cannot be solely attributed to the virtualization of the Amsterdam exchange. There are also other developments, such as the continuing consolidation in Dutch retail banking, the replacement of labour by capital (ATMs) and contingencies (e.g., the takeover of ABN AMRO in 2007). Nevertheless, similar developments took place in London and have not resulted in a net decline in finance-related employment. The loss of employment in exchange-related activities in particular can directly be ascribed to the increasing use by foreign traders of remote access. In other words, while virtualization is not the sole explanation of the decline of the Amsterdam IFC, it has substantially contributed to that decline and has resulted in a new spatial articulation of the Amsterdam IFC.

4. The case of Frankfurt—reasserting regionalization

Since the 1990s, the Frankfurt stock exchange has dominated German securities trade, with a market share of 80% of total turnover. This figure includes Xetra, a screen-based trading system developed by the Frankfurt stock exchange, used widely to trade German stocks. Stock exchange as well as derivatives exchange (Eurex) focuses to a large extent on the national market. While the share of foreign products traded on German markets is small, since the 1990s, a considerable portion of German financial products (especially German federal bonds) is traded abroad (Seifert, 1997). The Frankfurt stock exchange, Deutsche Börse, has become more

international since the early-1990s, with a rapid increase of foreign listings. This, however, has not increased the share of foreign equities traded in Germany, since the turnover volume of these shares remains comparatively small (Deutsche Börse, 2008).

This is not to say that the German stock exchange did not undergo internationalization. On the contrary, it increasingly set up pacts with other stock exchanges. Two examples of this are its cooperation with the Vienna and Bulgarian stock exchange, with each exchange enjoying full access to the other, and the Zürich stock exchange, with whom a joint derivative exchange (Eurex) was established. There are also close collaborations with the Czech, Hungarian and Slovenian stock exchanges and plans to form joint ventures with the Warsaw and Kuwait exchanges (Kalbhenn, 2009). These modes of internationalization were undertaken by the German exchange operator after it transformed itself during the 1990s from a passive marketplace into an important financial player in its own right. This transformation was facilitated by a modification of its legal structure in 1992, when it transformed itself in a limited liability corporation ('Deutsche Börse AG'), which now administers the Frankfurt based stock and derivative exchanges. In 2001, Deutsche Börse went public, enabling it to use its own stocks in any future takeovers of other stock exchanges and prepared it to play a major role in the future consolidation of the European stock exchange landscape. The unsuccessful merger attempts of the Frankfurt and London stock exchanges in 2000 and 2004/5 as well as the unsuccessful takeover attempt of Euronext in 2006 and the successful takeover of the International Securities Exchange (ISE) in New York in 2007 have been attempts to establish a large pan-European stock and derivatives exchange and serve as indications of the international ambitions of the Frankfurt-based operator.

A second example of internationalization of the German exchange was the gradual transformation of Xetra and Eurex into remote access ports. Many foreign participants use these systems from abroad, especially to trade in Bund-futures, one of the worlds most widely traded derivatives. Although based on German federal bonds, the market first emerged at Liffe, the London-based (and now Euronext owned) derivatives exchange, since before 1990 German regulation did not allow derivative trading. Initial efforts to lure Bund-future trading to Frankfurt had limited success. Only after Eurex placed remote-access terminals in London did London based traders start to use the Frankfurt based system. As a result, Eurex's turnover share of UK-based participants rose from 7% in 1997 to almost 30% in 2000 (Eurex, 2001). Eurex's market-share in Bund-future trading now stands at 99%. Currently, 80% of Eurex's and 68% of Xetra's turnover are generated from abroad. The success of this internationalization strategy is reflected in the shareholder structure of Deutsche Börse, with 82% foreign shareholders in 2008 (Deutsche Börse, 2008, 2009).

Much less internationalization is experienced in Frankfurt's primary market. Contrary to developments in Amsterdam, Deutsche Börse's trading operations focuses to a large extent on German firms. From 2001 to the third-quarter of 2008, only seven foreign firms listed at Deutsche Börse (see Figure 3). Some of them were only legally incorporated in Germany and were headquartered elsewhere, and most of them did not raise capital in the German market anyway.

