FINESS

SEVENTH FRAMEWORK PROGRAMME

Project funded under the Socio-economic Sciences and Humanities

European Commission

Working Paper D.1.5

Equity Markets, Financial Integration and Competitive Convergence

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May 2010

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May 7, 2010

Abstract

We expect a firm's competitive advantage to manifest itself in a return on invested capital that is higher than the opportunity cost of capital. Deviations of returns from the cost of capital are a signal for competitive entry or for exit, while the speed of convergence indicates the strength of competitive forces. . It is widely believed that, in some sense, the world is becoming more competitive, and that this is may be the effect of globalisation, facilitated by innovations in information technology. It also be the effect of determined actions by governments over two or three decades, to deregulate and open up markets to competition. So for example, in Europe one purpose of both the common currency and the Single Market project was to accelerate the process of economic convergence and, presumably, of competitive convergence. This paper examines the process of competitive convergence in profitability of listed companies in 7 countries of the European Union. We cast our examination of the convergence process in terms of three questions. The first is whether, and to what extent, we observe convergence in profitability through time. The second question is whether there are national differences in the extent of convergence or the speed at which it takes place. Thirdly, we look at the dynamics of convergence through time to see whether there is evidence that convergence in profitability has become more rapid, by which we mean above average or below average profitability persists for a shorter space of time because of increases in competition. The extent to which this can be related to economic and monetary convergence in the European Union remains an open question.

JEL Classification:

Keywords: Markov processes, profitability, competitive convergence.

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1 Introduction

We expect a firm's competitive advantage to manifest itself in a return on invested capital that is higher than the opportunity cost of capital. Deviations of returns from the cost of capital are a signal for competitive entry or for exit, while the speed of convergence indicates the strength of competitive forces. As Stigler put it some 50 years ago, "There is no more important proposition in economic theory than that, under competition, the rate of return on investment tends towards equality in all industries. Entrepreneurs will seek to leave relatively unprofitable industries and enter relatively profitable industries" (Stigler, 1963). It is widely believed that, in some sense, the world is becoming more competitive, and that this may be the effect of globalisation, facilitated by innovations in information technology. It may also be the effect of determined actions by governments over two or three decades, to deregulate and open up markets to competition. So for example, in Europe one purpose of both the common currency and the Single Market project was to accelerate the process of economic convergence and, presumably, of competitive convergence.

This paper examines the process of competitive convergence in profitability, using almost 30 years of data for listed companies in 7 countries of the European Union. We cast our examination of the convergence process in terms of three questions. The first is whether, and to what extent, we observe convergence in profitability through time. The second question is whether there are national differences in the extent of convergence or the speed at which it takes place. Thirdly, we look at the dynamics of convergence through time to see whether there is evidence that convergence in profitability has become more rapid, by which we mean above average or below average profitability persists for a shorter space of time because of increases in competition. The extent to which this can be related to economic and monetary convergence in the European Union remains an open question.

There is a large literature that examines the persistence of profitability. Many studies show that firms display persistent differences in profitability and that the rate of profit does not seem to converge to a common value. (Cubbin and Geroski, 1987; Mueller, 1990; Glen, Lee, Singh, 2001). On the other hand, the adjustment of profits to their firm-specific "permanent" values is rather quick, although significant variation has been observed across different countries (Fama and French, 2000, Geroski and Jacquemin, 1988; Droucopoulos and Lianos, 1993; Maruyama and Odagiri, 2002). Of course, the adjustment of a firm's returns to its own mean is a necessary, but not in any way a sufficient condition for competitive convergence as generally understood.

In the presence of observed persistence in profitability it is hard to separate the competing hypotheses of weak forces of competition and of strong competitive advantage, that is, of differential "efficiency" levels that are not eroded away by the competitive process. There are a number of research streams that seek to control the factors that may confer competitive advantage. For example, Cefis (2003) analyses persistence in the joint distribution of patent applications and profit margins. She finds that firms that systematically innovate and earn profits above average have a higher probability that they will continue to innovate and earn profits above average in the future. Aghion and Howitt (1992) and Klepper (1996) argue that innovations have only a transitory effect on the firm profitability by improving its competitive position, but only in the short-run. An innovation gives a firm temporary monopoly power, which increases the firm's market share and allows for higher profits until other firms eventually copy the innovation.

The existing literature uses a cross-sectional regression or a time series approach. The innovation of the present paper is to use transition matrices to characterise changes in profitability over time, following Quah (1996). The advantage of this approach is that it is much more transparent in exposing features of the underlying distribution of returns. So if convergence is partial or asymmetric, the entire distribution of returns over time is revealed. Naturally, the descriptive power of transitional matrices comes at a cost, the transition processes that it enables us to describe are unconditional. There is also the issue of whether these transition matrices can be treated as Markovian. In the parlance of Quah, whether the law of motion driving the transition matrices is memoryless and time invariant.

Most studies using Markov processes to examine convergence use countries or states as the objects of study. They are interested in direct questions of convergence, such as whether regional data on per capita income display evidence for convergence over time. And convergence tends to be monotonic, though leapfrogging is not ruled out.

Our question is, do we observe a process by which a firm that earns an abnormally high or low rate of return finds that this advantage or disadvantage is bid away over time? A Markov process can be said to be ergodic if the probability of the rate of return taking a particular value becomes independent of its initial value. It is unlikely that in a dynamic stochastic setting competitive convergence involves a process by which the rate of return that firms earn on their capital converges to a common value. Instead we characterise competitive convergence as the mechanism by which firms that earn returns above/below average returns face pressures by entry, imitation, acquisition or bankruptcy that simply erode any initial advantage or disadvantage. This means that in a stochastic environment, a firm that starts above/below the average return will be equally likely to end up in any state. In other words, we would expect to observe an ergodic distribution. In summary, convergence in profitability is a straightforward extension of Markov processes - the competitive convergence implies an ergodic distribution so the firm is equally likely to earn any rate of return in the future.

However firm data raises a number of challenges not found in country data. These are problems that face regression approaches just as much as approaches that use transition processes. One confounding factor is the presence of biases in accounting, particularly those which understate the balance sheet's completeness and thus overstate measured returns and profitability. These biases are persistent and are likely to be sectoral in their impact. Another challenge is the unbalanced nature of company panels. This forces the researcher's attention on the extraordinary degree of churn in the company population; both caused by new entrants, and the very high level of exit to acquisition in modern economies.[1]

2 Methodology

We will characterise the competitive process in terms of a Markov Chain. We have a finite number of states, n $(i = 1, ..., n)$ reflecting different rates of return (or strictly a range

[1] In 2004, worldwide, there there some 30,000 mergers and acquisitions (Cartwright And Schoenberg, 2006). There is also an issue concerning cross border acquistions. Jagersma (2005) in a study of the period 1976 to 2000 identifies 2933 well documented cross border acquisitions made by European companies. He finds that British and Benelux countries account for more than 50% of cross border acquisitions, Scandinavian countries for 12.7% and France for 12.9%. Germany accounts for only 7.1%. Unfortunately our data does not throw any light on cross border mergers.

of returns within a quantile). We observe transitions between these states at regular intervals for T periods ($t = 1, ..., T$). Let $M(t+k)$ be a matrix of observed transitions by firms between period t and period $t+k$, where the $ijth$ element $m_{ij}(t+k)$ is the number of firms that have moved from state i to state j between period t and period $t+k$. Let $P(t+k)$ be a matrix of transition probabilities, whose $ijth$ element, p_{ij} is the probability of moving from state i to state j, between periods t and $t+k$. For n states we have:

$$P(t+k) = \begin{bmatrix} p_{11} & p_{12} & p_{13} & \cdots & p_{1n} \\ p_{21} & . & . & . & . \\ p_{31} & . & . & . & . \\ . & . & . & . & . \\ p_{n1} & & & \cdots & p_{nn} \end{bmatrix}, \tag{1}$$

a maximum likelihood estimator of p_{ij} is

$$p_{ij} = \frac{\sum_{t=1}^{T-k} m_{ij}(t+k)}{\sum_{j=1}^{n}\sum_{t=1}^{T-k} m_{ij}(t+k)}. \tag{2}$$

From observations of a firm's state/quantile in year one and where it is in the following or subsequent years we can calculate the transition probabilities for each state/quantile. Assume that movement between states is driven by a variety of idiosyncratic, industry specific and aggregate shocks. Strictly we need the aggregate shocks to have an heterogeneous impact on different firms otherwise all firms are hit in the same way and would not move between states/quantiles. A Markov Chain is ergodic or irreducible if it is possible to go from each state to every other state. It is said to be regular if there is some power to which the transition matrix P can be raised which results in a matrix with only positive elements. So there is no state to which a firm cannot move.

If P is a transition matrix for a regular chain, then as $n \to \infty$, the powers P^n approach a limiting matrix W with all rows equal to the same vector w. All the elements of w are positive and sum to 1. Each element can then be interpreted as the probability of remaining in a particular state in equilibrium. However, if we wish to consider issues of convergence we need to take account of the exit (through bankruptcy or acquisition) and the entry process for firms. Unlike a closed group, for example of countries we have firms moving into an exit state (from which we assume that they do not re-emerge) and appearing in an entry state. Let the state for exit be denoted by x_i, and the state for entry e_j then our complete system can be written:

$$S(t+k) = \begin{bmatrix} p_{11} & p_{12} & p_{13} & \cdots & p_{1n} & x_1 \\ p_{21} & . & . & . & . & x_2 \\ p_{31} & . & . & . & . & . \\ . & . & . & . & . & . \\ p_{n1} & & & \cdots & p_{nn} & x_n \end{bmatrix}, \text{ given } \begin{bmatrix} e_1 \\ e_2 \\ e_3 \\ . \\ e_n \\ 0 \end{bmatrix}', \tag{3}$$

where x_1 is the probability of leaving the first quantile and exiting into acquisition or bankruptcy, while e_1 denotes the probability at time t that a firm entering goes into the first quantile, and so on.

3 Data

The rate of return is defined as earnings before interest and after corporate taxes divided by total assets, measured as $\frac{ebit*(1-\tau)}{assets}$, where the effective corporate tax rate is measured as τ = reported corporate taxes/pre-tax income.

Annual data for listed firms in 7 countries - Belgium, Denmark, France, Germany, Italy, Netherlands, the UK - are collected from Datastream for the years 1980 to 2007. For the UK, in addition, we are able to draw on data from the Cambridge/London Business School company accounts database which gives us both a much longer history, and also stock market and other descriptive data, and we use this in some of the analyses below.