While virtualization and demutualization have been good for the operator, it has been a mixed blessing for Frankfurt. Currently, Deutsche Börse is considering abandoning its Frankfurt trading floor altogether because of its small market share

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 (Q1-Q3)
domestic	134	135	21	6	0	6	15	31	62	4
foreign	34	18	0	0	0	0	0	4	3	0
in percent	25,4%	13,3%	0,0%	0,0%	n/a	0,0%	0,0%	12,9%	4,8%	0,0%

Figure 3. New Listings on the Deutsche Börse, 1999–2008.

Source: Deutsches Aktieninstitut (2009).

of only 4.6% of all German trading, down from 32.4% in 1999 (Kalbhenn, 2009). This development is mirrored by the location patterns of foreign banks in Germany. While Frankfurt after World War II has attracted most of the foreign banks that located in Germany, since mid-1990s, its attractiveness has waned (see Grote, 2008 for a detailed analysis). Facilitated by remote access, foreign banks have increasingly concentrated their activities in London as they did in the Amsterdam case. Dissimilar to developments in Amsterdam, however, has been an increasing shift of foreign banks from Frankfurt to other parts of Germany. A large number of foreign banks have moved to cities that are not known as IFCs at all. Strikingly, the majority of banks from countries south of Germany are located in southern Germany, Dutch and Belgian banks are located in the western parts, while Danish and Norwegian banks have preferred Germany's northern regions [Deutsche Bundesbank, 2007a; see Wójcik (2002) for similar observations on the shareholder structures of German firms]. Apparently, banks are increasingly seeking proximity to their customers located in the different German regions. This reflects a return of older regional patterns of economic specialization in which actors used to tap into regional circuits of capital (Piore and Sabel, 1984; Herrigel, 1996; see Klage and Martin, 2005).

The renewed regionalisation of finance in Germany has had direct consequences for financial service employment in Frankfurt. The number of finance-related jobs in Frankfurt has been rising steadily until 2002 to about 80,000, when the share of financial employment of total employment reached 11% (Deutsche Bundesbank, 2007b). However, both numbers have declined since (see Figure 1). In real terms, finance-related employment dropped to 74,400 workers in 2007. Employment in banking and finance as a share of total employment fell to about 10.4%, signalling a profound change in the spatial distribution of financial activities in Germany that goes beyond the business cycle. While in Frankfurt employment in other industries is rising compared to finance, in regional centres like Hamburg, Munich and Berlin the reverse can be observed. This is partly caused by the redistribution of foreign banks over the German economy discussed above and partly by German banks who have also rediscovered the need for spatial proximity to clients for more complex financial interactions (Wójcik, 2002; Klage and Martin 2005; Clark and Wójcik, 2007; Grote, 2008).

5. Theoretical discussion: rationality or institutions?

The cases discussed above present a similar picture of gradual decline and suggest that the virtualization of the exchanges that used to tie foreign banks to Amsterdam

and Frankfurt, provides at least part of the explanation. However, we also observed some notable differences, in particular, with regard to the new usages to which the respective equity markets are being put. Whereas, in Amsterdam, both the primary and secondary market have become truly transnational market ‘places’, meaning that their ‘catchment area’ is no longer the national economy; in Frankfurt, most IPOs are still domestic in nature, and the inroads that foreign investors have made in the secondary market are much more limited too. Foreign investors own over 80% of all the shares traded on the Amsterdam Exchange, while in Frankfurt they own just 21% in 2004, up from 16.6% in 1998 (FESE, 2009). A second difference concerns the spatial rearticulation caused by virtualization. While, in Amsterdam, we observed an increasing shift of the management of Dutch capital flows from Amsterdam-based intermediaries to London-based ones, in Frankfurt, the new spatial pattern was one of regionalization. Since there was no longer a functional need for concentration in Frankfurt, foreign banks increasingly chose to be located near their customers and hence displayed a regionally oriented location pattern. How to account for these similarities and differences? Below, we use NEG and CPE to assess to what extent they can account for our two cases.