Table 1 describes the composition of the sample. Reflecting the evolution of their respective stock markets, in earlier years the UK provides the largest number of companies while by the end of the period the French and German samples contain similar numbers to the UK.

Table 2 reports and Figure 1 plots the annual median rate of return for each of the countries since 1980. The rate of return has a clearly cyclical pattern and appears to be stationary. The null of non-stationarity in rates of returns is rejected for all countries, using unit root tests

Comin and Mulani (2006) show that while in the economy as a whole over the period we are studying aggregate volatility declined, firm level volatility in sales growth did not. Similar patterns have been observed in stock market returns (Campbell et al, 2001). As a measure of cross-sectional dispersion in returns we report in Table 3 the interquartile range and plot this in Figure 2 . There is a clear upward trend in the volatility of returns as measured by the interquartile range and the null of nonstationarity in the volatility of returns cannot be rejected for any country.

There are also clear sectoral differences in profitability behind these national averages. Figure 3 charts the median rate of return to capital for the UK economy at the two-digit sector level. Profitability is stationary in each sector but we show in Table 4, using a Wilcoxen Rank-Sum Test for differences between medians, that there are significant differences in rates of return between industries.

4 Results

We divide returns in each year into quantiles, then look at transitions out of each quantile into another, over different horizons. On the basis of a good deal of preliminary work, we report results for *tritiles*[2], for the following reasons. Initial analysis was done, as is conventional, using deciles, and in other, unpublished, analyses we explore coarser partitioning. In Figure 4 we plot the deciles for the rates of return over the period of 1980 to 2007. Generalising, rather, across the different economies the cross section of company rates of return has the following characteristics - a central core of say 50% of companies whose returns are quite tightly grouped in the range 10 to 15% with, on either side, leaders and laggards who do significantly better or worse than this. The noisiness of accounting data, and the vagaries of accounting rules suggest that there may be relatively little economic significance in transitions between quantiles in the centre of

[2] In other words rates of return are ordered and then divided into three quantiles.

the distribution. On the other hand, we elect for equal-sized quantiles to assist in the comparability of transition probabilities.

Tables 5 to 11 report the transitions for all seven countries from year t to $t+1$, $t+5$, $t+10$ and $t+15$ years respectively. We have 28 years of data, so we observe 27 one-year transitions, 22 5-year transitions, 17 10-year transitions, and 12 15-year transitions. The numbers we report initially, in Tables 5 to 11, are the average transitions across these observations.

We interpret the tables as follows. The diagonal elements give the probability that a firm that earned a rate of return within each quantile in year one would still be earning that return 1, 5, 10 and 15 years later. So for Belgium there is a 63% chance that if you are earning a rate of return in the lowest quantile you will still be in that quantile in a year's time. Equally, if you are in the top quantile there is also a 63% chance that you will do so in the following year. If a Belgium firm earns rate of return in the middle quantile, the probability of still being there in one year's time is 52%. Reading across rows indicates when firms are likely to land if they exit a quantile. Reading across the first row for Belgium, firms leaving the lowest quantile have a 20% chance of ending up in the middle quantile, a 11% chance of ending up in the top quantile, and a 6% chance of exiting. The remaining lower triangular elements capture the likelihood of movements from higher into lower quantiles. The probability of moving into the lowest quantile from the highest quantile is lower than the probability of moving into the highest quantile from the lowest quantile.

Comparing countries, the results in the diagonal cells are very similar for the one year transitions. And for all countries there is always a higher probability of moving to an adjacent cell than further along the row and the column. It is also the case that firms are more likely to exit if they start in the lowest quartile. The UK has the highest exit probability at 9% compared with a range of 5 - 7% for the other 6 countries.

In the 5-year transitions, and as we would expect, the diagonal probabilities are markedly lower compared to the one year transitions. There remain considerable similarities across all seven countries, with Germany having on average the highest probability of remaining in a particular quartile. The probability of exit also jumps sharply compared to the one year transitions. Now compared to the other countries, Germany has a much lower probability of exit while the UK has much the highest probability of exit. The separation continues with the 10 year transitions, with Germany having a significantly lower probability of exit and the UK significantly higher. There continues to be a flattening out of the probabilities - by ten years, the probabilities of being in any particular quantile are now very similar. The only exception to this is Germany where it is still the case that if a firm is in the lowest quantile it is much less likely to still be there after 10 years, compared to the other two quantiles. The 15 year transitions show a similar picture. For 5 countries there is now a probability of exiting from the lowest quantile of around 60%. For the UK it is 70%, but for Germany it is only 40%.

How do we interpret these results? In terms of competitive convergence, the ergodic Markov process do not imply that everyone converges to the centre of the distribution. Indeed, once your competitive advantage has been eroded you are as likely to be earning high returns as low returns, so the probability of ending up in any quantile is the same. This is the ergodic property. The empirical evidence is broadly consistent with that.

For all countries and all transition horizons the probability of exiting is always highest from the lowest quantile. Moreover, while the gradient of probabilities flattens as the horizon lengthens, for a number of countries there are significant variations. Probably the flattest transition matrix at the 15 year horizon among those who have not exited is that of the UK, with Germany next.

In Table 12 we report χ^2 tests of significance. In the upper panel, the off-diagonal elements are pairwise tests of the null hypothesis that the estimated transition probability for the row country is the same as that of the column country (Anderson and Goodman, 1957). That is, we test the transition probability $p_{ij} = p^0_{ij}$ for all i, j. Under the null hypothesis,

$$\sum_{i=1}^{3}\sum_{j=1}^{4} m_{i\cdot}\frac{(\hat{p}_{ij} - p^0_{ij})^2}{p^0_{ij}}$$

where $m_{i\cdot} = \sum_j m_{ij}$. The statistic is distributed as a χ^2 with 9 degrees of freedom in our case. For example, the last row of the upper panel confirms the significance of the difference between the UK and the other countries. For Germany, see the fourth row. The diagonal elements in the upper panel of Table 12 are test statistics of the null hypothesis that the transition sequence for each country is actually random (Chatfield, 1973). In this test the null hypothesis is that the transition probability $p_{ij} = p^0_{ij}$ for all i, j, except that each p^0_{ij} is obtained assuming successive events are independent. If successive events are independent, the expected probability of an outcome i is followed by an outcome j should be independent of i: $p^0_{ij} = \frac{m_{\cdot j}}{m}$ where $m_{\cdot j} = \sum_i m_{ij}$ is the number of pairs ending with j and $m = \sum_{ij} m_{ij}$ the total number of pairs. Given our relatively large sample for each country, the noticeably large statistics confirm that a random sequence is almost impossible. We also conduct a sampled randomisation test (Rechten and Fernald, 1979) to examine the null hypothesis that each individual cell of the transition matrices is generated randomly. The test generates randomly, permutations of the observed sequence to form a distribution for each individual cell of the transition matrices. Then it compares the estimated probabilities with the distribution to make inferences. The results using 10000 permutations (not presented here) confirm the high significance against the null for all the diagonal elements in the estimated transition matrices, that is, the probabilities of staying in the same tier after one year, for every country.

The results clearly show that the probability of exit grows with time. For the UK we have further information on the characteristics of this exit state. In particular it is possible (because of data errors) that exit is accidental. To check this we report in Table 13 a breakdown of the exit state for the UK into acquisition, bankruptcy, delisted, and unknown. The results should be interpreted as follows. The second column gives the proportion of all firms in each year that exit after one year. For 1980, 4.3% of firms exit after one year. In 2006, 9.5% of firms exit after one year. A firm can exit into 4 states. Using 1980 as an example, 61% of the firms that exited were acquired by other firms, 25% went bankrupt, 13% were delisted (for example, a firm can buy back all its equity). In 1980 no firms exited into an unknown state. It is clear that the unknown state accounts for a very small number of exits. Although we do not have direct evidence for the other 6 countries in Datastream, it seems reasonable to conclude that a similar situation pertains for the other countries. In 2006 and 2007 a significant number exited into an unknown state, simply reflecting data collection limitations towards the end of the period. Overall, though we can see that the vast majority of exits over the sample exit into a recognisable state, with acquisition being by far the most common.[3]

The subsequent panels in Table 13 show what happens for the 1980 cohort after 5

[3]For a recent analysis of the drivers of acquisitions and bankruptcies in the UK and the US see Bhattacharjee, Higson, Holly and Kattuman (2009a, 2009b)

years, etc. 22% have exited after 5 years, 46% exited after 10 years, and 57% after 15 years. By 1993 the exit probabilities are 3.4%, 23%, 53% and 69%, respectively. Yet again acquisition is by far the most common form of exit.

Table 15 shows further information about new entrants for the 7 countries . The Table reports the proportion of new entrants going into each tritile for each year from 1981 to 2007, with the last row reporting the overall average. Across all countries (with the exception of Belgium) there is a greater likelihood that new entrants will be earning a rate of return in either the lowest or the highest tritile.

4.1 Testing the Markovian Property

The most common approaches to testing the Markovian properties of transition matrices are chi-square, and Likelihood-Ratio tests. See, for example, Anderson and Goodman (1957), Goodman (1958), Billingsley (1961); see also Basawa and Prakasa Rao (1980).

Time-homogeneity (time-stationarity) can be tested by dividing the entire sample into T periods, and testing whether or not the transition matrices estimated from each of the T sub-samples differ significantly from those estimated for the entire sample (Anderson and Goodman, 1957). The results of these tests are reported in the last row of Table 12. Our tests reject the null hypothesis of time homogeneity for all countries except the Netherlands.

An alternative approach to testing for the Markovian property of transition matrices is that of Bangia et al (2002). They argue that to follow a Markov chain process, two conditions have to be met. First, the eigenvalues of transition matrices at increasing time horizons should decay exponentially. So, if all the eigenvalues, ρ_i, of the estimated transition matrices at varying horizons are ranked in order of magnitude, there will a linear relationship between $\log \rho_i$ and the horizon of the transition matrices for each i. Secondly, the set of eigenvectors for each transition matrix are the same at all horizons.

The plots of the eigenvalues apart from unity in Figure 5 shows the following. First, with transition horizons of 4-5 years, the logarithmic eigenvalues do decay linearly against the horizon. However, over longer horizons, the linearity is weakened, suggesting the Markov chain property is not been satisfied.

The eigenvectors corresponding to the second largest eigenvalues are plotted in Figure 6. For a Markov chain, the eigenvectors have to be exactly the same for different horizons. We could observe that it is not the case, though the differences confined in a small range (see the scale of the Y axes). Thus, the eigen analysis of the transition matrices also leads to rejection of time-stationarity.

4.2 How do transitions vary over time?

In the previous section we have rejected the postulated markovian properties of the transitions in profitability. However, we are also interested in the question whether these changes in transitions over time can be interpreted as evidence of increased competitiveness as a result of economic and monetary integration and convergence. In Figures 7 to 14 we plot a series of transitions at different horizons. Figures 7 shows a series of one year transitions. The three lines for each country are the diagonal elements of the transition matrices. So they are the probability after one year of remaining in the same tritile. There appears little evidence that this probability has changed significantly over time. For the 5 year transitions in Figure 8 it appears that at least for France and

Germany there is a suggestion that the probabilities of leaving a particular quantile have fallen over time. In Figures 9 and 10 we show the 10 and 15 year transitions. Now there is a clear picture of declining probabilities of remaining in the initial quantile for the majority of countries (the Netherlands being the exception). Figures 11 to 14 report the exit probabilities. It is clear that there is a close correspondence between the fall in the probability of remaining in a particular quantile and a rise in the probability of exiting, particularly at the 10 and 15 year horizons. How should this be interpreted? A reduced probability of remaining in a particular quantile over time can be interpreted as evidence of increasing competitive convergence. Firms that start off with high returns are much less likely to continue to hang onto these returns. But equally, the corresponding rise of the probability of exiting also points to the increasing importance of the market for corporate control as acquisitions play an increasing role in re-organisation and the pursuit of higher rates of return.

5 Conclusions

Using data on 7 major European countries we examine how profitability evolves over time and how this can be interpreted as part of a competitive and convergent process. Using simple transition matrices for the rate of return on capital for a large population of European companies, we find that as the horizon increases firms that initially earn high rates of return tend to find that the probability of continuing to do so diminishes. Equally, firms that earn below average returns are less likely to continue to do so as time elapses. However, this process is complicated by the large amount of churning that takes place among firms. Exit into acquisition and bankruptcy is a common situation. On average after 15 years more than 60% of quoted UK firms exit. For Germany it is much lower at around 30%, with the remaining countries between 50 and 60 %. There is also evidence that the competitive convergence has increased. The likelihood that a firm will continue to earn above or below average rates of return on capital diminishes over the course of 1980 to 2007. However, it is not possible to discern an effect that we can be attributed to the adoption of the Euro, since for the longer horizons where the effect is most striking we have insufficient observations for the Euro period.

Furthermore, the increase in competitive convergence goes hand in hand with an increase in exit probabilities, indicating that the market for corporate control plays an increasingly important role in the re-allocation of resources and in driving the return on capital.

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Table 1. Number of Firms in Each Year: 1980 - 2007

	Belgium	Denmark	France	Germany	Italy	Netherlands	UK
1980	65	38	156	122	85	39	1565
1981	67	44	159	122	79	42	1558
1982	70	46	160	123	85	43	1587
1983	72	50	170	145	84	51	1638
1984	70	60	182	156	105	50	1703
1985	78	61	185	170	119	52	1730
1986	100	62	197	179	135	52	1722
1987	171	92	372	257	241	91	1751
1988	179	154	450	343	247	103	1731
1989	181	189	503	368	254	112	1680
1990	181	190	526	395	252	132	1630
1991	185	192	538	420	253	138	1561
1992	183	189	532	445	248	137	1578
1993	183	188	531	493	233	136	1609
1994	182	193	534	515	242	160	1601
1995	170	184	524	524	237	160	1581
1996	164	183	494	531	235	173	1593
1997	150	183	473	565	240	181	1542
1998	138	174	479	578	243	181	1392
1999	129	160	488	596	252	173	1267
2000	142	145	668	658	268	173	1196
2001	138	128	706	635	269	154	1133
2002	149	141	774	780	300	157	1076
2003	156	152	770	804	296	153	1011
2004	167	144	748	814	309	150	961
2005	162	132	742	799	302	148	905
2006	160	130	702	775	298	147	836
2007	146	122	613	737	288	137	772

Table 2. Median Rate of Return 1980-2007

	Belgium	Denmark	France	Germany	Italy	Netherlands	UK
1980	0.040	0.054	0.042	0.024	0.050	0.050	0.050
1981	0.041	0.062	0.042	0.024	0.054	0.049	0.045
1982	0.041	0.068	0.044	0.023	0.052	0.047	0.041
1983	0.053	0.067	0.041	0.027	0.054	0.053	0.051
1984	0.075	0.064	0.042	0.031	0.061	0.059	0.055
1985	0.064	0.063	0.051	0.037	0.058	0.061	0.058
1986	0.058	0.063	0.042	0.035	0.062	0.063	0.064
1987	0.063	0.064	0.058	0.033	0.061	0.061	0.072
1988	0.062	0.065	0.059	0.037	0.057	0.065	0.075
1989	0.073	0.068	0.060	0.039	0.053	0.071	0.067
1990	0.068	0.075	0.058	0.038	0.047	0.071	0.055
1991	0.054	0.053	0.055	0.038	0.040	0.070	0.042
1992	0.043	0.057	0.047	0.034	0.028	0.068	0.042
1993	0.041	0.057	0.042	0.033	0.032	0.068	0.050
1994	0.047	0.064	0.045	0.037	0.032	0.074	0.057
1995	0.048	0.072	0.043	0.040	0.040	0.079	0.057
1996	0.048	0.062	0.044	0.039	0.041	0.071	0.059
1997	0.055	0.063	0.047	0.043	0.043	0.074	0.062
1998	0.054	0.065	0.046	0.042	0.047	0.076	0.056
1999	0.054	0.057	0.043	0.038	0.044	0.066	0.050
2000	0.053	0.048	0.042	0.042	0.038	0.066	0.037
2001	0.047	0.048	0.038	0.034	0.027	0.058	0.021
2002	0.035	0.043	0.036	0.021	0.024	0.045	0.025
2003	0.045	0.039	0.033	0.023	0.028	0.044	0.029
2004	0.049	0.048	0.042	0.039	0.032	0.055	0.035
2005	0.052	0.061	0.045	0.042	0.035	0.062	0.044
2006	0.059	0.064	0.047	0.051	0.037	0.067	0.049
2007	0.054	0.058	0.049	0.053	0.044	0.074	0.048

Table 3. Interquartile Range of Returns 1980-2007

	Belgium	Denmark	France	Germany	Italy	Netherlands	UK
1980	0.031	0.040	0.044	0.027	0.034	0.029	0.068
1981	0.047	0.044	0.041	0.025	0.052	0.036	0.069
1982	0.046	0.034	0.053	0.033	0.042	0.039	0.066
1983	0.050	0.039	0.041	0.025	0.041	0.029	0.053
1984	0.033	0.039	0.051	0.032	0.037	0.026	0.054
1985	0.035	0.038	0.048	0.034	0.041	0.024	0.054
1986	0.063	0.050	0.046	0.033	0.045	0.031	0.062
1987	0.064	0.052	0.050	0.036	0.038	0.038	0.064
1988	0.064	0.046	0.053	0.031	0.041	0.039	0.061
1989	0.055	0.043	0.049	0.033	0.040	0.041	0.063
1990	0.055	0.044	0.050	0.035	0.034	0.045	0.072
1991	0.058	0.052	0.049	0.037	0.040	0.044	0.081
1992	0.056	0.056	0.054	0.046	0.044	0.053	0.085
1993	0.063	0.046	0.056	0.047	0.048	0.052	0.078
1994	0.057	0.044	0.046	0.049	0.040	0.049	0.070
1995	0.058	0.043	0.052	0.052	0.045	0.042	0.071
1996	0.066	0.057	0.050	0.054	0.040	0.043	0.074
1997	0.050	0.050	0.044	0.051	0.043	0.038	0.082
1998	0.062	0.044	0.045	0.052	0.043	0.046	0.087
1999	0.045	0.054	0.050	0.056	0.045	0.049	0.090
2000	0.059	0.071	0.054	0.061	0.050	0.069	0.103
2001	0.082	0.070	0.066	0.087	0.057	0.079	0.124
2002	0.090	0.066	0.089	0.154	0.059	0.089	0.113
2003	0.071	0.067	0.085	0.115	0.069	0.096	0.095
2004	0.071	0.072	0.071	0.093	0.059	0.066	0.090
2005	0.067	0.062	0.063	0.077	0.061	0.071	0.083
2006	0.058	0.080	0.061	0.078	0.054	0.064	0.082
2007	0.056	0.085	0.058	0.076	0.058	0.071	0.080

z Value	0001	1000	2000	3000	4000	5000	6000	7000	9000
0001	-	-6.9337**	-7.1822**	-7.8733**	-2.2907*	-5.3292**	-9.7934**	-4.4232**	-5.4008**
1000	-	-	-.4097	-1.2055	4.2725**	1.4753	-3.1328**	1.9172	.8408
2000	-	-	-	-.7842	4.5715**	1.8826	-2.7140**	2.3065*	1.1718
3000	-	-	-	-	5.2874**	2.6667**	-1.9246	2.9993**	1.8188
4000	-	-	-	-	-	-2.835**	-7.0634**	-2.0359*	-3.0230**
5000	-	-	-	-	-	-	-4.5519**	.5564	-.4967
6000	-	-	-	-	-	-	-	4.7440**	3.5907**
7000	-	-	-	-	-	-	-	-	-1.0122
9000	-	-	-	-	-	-	-	-	-

TABLE 4. Testing for Industrial Difference in Return by Wilcoxon Rank-Sum Test[a]

[a]The rows and column titles are corresponding ICB codes for Industry Classifications listed below. * and ** indicates significance of rejection at 5% and 1% level respectively. The 8000 industry, Financials, is not reported here due to lack of observations.