5.1. New economic geography

NEG offers parsimonious explanations for the development of economic agglomerations (Krugman, 1991; Venables, 1996). So far, NEG has rarely been applied systemically to financial centre development (Grote, 2008). NEG considers financial centres to be like other agglomerations as the net sum of centripetal and centrifugal forces. Generally, NEG conceptualises these centripetal forces in a classic Marshallian way, that is, as the effects of dedicated infrastructure, firms using each other’s output as input, specialised labour markets, and knowledge spillovers. Centrifugal forces on the other hand are mostly conceptualised as increasing transportation costs, increasing rents and negative technological effects. In general, NEG builds upon a conception of rational agents who pursue ‘satisficing’ strategies (Simon, 1982) in an economic universe that is not frictionless and hence does experience increasing returns.

Of foremost relevance for the empirical cases at hand is the hypothesis of the decline over time of once successful agglomerations (the so-called U-curve) (Brühlhart, 1998; Tabuchi, 1998; Puga, 1999; Tabuchi and Thisse, 2001). In our discussion, we follow the common assumption that workers are not completely mobile between locations, from which the ‘U’-shape results. For firms using each others output as input, co-location is advantageous in times of high transaction costs. With declining transaction costs, it becomes less and less profitable for firms to locate close to other firms (Fujita and Thisse, 1996). Lower transaction costs increase the force of countervailing effects such as higher rents and congestion in urban centres and hence lead to more dispersion. Thus, NEG predicts first increasing concentration followed by a dispersion of financial actors over space—a ‘U’-shaped pattern over time (Grote, 2008). While NEG has been criticised by geographers for their lack of real-world foundations, misspecified dynamics and lack of originality (e.g. Martin, 1999; Sheppard, 2001; Sunley, 2001), NEG offers an explanation for the dispersion of actors over time that approaches building on ‘path dependence’ do not. However, it is hard to tease out clear-cut spatial predictions from NEG models with regard to future developments of the

European financial landscape. Depending on the assumed current position on the inverted 'U-curve', further reductions in transaction costs could either lead to more concentration, to no changes at all, or further dissemination of financial actors over Europe. Krugman and Venables (1996) predict that further going European market integration will facilitate further centralization at one European spot; Fujita et al. (1999) explicitly foresee such a development for IFCs (1999, 290–291). But these forecasts do not follow seamlessly from the theory.

To what extent do our cases fit this expectation? The reproduction of the two IFCs over time clearly seems to follow that of a Marshallian district. Dedicated institutions like physical exchanges, street patterns, available real estate, information technologies, networks, legal and fiscal arrangements go a long way to explain the growth over time of the two IFCs in a universe of increasing economic and financial linkages (Cassis, 2007). The same is true for specialised labour markets. Both cities harbour a large number of higher education institutions, some of which offer specialised courses in finance, actuarial studies, asset and liability management and other doctoral and post-doctoral courses demanded by today's financial service providers. Finally, the 'buzz' of informal social exchange stressed by the 'cognitive turn' in current cluster theory (Grabher, 2002, 2004; Scott, 2004; Storper and Venables, 2004) leads us to expect a close spatial overlap between the locations of financial firms and those of public amenities. Indeed, both the Amsterdam and Frankfurt city centres provide urban settings where a strong spatial proximity between the two can be observed: the city centres harbour most of the financial providers as well as the highest concentration of amenities.

At first sight, NEG is able to account for the decline of our cases too. What the data suggest is that Amsterdam-based firms as well as (some) Frankfurt-based firms, as satisficing agents, have responded to virtualization by moving their activities to London—arguably one of the most crowded, most congested, and most expensive places in Europe. At the same time, the remaining actors in Amsterdam have moved out of the crowded centre of Amsterdam to the periphery. Apparently, in a context of declining transaction costs, the gains from dedicated institutions, specialised labour market and knowledge spillovers do no longer exceed the costs of overcrowding. In the case of Frankfurt, foreign and domestic banks disseminated to other parts of Germany. The costs of maintaining a Frankfurt office no longer outweighed the benefits of profitable business on the basis of 'local' information once trade went virtual and market information became available in real time digitally (Grote, 2008).