0001	Oil and Gas
1000	Basic Materials
2000	Industrials
3000	Consumer Goods
4000	Health Care
5000	Consumer Services
6000	Telecommunications
7000	Utilities
9000	Technology

Table 5. Average Transition Probability, Belgium

1 Year	Low	Mid	High	Exit
Low	0.6293	0.2013	0.1105	0.0589
Mid	0.2175	0.5227	0.2263	0.0335
High	0.0891	0.2279	0.6326	0.0504

5 Years	Low	Mid	High	Exit
Low	0.3511	0.2071	0.1578	0.2840
Mid	0.2056	0.3449	0.2555	0.1940
High	0.1773	0.2321	0.3825	0.2080

10 Years	Low	Mid	High	Exit
Low	0.1985	0.1795	0.1087	0.5133
Mid	0.1488	0.2165	0.2153	0.4194
High	0.1202	0.2036	0.2690	0.4071

15 Years	Low	Mid	High	Exit
Low	0.1332	0.1525	0.0849	0.6293
Mid	0.0909	0.1742	0.1894	0.5455
High	0.0616	0.2138	0.2319	0.4928

Table 6. Average Transition Probability, Denmark

1 Year	Low	Mid	High	Exit
Low	0.5767	0.2397	0.1129	0.0707
Mid	0.2318	0.5091	0.2170	0.0421
High	0.1165	0.2238	0.6206	0.0391

5 Years	Low	Mid	High	Exit
Low	0.2997	0.2400	0.1854	0.2750
Mid	0.2320	0.3050	0.2192	0.2438
High	0.1603	0.2616	0.3579	0.2203

10 Years	Low	Mid	High	Exit
Low	0.2041	0.1767	0.1247	0.4945
Mid	0.1315	0.2109	0.1719	0.4857
High	0.1415	0.2084	0.2267	0.4233

15 Years	Low	Mid	High	Exit
Low	0.1526	0.1344	0.1048	0.6082
Mid	0.1123	0.2333	0.1080	0.5464
High	0.1000	0.1391	0.1413	0.6196

Table 7. Average Transition Probability, France

1 Year	Low	Mid	High	Exit
Low	0.6296	0.2097	0.0901	0.0706
Mid	0.2196	0.5511	0.1827	0.0466
High	0.0947	0.2015	0.6527	0.0511

5 Years	Low	Mid	High	Exit
Low	0.3525	0.2228	0.1369	0.2878
Mid	0.2288	0.3630	0.1721	0.2361
High	0.1569	0.2221	0.3883	0.2326

10 Years	Low	Mid	High	Exit
Low	0.2164	0.2054	0.0865	0.4918
Mid	0.1584	0.2547	0.1301	0.4568
High	0.1248	0.1911	0.2699	0.4142

15 Years	Low	Mid	High	Exit
Low	0.1217	0.1763	0.0767	0.6254
Mid	0.1118	0.2126	0.1081	0.5675
High	0.0896	0.1661	0.1908	0.5535

Table 8. Average Transition Probability, Germany

1 Year				
	Low	Mid	High	Exit
Low	0.6271	0.2040	0.1133	0.0555
Mid	0.2074	0.5754	0.1910	0.0262
High	0.1042	0.2097	0.6562	0.0299

5 Years				
	Low	Mid	High	Exit
Low	0.3661	0.2512	0.1662	0.2165
Mid	0.2220	0.4074	0.2300	0.1406
High	0.1741	0.2676	0.4120	0.1463

10 Years				
	Low	Mid	High	Exit
Low	0.2518	0.2586	0.1510	0.3386
Mid	0.1620	0.3676	0.2082	0.2622
High	0.1677	0.2624	0.3364	0.2334

15 Years				
	Low	Mid	High	Exit
Low	0.1739	0.2838	0.1523	0.3900
Mid	0.1430	0.3137	0.1983	0.3450
High	0.1526	0.2618	0.2858	0.2997

Table 9. Average Transition Probability, Italy

1 Year				
	Low	Mid	High	Exit
Low	0.6316	0.2314	0.0881	0.0490
Mid	0.2252	0.5140	0.2206	0.0402
High	0.0888	0.2314	0.6535	0.0264

5 Years				
	Low	Mid	High	Exit
Low	0.3657	0.2423	0.1471	0.2449
Mid	0.2588	0.3112	0.2358	0.1942
High	0.1467	0.2876	0.3884	0.1773

10 Years				
	Low	Mid	High	Exit
Low	0.2257	0.2128	0.1110	0.4505
Mid	0.2002	0.1948	0.2135	0.3915
High	0.1370	0.2493	0.2405	0.3731

15 Years				
	Low	Mid	High	Exit
Low	0.1326	0.1693	0.0959	0.6023
Mid	0.1918	0.1619	0.1469	0.4993
High	0.1556	0.1516	0.2111	0.4817

Table 10. Average Transition Probability, Netherlands

1 Year				
	Low	Mid	High	Exit
Low	0.6539	0.2170	0.0711	0.0580
Mid	0.2189	0.5678	0.1758	0.0375
High	0.0728	0.1911	0.6988	0.0373

5 Years				
	Low	Mid	High	Exit
Low	0.3624	0.2385	0.1411	0.2580
Mid	0.2408	0.3483	0.2262	0.1848
High	0.1627	0.2649	0.3996	0.1728

10 Years				
	Low	Mid	High	Exit
Low	0.2248	0.1950	0.1091	0.4711
Mid	0.1710	0.3081	0.1903	0.3306
High	0.1520	0.2467	0.3007	0.3007

15 Years				
	Low	Mid	High	Exit
Low	0.1568	0.1598	0.1095	0.5740
Mid	0.1282	0.2422	0.1567	0.4729
High	0.1304	0.2580	0.2232	0.3884

Table 11. Average Transition Probability, UK

1 Year				
	Low	Mid	High	Exit
Low	0.6395	0.1981	0.0698	0.0927
Mid	0.2136	0.5513	0.1771	0.0580
High	0.0792	0.2005	0.6696	0.0507

5 Years				
	Low	Mid	High	Exit
Low	0.3229	0.2044	0.1226	0.3501
Mid	0.2105	0.3153	0.1793	0.2950
High	0.1579	0.2288	0.3446	0.2688

10 Years				
	Low	Mid	High	Exit
Low	0.1932	0.1515	0.0917	0.5635
Mid	0.1413	0.2189	0.1376	0.5023
High	0.1314	0.1785	0.2225	0.4677

15 Years				
	Low	Mid	High	Exit
Low	0.1189	0.1083	0.0736	0.6991
Mid	0.1059	0.1623	0.1024	0.6293
High	0.1006	0.1414	0.1530	0.6051

Table 12. χ^2 Statistics for Significance Test[a]

	Belgium	**Denmark**	**France**	**Germany**	**Italy**	**Netherlands**	**UK**
Belgium	6589.23	32.96	33.65	41.79	45.42	80.34	100.24
Denmark	34.55	5839.90	44.14	53.97	45.68	114.57	140.23
France	107.74	146.54	21706.03	181.90	208.30	114.48	130.66
Germany	107.55	160.88	123.83	17667.73	138.60	210.02	400.49
Italy	48.31	59.67	72.59	68.69	9803.20	82.72	163.36
Netherlands	55.64	83.74	24.56	43.76	42.83	5774.73	41.02
UK	1313.37	1475.54	451.55	2024.04	1737.54	829.68	107999.17
	491.2427	472.4471	491.6790	499.5465	379.4655	274.7496*	882.5208

[a]This table lists three χ^2 tests. In the upper panel, The diagonal elements are test statistics against the null hypothesis that the transitions are random sequences. The off diagonal elements in the upper panel are test statistics against the null that the transition probabilities for the row country i are the same with that of the column country. The last row displays the statistics for a test against the null hypothesis that all the transition probabilities are time homogeneous. All the nulls are rejected at 1% level except the starred one.

Table 13. Death Analysis[a]

	1 Year Later					5 Years Later					10 Years Later					15 Years Later				
Year	Death Rate	Acquired	Failed	Delisted etc	Unknown	Death Rate	Acquired	Failed	Delisted etc	Unknown	Death Rate	Acquired	Failed	Delisted etc	Unknown	Death Rate	Acquired	Failed	Delisted etc	Unknown
1981	.043	.6119	.2537	.1343	0	.2207	.7654	.1466	.0821	.0059	.457	.8102	.1034	.068	.0184	.5708	.7961	.111	.0736	.0193
1982	.0362	.6964	.2143	.0893	0	.2565	.8223	.0964	.0685	.0127	.475	.814	.0985	.0684	.0192	.58	.8101	.0994	.0704	.0201
1983	.0471	.7432	.1757	.0811	0	.2891	.8625	.0621	.0532	.0222	.4847	.8221	.0896	.0646	.0237	.5944	.8235	.0888	.0663	.0214
1984	.0479	.8462	.0769	.0513	.0256	.3001	.8864	.0455	.0434	.0248	.4855	.827	.0878	.0611	.0242	.62	.8293	.0878	.0619	.021
1985	.0603	.8922	.049	.049	.0098	.3138	.8885	.0491	.0416	.0208	.4789	.8213	.0943	.062	.0223	.6506	.8271	.0878	.0668	.0183
1986	.0845	.9034	.0276	.0483	.0207	.3248	.8477	.0789	.052	.0215	.4758	.8113	.1029	.0637	.0221	.6657	.8215	.0945	.0665	.0175
1987	.0705	.925	.025	.0167	.0333	.3109	.7947	.1224	.064	.0188	.456	.7815	.1208	.0771	.0206	.661	.7966	.1105	.0752	.0177
1988	.0612	.9057	.0377	.0377	.0189	.2933	.7402	.1496	.0906	.0197	.4499	.7542	.1344	.0935	.0179	.6611	.775	.1216	.086	.0174
1989	.0731	.808	.112	.064	.016	.2689	.6928	.1808	.1046	.0218	.4713	.7413	.143	.0983	.0174	.6655	.7592	.1322	.0911	.0175
1990	.0684	.614	.2632	.1053	.0175	.2423	.6542	.2015	.1169	.0274	.4948	.746	.1362	.0994	.0184	.6677	.752	.1353	.0956	.0171
1991	.073	.6441	.2119	.1186	.0254	.2192	.6893	.161	.1215	.0282	.5115	.7821	.1114	.0896	.0169	.6689	.7645	.1228	.0951	.0175
1992	.0467	.5972	.1806	.1806	.0417	.2053	.7468	.1203	.1108	.0222	.5136	.8023	.0982	.0819	.0176	.6714	.7826	.1054	.0948	.0172
1993	.0341	.7358	.1132	.1321	.0189	.2295	.7799	.1086	.1003	.0111	.5297	.8096	.0976	.0795	.0133	.6901	.7934	.101	.0863	.0193
1994	.0364	.6897	.1724	.1034	.0345	.2858	.8079	.1015	.0817	.0088	.5588	.8119	.1014	.0732	.0135					
1995	.0447	.8169	.0704	.0986	.0141	.3519	.833	.0853	.0726	.0091	.5759	.8055	.1044	.078	.0121					
1996	.0615	.8125	.0938	.0833	.0104	.3827	.8431	.0885	.0601	.0083	.5889	.7987	.1115	.0779	.0119					
1997	.0727	.7826	.113	.1043	0	.3927	.8274	.1032	.0581	.0113	.6042	.7994	.1076	.0794	.0136					
1998	.0988	.8333	.1	.06	.0067	.3907	.8208	.1022	.0637	.0134	.6077	.7994	.1014	.079	.0203					
1999	.1248	.8882	.0588	.0412	.0118	.3794	.8123	.1054	.067	.0153										
2000	.1018	.875	.0938	.0234	.0078	.3488	.7701	.1287	.0874	.0138										
2001	.0776	.7065	.1739	.087	.0326	.3477	.7379	.1383	.1092	.0146										
2002	.0774	.6897	.1379	.1609	.0115	.3559	.7525	.105	.1275	.015										
2003	.0821	.7701	.1034	.1149	.0115	.3597	.7494	.1059	.1111	.0336										
2004	.0765	.7368	.1447	.1184	0															
2005	.0873	.7952	.1084	.0723	.0241															
2006	.0847	.7763	.0263	.1579	.0395															
2007	.0945	.7089	.1266	.0759	.0886															

[a] The death rate is the ratio of firms that become dead after certain years out of all the firms with data available in the years in the first column.

Table 14. Entrant Analysis

	Belgium			Denmark			France			Germany		
Year	Tritile 1	Tritile 2	Tritile 3	Tritile 1	Tritile 2	Tritile 3	Tritile 1	Tritile 2	Tritile 3	Tritile 1	Tritile 2	Tritile 3
1981	.6667	0	.3333	.5	.1667	.3333	.1429	.4286	.4286	.	.	.
1982	0	0	1	1	0	0	.25	.75	0	1	0	0
1983	.	.	.	.25	0	.75	.125	.5	.375	.2273	.2727	.5
1984	0	0	1	.3333	.3333	.3333	.2727	.1818	.5455	.25	.1667	.5833
1985	0	.4	.6	0	0	1	0	.3333	.6667	0	.2308	.7692
1986	.381	.4286	.1905	1	0	0	.2857	.2857	.4286	.2	.4	.4
1987	.2432	.4459	.3108	.375	.2188	.4063	.236	.3708	.3933	.3077	.2692	.4231
1988	0	.3636	.6364	.4127	.3492	.2381	.314	.3256	.3605	.2556	.3556	.3889
1989	.3333	.6667	0	.3684	.3421	.2895	.2	.3077	.4923	.0435	.3043	.6522
1990	.8571	.1429	0	.125	.25	.625	.3	.2667	.4333	.3448	.1379	.5172
1991	.125	0	.875	0	.7778	.2222	.2857	.0952	.619	.16	.24	.6
1992	0	0	1	0	0	1	.2353	.2941	.4706	.1333	.3	.5667
1993	.2	.6	.2	0	.4	.6	0	.3125	.6875	.4	.2364	.3636
1994	0	.6667	.3333	.1667	.1667	.6667	.3235	.1471	.5294	.4583	.0833	.4583
1995	0	1	0	0	0	1	.1923	.3846	.4231	.3529	.2941	.3529
1996	.3333	.3333	.3333	0	.125	.875	0	.2222	.7778	.3333	.3333	.3333
1997	.6667	0	.3333	.3333	.1667	.5	.7273	.0909	.1818	.5349	.1395	.3256
1998	1	0	0	.	.	.	.4063	.2188	.375	.7895	.0526	.1579
1999	0	.2857	.7143	.6667	0	.3333	.3774	.2264	.3962	.4912	.2456	.2632
2000	.5667	.2	.2333	.3636	.4091	.2273	.4131	.2629	.3239	.4225	.2465	.331
2001	.5	.25	.25	0	.4	.6	.2432	.2297	.527	.5588	.1765	.2647
2002	.5238	.2857	.1905	.5	.125	.375	.3802	.1901	.4298	.525	.2562	.2188
2003	.6364	.1818	.1818	.5455	.1818	.2727	.371	.3226	.3065	.5479	.1918	.2603
2004	.2941	.3529	.3529	.6	.4	0	.2759	.2069	.5172	.4318	.2045	.3636
2005	1	0	0	.25	0	.75	.5185	.2963	.1852	.375	.2917	.3333
2006	.5	.1667	.3333	1	0	0	.7	.3	0	.7273	.1818	.0909
2007	0	1	0	.	.	.	.6667	0	.3333	.4286	.1429	.4286
Overall	.35	.3269	.3231	.3523	.2879	.3598	.3213	.2758	.4029	.4049	.2418	.3533

	Italy			Netherlands			UK		
Year	Tritile 1	Tritile 2	Tritile 3	Tritile 1	Tritile 2	Tritile 3	Tritile 1	Tritile 2	Tritile 3
1981	0	0	1	.6667	0	.3333	.1912	.1765	.6324
1982	.25	0	.75	0	1	0	.1685	.1685	.6629
1983	0	.6	.4	.125	.25	.625	.2239	.1119	.6642
1984	.5	.2857	.2143	0	0	1	.1571	.25	.5929
1985	.2	.3	.5	.	.	.	.1791	.2836	.5373
1986	.3333	.2917	.375	0	0	1	.2517	.2937	.4545
1987	.3039	.2941	.402	.25	.375	.375	.2949	.1538	.5513
1988	.3077	.2308	.4615	.2143	.3571	.4286	.4337	.2169	.3494
1989	.5556	.2222	.2222	.3636	.2727	.3636	.4595	.2297	.3108
1990	0	0	1	.3333	.381	.2857	.3621	.2586	.3793
1991	.25	.25	.5	.4	0	.6	.1923	.3269	.4808
1992	0	.5	.5	0	0	1	.3053	.2316	.4632
1993	.2	.4	.4	.5714	.2857	.1429	.5057	.2184	.2759
1994	.1579	.2105	.6316	.3333	.2917	.375	.5349	.2326	.2326
1995	0	.25	.75	.2	.6	.2	.2	.2889	.5111
1996	.1111	.3333	.5556	.2308	.2308	.5385	.386	.2544	.3596
1997	.56	.16	.28	.4167	.1667	.4167	.3455	.3091	.3455
1998	.5625	.0625	.375	0	0	1	.4615	.2308	.3077
1999	.5417	.25	.2083	.3571	.2143	.4286	.6154	.1923	.1923
2000	.4815	.2593	.2593	.4545	.0455	.5	.5758	.2424	.1818
2001	.1538	.3846	.4615	1	0	0	.3103	.5172	.1724
2002	.4286	.3571	.2143	.6	.1	.3	.3667	.2333	.4
2003	.4706	.2353	.2941	.1667	.3333	.5	.4286	.3571	.2143
2004	.2778	.4444	.2778	.6667	0	.3333	.3448	.2069	.4483
2005	.3	.5	.2	.3333	.3333	.3333	.6154	.0769	.3077
2006	0	0	1	1	0	0	.75	.25	0
2007	.5	.5	0	1	0	0	1	0	0
Overall	.3505	.2827	.3668	.3512	.2438	.405	.3152	.2321	.4526