As such, NEG is compatible with almost any spatial pattern that could have occurred in our two cases. NEG, in other words, is able to account for the decline of Frankfurt and Amsterdam, but fails to account for the distinct patterns of dispersal in our two cases, that is, transnationalization in the Amsterdam case and regionalization in the Frankfurt case. While proponents of NEG do not explicitly discuss the institutional changes that might drive agglomeration or dispersion processes, neither do they claim that institutions do not matter. Given that the explanations offered by NEG are both too general and too indeterminate to account for the distinct patterns of relocation of our two cases, we have to add a second explanatory 'layer'. Below we turn to CPE to see whether a more institutionally oriented approach might be able to address empirical specifics.

5.2. Comparative political economy

CPE starts from a different set of assumptions. Instead of assuming satisficing agents with clear and well-articulated preferences, pursuing actions that are calibrated to changing environmental variables, resulting in universally valid propositions about human action and their aggregate effects, CPE starts from differences in relatively stable institutional constellations in order to investigate their behavioural effects. According to CPE, firm behaviour is determined in a non-deterministic way by institutions, broadly interpreted. The explanatory leverage for behavioural change in such a framework lies in changes in the institutional environment, which, in turn, reflect a political action-space that is nationally bounded (Hall and Taylor, 1996; Immergut, 1998). While some economic geographers have lauded CPE for its ‘discovery’ of institutional difference and have recently called upon economic geographers to take CPE more seriously (Peck and Theodore, 2007; Gertler, 2008), that does not imply that the CPE framework can be imported lock, stock and barrel. In fact, Peck and Theodore have emphasised that the intellectual exchange should be reciprocal and that CPE, given its nation-state based causal narrative, remains too much wedded to the ‘territorial trap’ that is often found in geographically insensitive research.

For our purposes, this is not directly relevant. Here, we take the ‘Varieties of Capitalism’—approach of Peter Hall and David Soskice as representative for CPE more broadly and use its main heuristic of two basic models of capitalism as our hypothesis generating tool (Hall and Soskice, 2001). Hall and Soskice distinguish between Liberal Market Economies (LMEs) and Coordinated Market Economies (CMEs). LMEs embody a logic of mobility, liquidity, flexibility and short-termism. Ideal-typical LMEs display liquid financial markets, deregulated labour markets, highly competitive product markets, a shareholder oriented corporate governance regime, decentralised wage bargaining, low levels of labour market protection and rapid innovation. CMEs, by contrast, are premised on a logic of high commitments, patience and stability. Ideal-typical CMEs showcase a bank-based system providing patient capital, highly regulated product and labour markets, nation-wide or industry-wide collective bargaining, a stakeholder oriented model of corporate governance, high levels of employment protection and incremental rather than radical innovations.

At first sight, the political economies of Germany and the Netherlands are quite similar, seemingly disconfirming our claim. Both possess regulated labour and production markets, strong bank-firm linkages and a high degree of producer and consumer market regulation by the state (Engelen et al., 2009). For these reasons, Hall and Soskice classified both the Netherlands and Germany as true to type CMEs (Hall and Soskice, 2001, 19–20). A closer look, however, reveals far-reaching institutional differences. The historical heritage of a large internationally oriented financial centre largely explains the strong foreign orientation of Dutch banks, brokers and investors. Moreover, because of a liquid stock market, Dutch firms could easily attract outside capital, implying a much looser relationship between corporations and banks and a more shareholder oriented corporate governance regime. Furthermore, the depth, liquidity and sophistication of Dutch financial markets mimics the United Kingdom and the United States and is at odds with its European continental neighbours. Finally, deep and liquid financial markets facilitated the establishment of a pre-funded pension system much like those of the United Kingdom

and the United States and quite unlike that of Germany and France (Clark and Bennett, 2001).

These differences also account for the diverging responses of the two economies to the rise of Anglo-American finance. In the Netherlands, regulatory changes have linked Dutch financial markets and intermediaries ever stronger with cross border capital flows managed from London. In Germany, on the other hand, the rise of Anglo-American finance is seen with increasing suspicion (Engelen et al., 2008). And while some legal initiatives were launched in the 1990s to make Germany more attractive to foreign investors, enhance the liquidity of the German equity market and stimulate equity-based pension savings, the impact on the ownership structure has been limited (Gourevitch and Shinn, 2005). Germany is still largely a bank-based system (Hackethal et al., 2006). While foreign stock ownership has steadily increased, domestic cross holdings still dominate the German ownership structure (FESE, 2009). In other words, as far as the institutions that impact upon finance are at stake, the Netherlands fits the LME mould while Germany clearly is a CME.