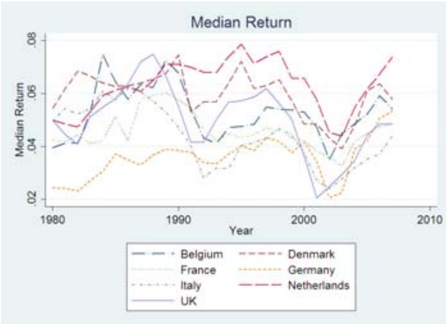

FIGURE 1. Median Return

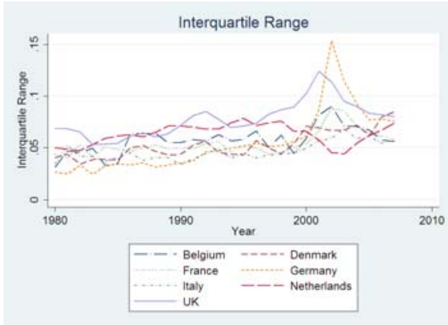

FIGURE 2. Interquartile Range

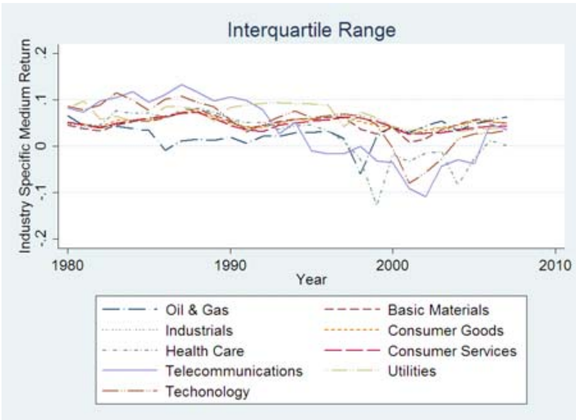

FIGURE 3. Industry Specific Median Return

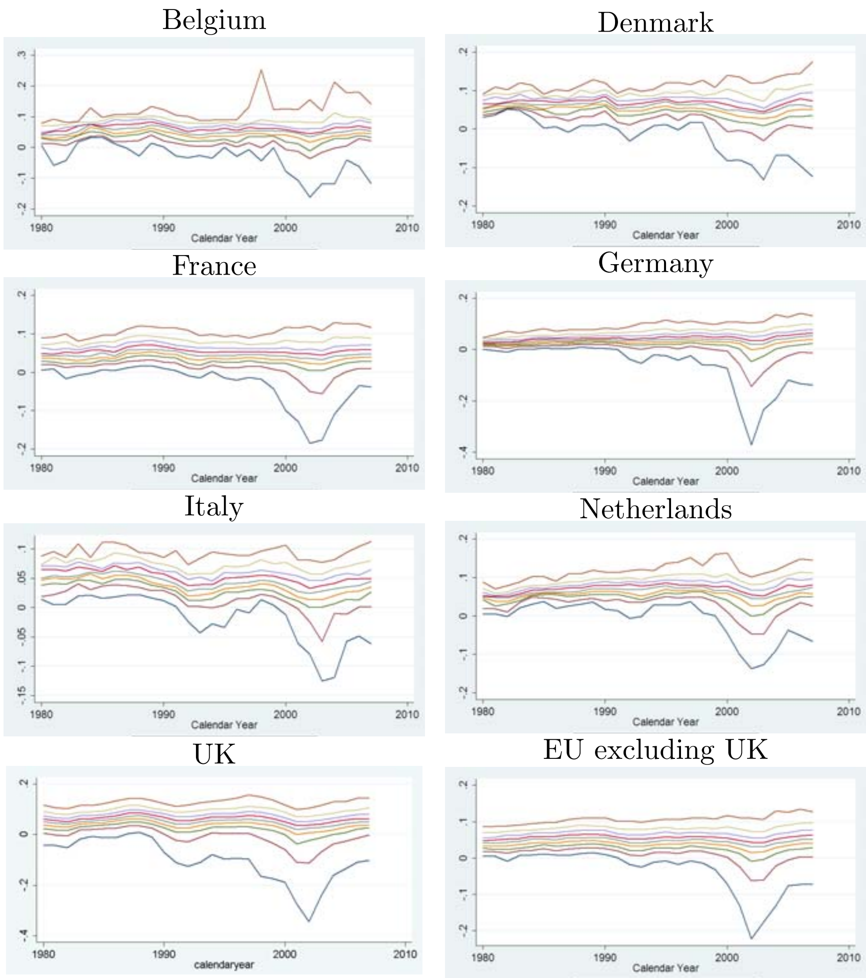

FIGURE 4. Return Deciles over Years

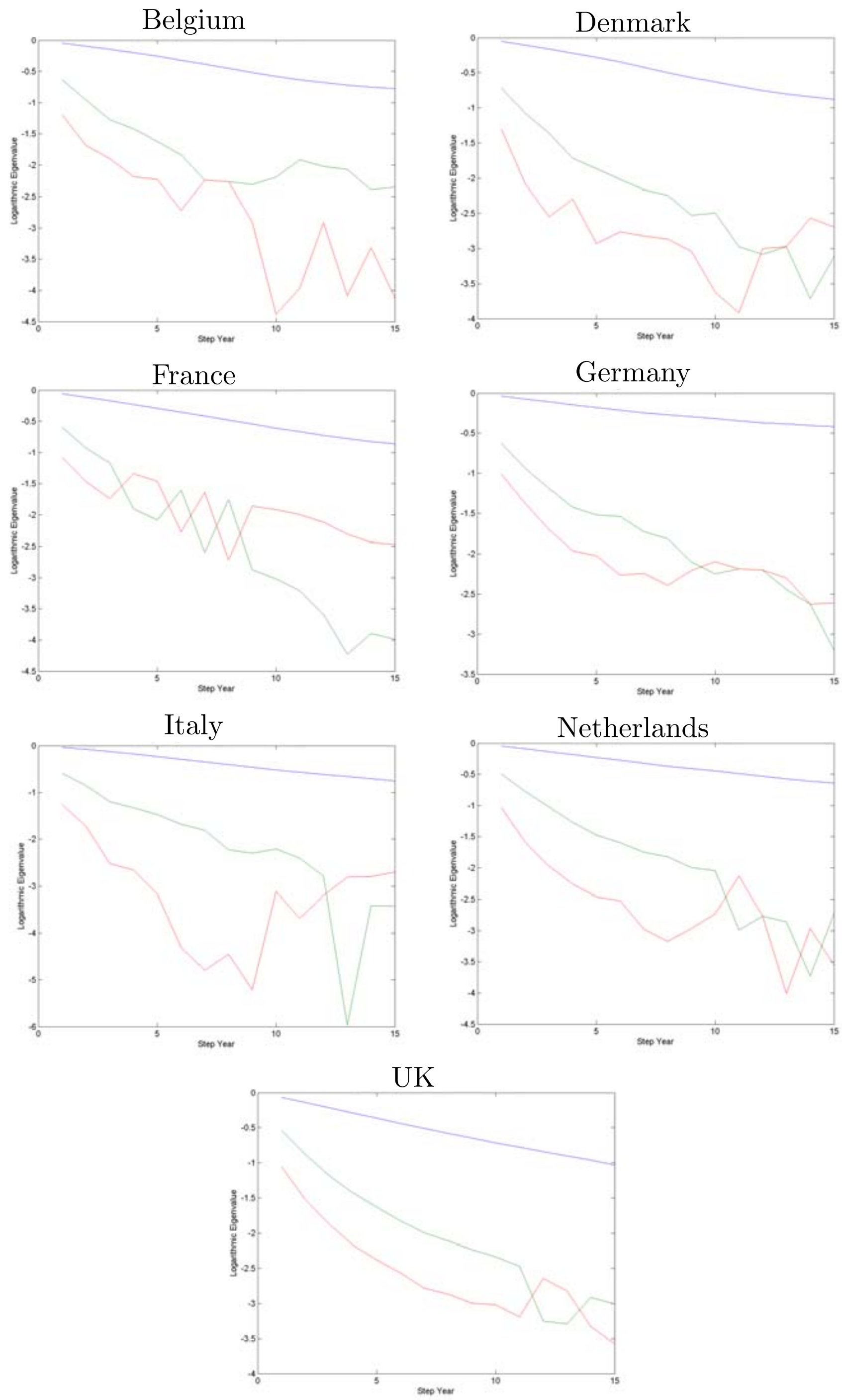

FIGURE 5. Decay of Eigenvalues with Transition Horizon

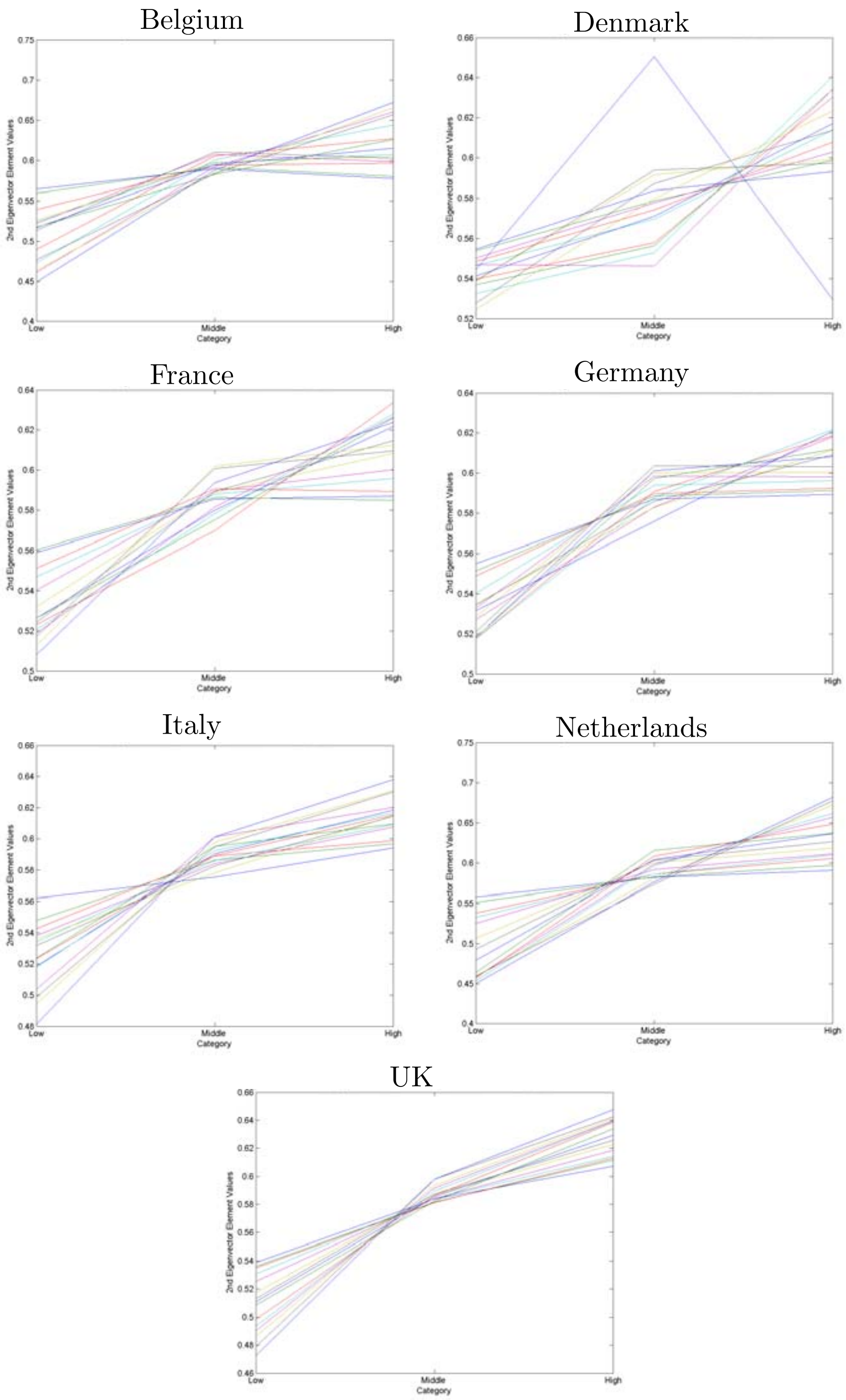

Figure 6. 2nd Eigenvector of Matrices with Different Transition Horizons

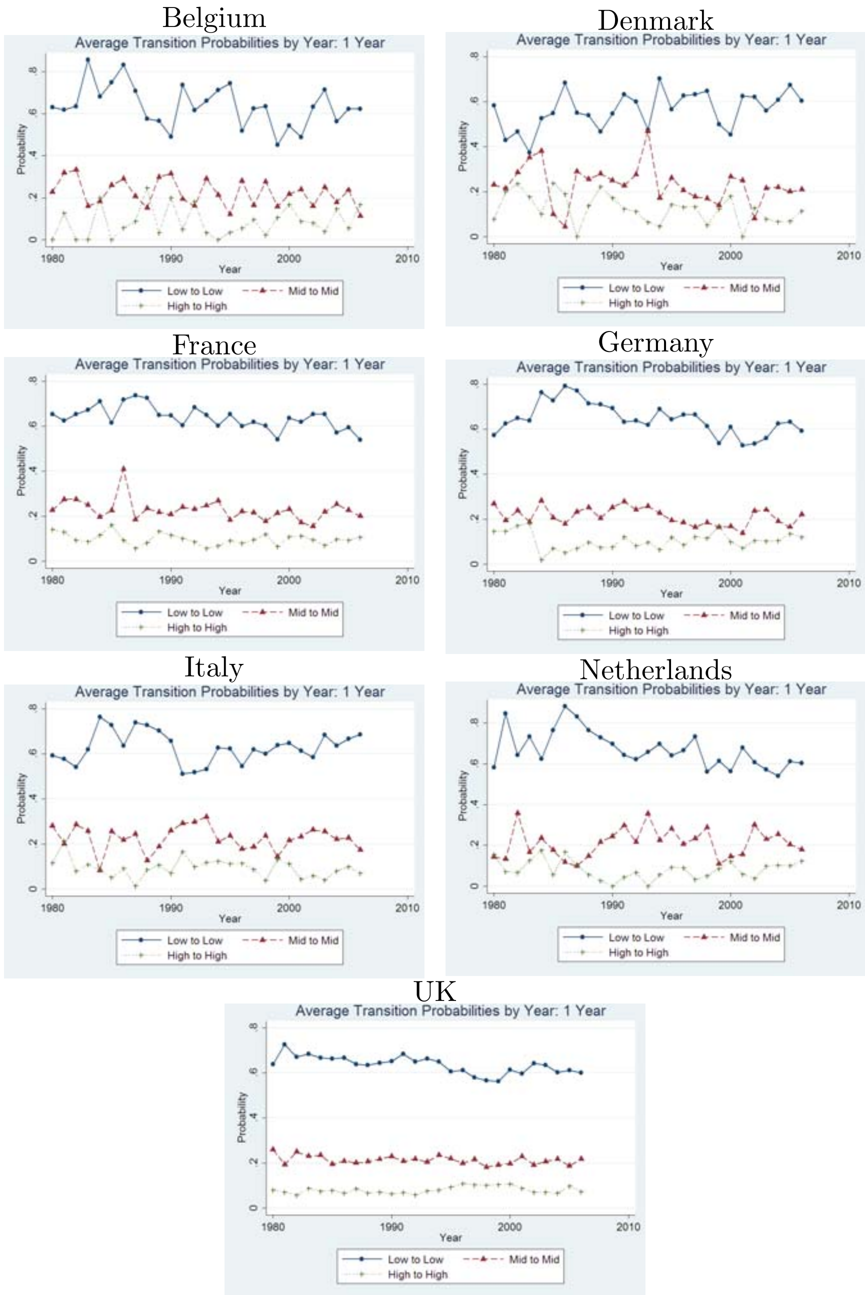

Figure 7. Average Transition Probabilities by Year: 1 Year

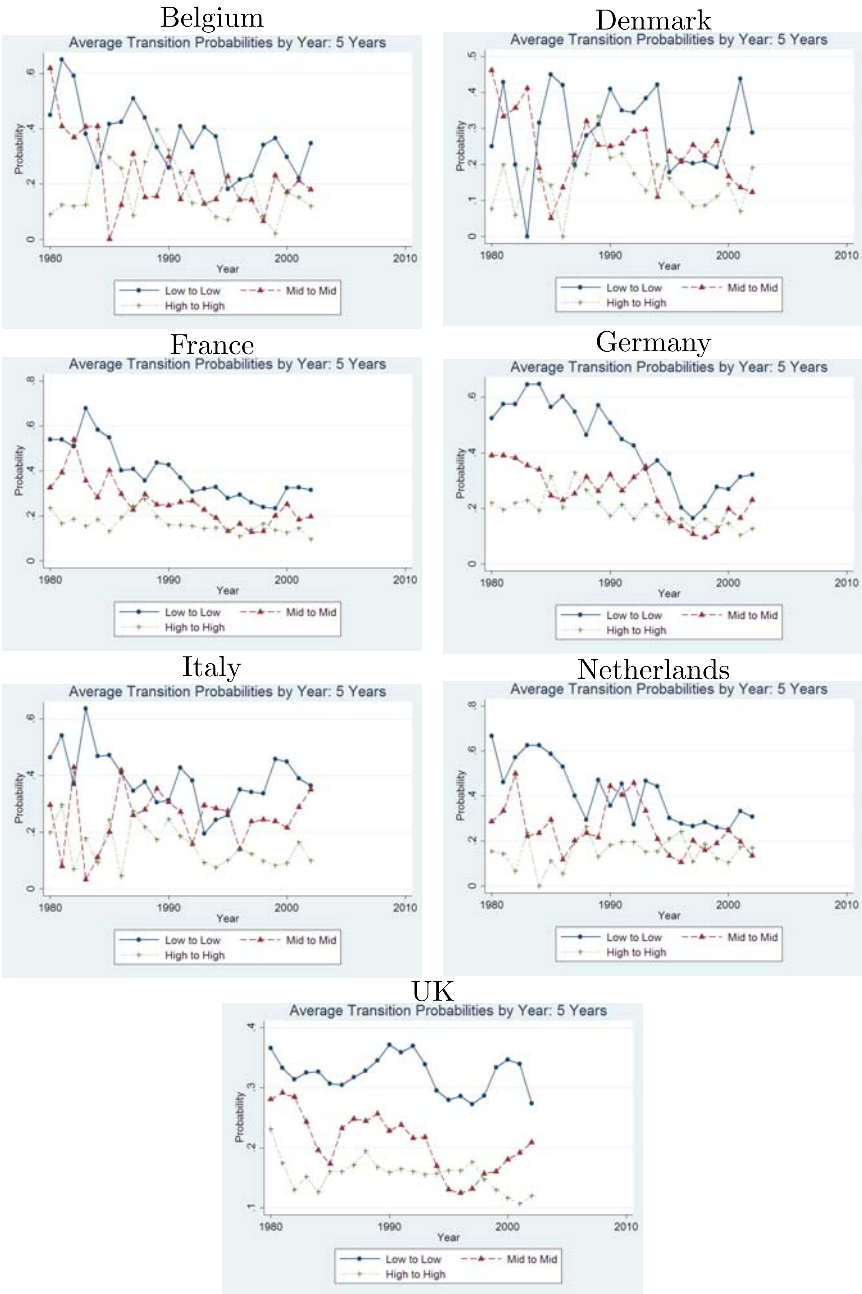

FIGURE 8. Average Transition Probabilities by Year: 5 Years

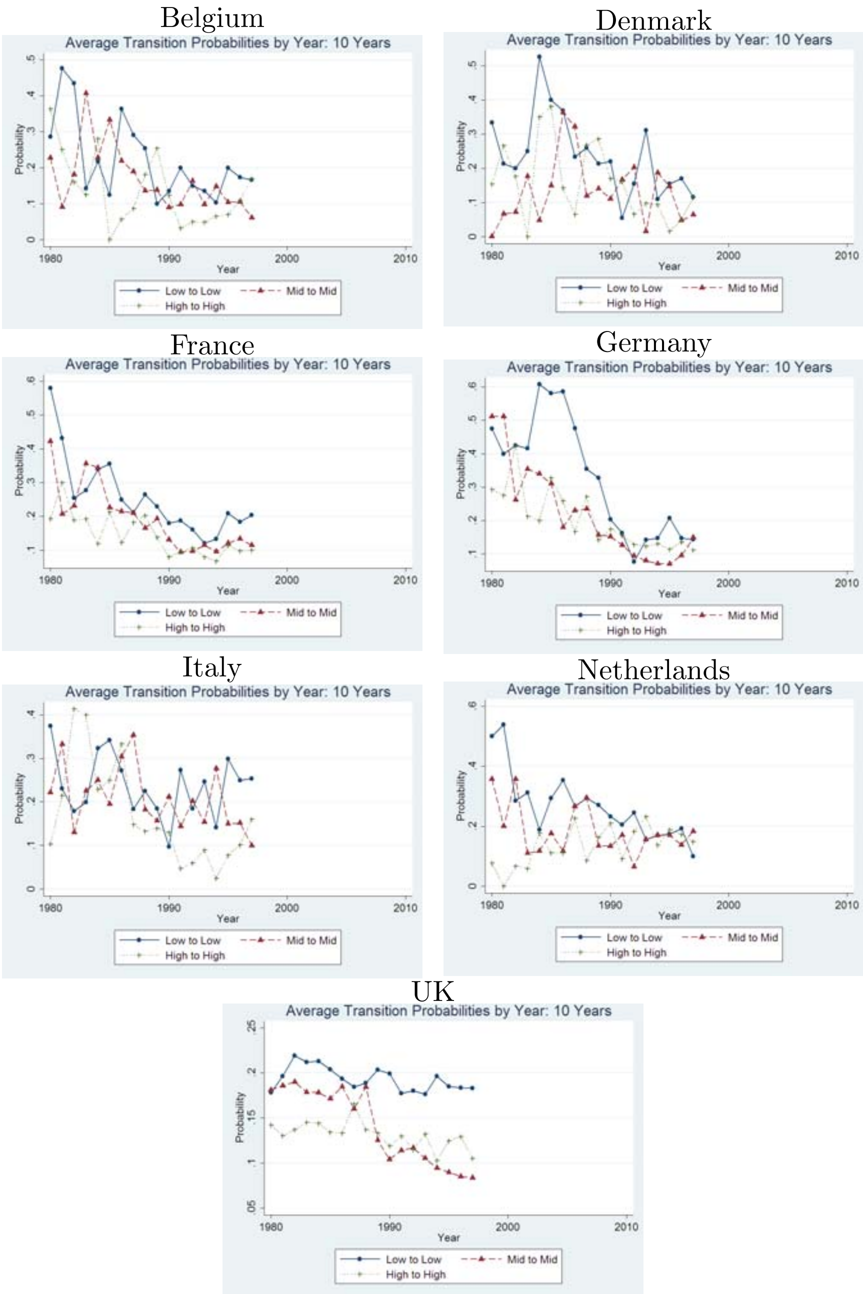