This can be seen to have affected the spatial rearticulation of finance in the two economies in quite distinct ways. In the Dutch case, the rise of finance has over time stimulated a gradual process of transnationalization of Dutch financial agents and pools of capital. When the virtualization of the Amsterdam exchange undid the earlier equilibrium between centrifugal and centripetal forces, the result was a move of Dutch financial activities to what was and is the only true European capital of finance, London (Cassis, 2007; Roberts, 2008; FT, 2009b). Hence, it is the institutional configuration emphasised by CPE which provides the explanation for the specific spatial trajectory that the financial services in the Amsterdam IFC underwent.

In the German case, the continuing integrity of its Coordinated Market Economy implied that, despite some activities moving to London, the strong reliance on banks for financing needs resulted in the reassertion of older regional circuits of capital. Foreign banks and private equity funds insinuated themselves in regional circuits of capital, demanding close spatial proximity to their clients—mostly small and medium sized enterprises, the German industrial backbone—in order to assess their creditworthiness and serve their highly specific needs (Klage and Martin, 2005; Grote, 2008; Zademach, 2009). In other words, it is Germany's highly specific institutional configuration that allows us to account for the spatial trajectory of finance in Germany after virtualisation.

6. Conclusion

Empirically, this article studies two recent and prominent cases of second-tier IFC decline that illustrates wider processes of increasing centralization and consolidation in a limited number of truly global financial centres. As such, the article adds to the literature on IFCs, which has so far been dominated by descriptions of successes of Anglo-American IFCs (see Beaverstock et al., 2001; Faulconbridge, 2004; Engelen, 2007; Faulconbridge et al., 2007; Wojczik, 2007; Grote, 2008 for exceptions).

Theoretically, the article brings together two widely debated theoretical approaches in economic geography, that is, NEG and CPE. The aim was to assess to what extent these approaches could account for the empirical material presented here. NEG

suggests a 'U'-shaped pattern of spatial concentration followed by dispersal as transaction and transportation costs diminish over time. This approach serves well to explain the decline of second tier IFCs in Europe where, due to limited size and liquidity, the centripetal forces of Marshallian clusters are relatively underdeveloped. However, NEG appeared less capable of accounting for the specific patterns of dispersal described in this article, that is, transnationalisation in the Amsterdam case and regionalization in the Frankfurt one. The cost-benefit mechanism underlying NEG is both too general and too underdetermined to explain the specificity of the articulations demonstrated by our cases of the more general process of dispersal predicted by the 'U-curve'.

We used CPE, a theoretical perspective that possesses more sensibility for context and specificity, to see whether a more institutionally oriented perspective might provide us with more theoretical leverage over the precise patterns of dispersal our two cases demonstrated. It appeared that the more hybrid institutional setting of the Netherlands, with its deep, liquid and sophisticated financial markets, its internationally oriented banks and its pre-funded pension system, allowed for a stronger interconnectedness with London and Anglo-American capital markets than the German institutional setting. Instead, the much more pronounced regional structure of the German economy was seen to generate 'new' dispersing forces on Frankfurt based financial service providers once virtualization and digitization had raised the older anchors of proximity and co-location of physical equity trade.

This suggests not superiority of CPE over NEG but rather a more 'layered' theoretical approach in which universal mechanisms, such as those embedded in the agent model of NEG, are being qualified by more context specific causal variables such as those analysed by CPE. This paper hence marks not so much the end of a discussion as the beginning of a hopefully fruitful dialogue.

References

- Aggarwal, R. (2002) Demutualization and corporate governance of stock exchanges. *Journal of Applied Corporate Finance*, 15: 105–113.
- Bathelt, H., Malmberg, A., Maskell, P. (2003) Clusters and knowledge. Local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography*, 28: 35–56.
- Beaverstock, J. V., Hoyler, M., Pain, K., Taylor, P. J. (2001) *Comparing London and Frankfurt as World Cities. A Relational Study of Contemporary Urban Change*. London: Anglo-German Foundation for Study of Industrial Society.
- Beunza, D. and Stark, D. (2004) Tools of the trade. The socio-technology of arbitrage in a Wall Street trading room. *Industrial and Corporate Change*, 13: 369–400.
- Boschma, R. A. and Kloosterman, R. C. (2005) *Learning from Clusters. A Critical Assessment from an Economic Geographical Perspective*. Dordrecht: Springer.
- Brühlhart, M. (1998) Economic geography, industry location and trade: the evidence. *The World Economy*, 21: 775–801.
- Bureau Bosch (2007) *Trends of the Dutch Investment Management Market*. Utrecht: Bureau Bosch.
- Carruthers, B. and Stinchcombe, A. (1999) The social structure of liquidity. Flexibility, markets and state. *Theory and Society*, 28: 353–382.
- Cairncross, F. (1998) *The Death of Distance. How the Communications Revolution Will Change Our Lives*. London: Orion Business Books.
- Cassis, Y. (2007) *Capitals of Capital. A History of International Financial Centres, 1780–2005*. Cambridge: Cambridge University Press.

- CBS (2009) Omzetten op de Amsterdamse effectenbeurs. Statline, at statline.cbs.nl (as of 12 February 2009).
- Clark, G. L. (2002) London in the European Financial Services Industry: Locational Advantage and product complementarities. *Journal of Economic Geography*, 2: 433–453.
- Clark, G. and Bennett, P. (2001) Dutch sector-wide supplementary pensions. Fund governance, European competition policy, and the geography of finance. *Environment & Planning A*, 33: 27–48.
- Clark, G. L. and Wójcik, D. (2007) *The Geography of Finance. Corporate Governance in the Global Marketplace*. Oxford: Oxford University Press.
- Deutsche Börse (2008) *Geschäftsbericht 2007*. Frankfurt: Deutsche Börse.
- Deutsche Börse (2009) *Geschäftsbericht 2008*. Frankfurt: Deutsche Börse.
- Deutsche Bundesbank (2007a) *Auslandsbanken in der Bundesrepublik Deutschland*. Frankfurt: Deutsche Börse.
- Deutsche Bundesbank (2007b) *Bankenplatz Frankfurt*. Available online at: www.bundesbank.de/download/hv/frankfurt/bankenplatz_frankfurt.pdf [Accessed 7 April 2008].
- Deutsches Aktieninstitut (2009) *Factbook 2008*. Frankfurt, preprint.
- Di Noia, C. (1998) Competition and integration among stock exchanges in Europe: network effects, implicit mergers and remote access. *Working Paper 98-03, Financial Institutions Center, The Wharton School*.
- DNB (2007) *Statistisch Bulletin. September 2007*. Amsterdam: DNB.
- DNB (2009) 'Emissiemarkt', *Tabel 4.2 Emissies en koerswaarden van op de Euronext Amsterdam Stock Market genoteerde aandelen*. Available online at: <http://www.statistics.dnb.nl> [Accessed 12 February 2009].
- Engelen, E. (2007) Amsterdamned? The uncertain future of a financial center. *Environment and Planning A*, 39: 1306–1324.
- Engelen, E., Konings, M., Fernandez, R. (2008) The rise of activist investors and patterns of political responses. Lessons on agency. *Socio-Economic Review*, 6: 611–636.
- Engelen, E., Konings, M., Fernandez, R. (in press) Geographies of financialization in disarray; the Dutch case in comparative perspective. *Economic Geography*.
- Epstein, G. (2005) *Financialization and the World Economy*. Cheltenham: Edward Elgar.
- Eurex (2001) Eurex monthly statistics. *Derivatives Market*, April 2001.
- FESE (2009) *Share Ownership Structure in Europe*. Available online at <http://www.fese.be> [Accessed 12 February 2009].
- FT (2009a) *Global Exchanges: Case for Change Heard Loud and Clear*. Available online at: <http://www.ft.com> [Accessed 9 February 2009].
- FT (2009b) *London Cooling*. Available online at: <http://www.ft.com> [Accessed 12 February 2009].
- Faulconbridge, J. (2004) London and Frankfurt in Europe's evolving financial centre network. *Area*, 36: 235–244.
- Faulconbridge, J., Engelen, E., Hoyler, M., Beaverstock, J. (2007) Analysing the changing landscape of European financial centres: the role of financial products and the case of Amsterdam. *Growth and Change*, 38: 285–309.
- Fujita, M. and Thisse, J.-F. (1996) Economics of agglomeration. *Journal of Japanese and International Economics and Philosophy*, 10: 339–378.
- Fujita, M., Krugman, P., Venables, A. J. (1999) *The Spatial Economy—Cities, Regions, and International Trade*. Cambridge, MA: MIT Press.
- Gerring, J. (2007) *Case Study Research: Principles and Practices*. Cambridge: Cambridge University Press.
- Gertler, M. S. (2008) Rules of the game: the place of institutions in regional economic change, Regional Studies Lecture, Association of American Geographers, Boston, 17 April 2008.
- Gourevitch, P. and Shinn, J. (2005) *Political Power and Corporate Control. The New Global Politics of Corporate Governance*. Princeton: Princeton University Press.
- Grabher, G. (2002) The project ecology of advertising: tasks, talents and teams. *Regional Studies*, 36: 245–262.
- Grabher, G. (2004) Temporary architectures of learning: knowledge governance in project ecologies. *Organization Studies*, 25: 1491–1514.
- Grote, M. H. (2007) Mobile marketplaces—consequences of the changing governance of European stock exchanges. *Growth and Change*, 38: 260–278.

- Grote, M. H. (2008) Foreign banks' attraction to the financial centre Frankfurt—an inverted 'U'-shaped relationship. *Journal of Economic Geography*, 8: 239–258.
- Hackethal, A., Schmidt, R. H., Tyrell, M. (2006) The transformation of the German financial system. *Revue D'économie Politique*, 117: 431–456.
- Hall, P. and Soskice, D. (2001) *Varieties of Capitalism. The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.
- Hall, P. and Taylor, R. (1996) Political science and the three new institutionalisms. *Political Studies*, 44: 936–957.
- Hazarika, S. (2005) Governance change in stock exchanges. *Working Paper, Baruch College, City University, New York*.
- Herrigel, G. (1996) *Industrial Constructions. The Sources of German Industrial Power*. Cambridge: Cambridge University Press.
- Immergut, E. (1998) The theoretical core of the new institutionalism. *Politics and Society*, 26: 5–34.
- Kalbhenn, C. (2009) Frankfurter Börse steht vor umfassender reform. *Börsenzeitung*, 69: 5.
- Klagge, B. and Martin, R. (2005) Decentralized versus centralized financial systems: Is there a case for local capital markets? *Journal of Economic Geography*, 5: 387–421.
- Krugman, P. (1991) *Geography and Trade*. Cambridge: MIT Press.
- Krugman, P. R. and Venables, A. J. (1996) Integration, specialization, and adjustment. *European Economic Review*, 40: 959–967.
- Lo, V. and Grote, M. H. (2002) Where traders go when stock exchanges go virtual—concentration, dissemination or persistence? In M. Balling, F. Lierman, A. Mullineux (eds) *Technology and Finance: Challenges for Financial Markets, Business Strategies and Policy Makers*, pp. 190–203. London: Routledge.
- Lütz, S. (1998) The revival of the nation-state? Stock exchange regulation in an era of globalized financial markets. *Journal of European Public Policy*, 5: 153–168.
- MGI (2007) *Mapping the Global Capital Market. Third Annual Report*. New York: McKinsey & Company.
- Majury, N. (2007) Technology and the architecture of markets. Reconfiguring the Canadian equity market. *Environment and Planning A*, 39: 2187–2206.
- Martin, R. (1999) The new, geographical turn in economics: some critical reflections. *Cambridge Journal of Economics*, 23: 65–91.
- Michie, R. (2006) *The Global Securities Markets. A History*. Oxford: Oxford University Press.
- NIBE-SVV (2002/3) *Bankenboekje. Banks and Brokers in the Netherlands*. NIBE-SVV: Amsterdam.
- NIBE-SVV (2008/9) *Bankenboekje. Banks and Brokers in the Netherlands*. NIBE-SVV: Amsterdam.
- O+S (2008) *Tabel 12.5a Vestigingen en werkzame personen in de financiële dienstverlening, 2004–2008*. Available online at <http://www.os.amsterdam.nl> [Accessed 12 February 2009].
- O'Brien, R. (1992) *Global Financial Integration. International Capital Markets in the Age of Reason*. London: The Royal Institute of International Affairs.
- Peck, J. and Theodore, N. (2007) Variegated Capitalism. *Progress in Human Geography*, 31: 731–772.
- Piore, M. and Sabel, C. (1984) *The Second Industrial Divide. Possibilities for Prosperity*. New York: Basic Books.
- Porteous, D. J. (1999) The development of financial centres: location, information externalities and path dependence. In R. Martin (ed.) *Money and the Space Economy*, pp. 95–114. Chichester: John Wiley & Sons.
- Posner, E. (2005) Sources of Institutional Change. The Supranational Origins of Europe's New Stock Markets. *World Politics*, 58: 1–40.
- Posner, E. (2009) *The Origins of Europe's New Stock Markets*. Cambridge, MA: Harvard University Press.
- Power, D. (2002) IT and institutions in the structuring of European finance: urban impacts. *Economic and Industrial Democracy*, 23: 335–356.
- Puga, D. (1999) The rise and fall of regional inequalities. *European Economic Review*, 43: 303–334.

- Roberts, R. (2008) *A Guide to London's Global Financial Centre*. London: Profile Books.
- Scott, A. (2004) A perspective of economic geography. *Journal of Economic Geography*, 4: 479–499.
- Seifert, W. G. (1997) Finanzplatz Frankfurt—dynamics for Europe. Presentation for the Representatives of Foreign Banks in Frankfurt, Frankfurt, 20 May 2007.
- Sheppard, E. (2001) How 'economists' think: about geography, for example. *Journal of Economic Geography*, 1: 131–136.
- Shiller, R. (2000) *Irrational Exuberance*. New York: Broadway Books.
- Simon, H. (1982) *Models of Bounded Rationality, Vols. I and II*. Cambridge, MA: MIT Press.
- Steil, B. (2002) Changes in the ownership and governance of securities exchanges: causes and consequences. *Brookings-Wharton Papers on Financial Services*, 61–91.
- Stockhammer, E. (2008) Some stylized facts on the finance-dominated accumulation regime. *Competition and Change*, 12: 184–202.
- Storper, M. and Venables, A. J. (2004) Buzz: face-to-face contact and the urban economy. *Journal of Economic Geography*, 4: 351–370.
- Sunley, P. (2001) What's behind the models? A review of The Spatial Economy. *Journal of Economic Geography*, 1: 136–139.
- Tabuchi, T. (1998) Urban agglomeration and dispersion: a synthesis of Alonso and Krugman. *Journal of Urban Economics*, 44: 333–351.
- Tabuchi, T., Thisse, J.-F. (2001) Labor mobility and economic geography, Discussion Paper CIRJE-F-99, University of Tokyo, Tokyo.
- Thrift, N. (1994) On the social and cultural determinants of international financial centres. The case of the city of London. In S. Corbridge, R. Martin, N. Thrift (eds) *Money, Power and Space*, pp. 327–355. Oxford: Blackwell.
- Venables, A. J. (1996) Equilibrium locations of vertically linked industries. *International Economic Review*, 37: 341–359.
- WFE (2007) *Annual Report and Statistics*. Available online at: <http://www.world-exchanges.org> [accessed 12 February 2009].
- Wójcik, D. (2002) The Länder are the building blocks of the German capital market. *Regional Studies*, 36: 877–895.
- Wójcik, D. (2007) Geography and the future of stock exchanges: between real and virtual space. *Growth and Change*, 38: 200–223.
- Zademach, H.-M. (2009) Global finance and the development of regional clusters: tracing paths in Munich's film and TV industry. *Journal of Economic Geography*, doi:10.1093/jeg/lbp029.
- Z/Yen (2007) *The Global Financial Centres Index 1. March 2007*. London: City of London.
- Z/Yen (2009) *The Global Financial Centres Index 5. March 2009*. London: City of London.