FIGURE 9. Average Transition Probabilities by Year: 10 Years

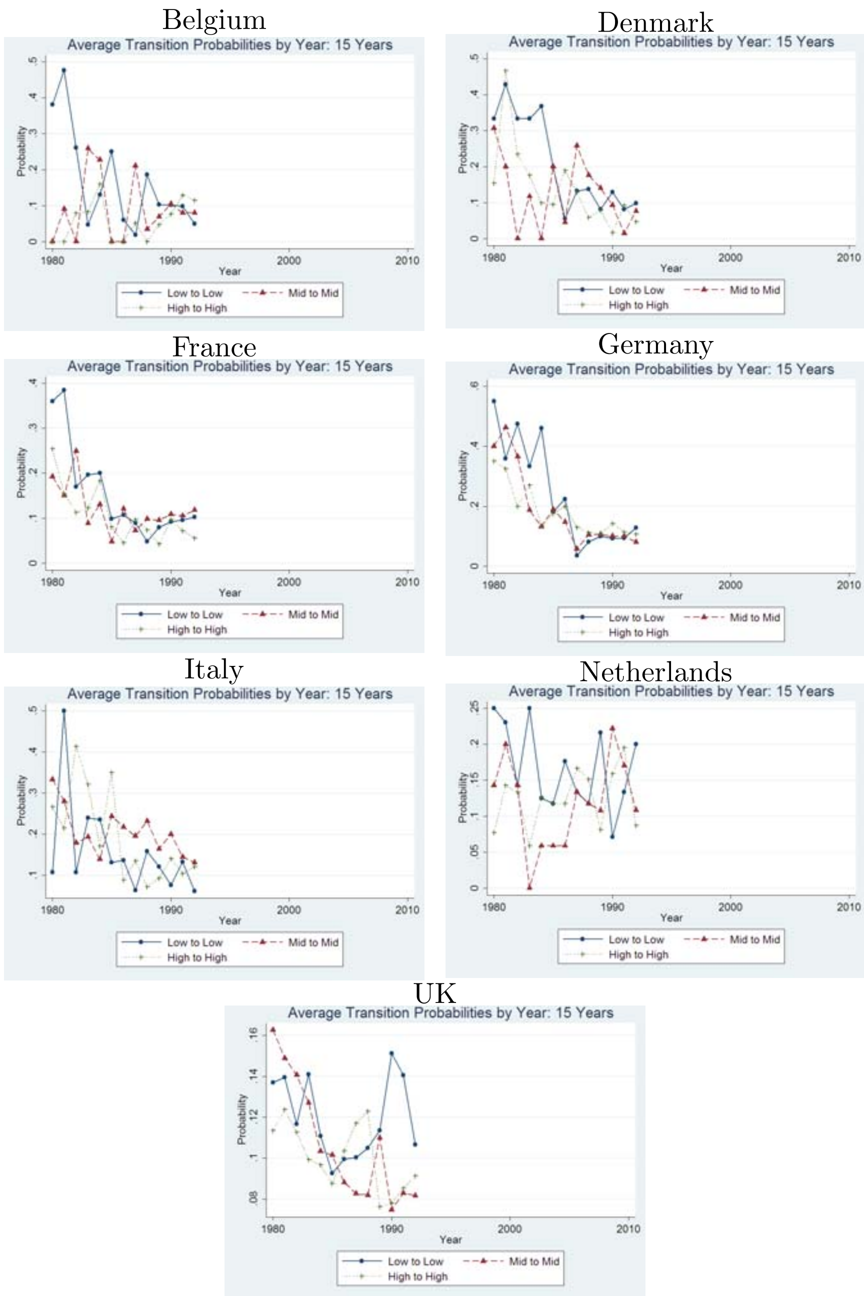

FIGURE 10. Average Transition Probabilities by Year: 15 Years

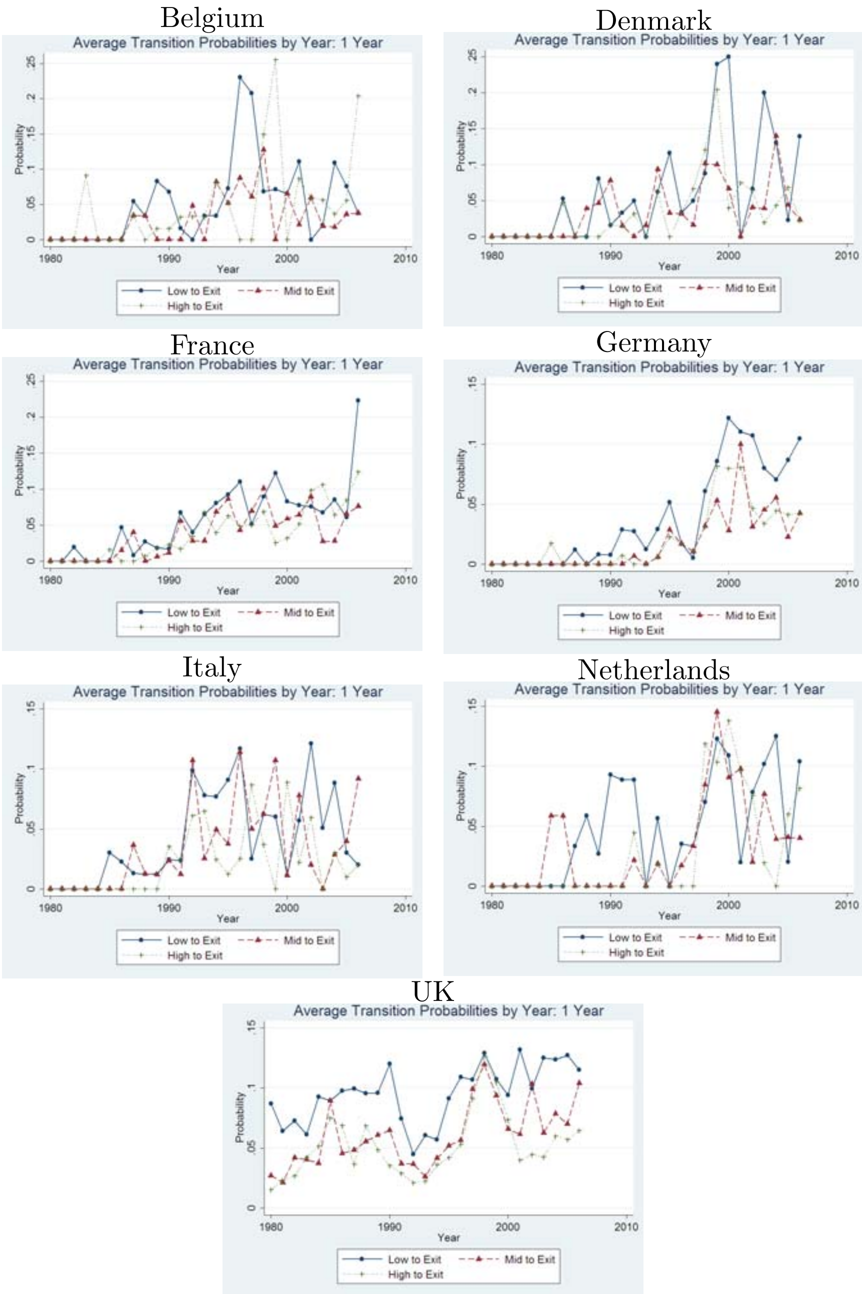

FIGURE 11. Average Transition Probabilities by Year: 1 Year

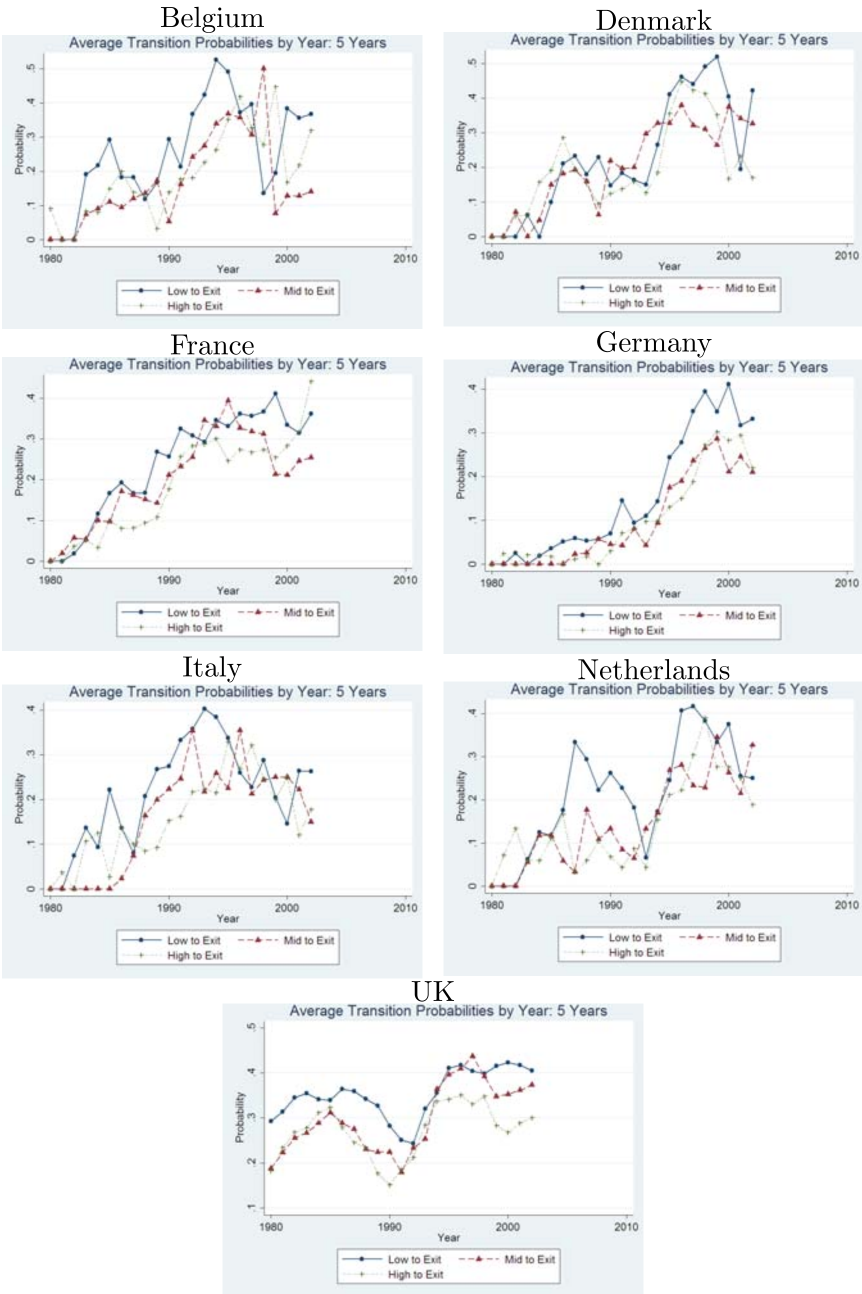

Figure 12. Average Transition Probabilities by Year: 5 Years

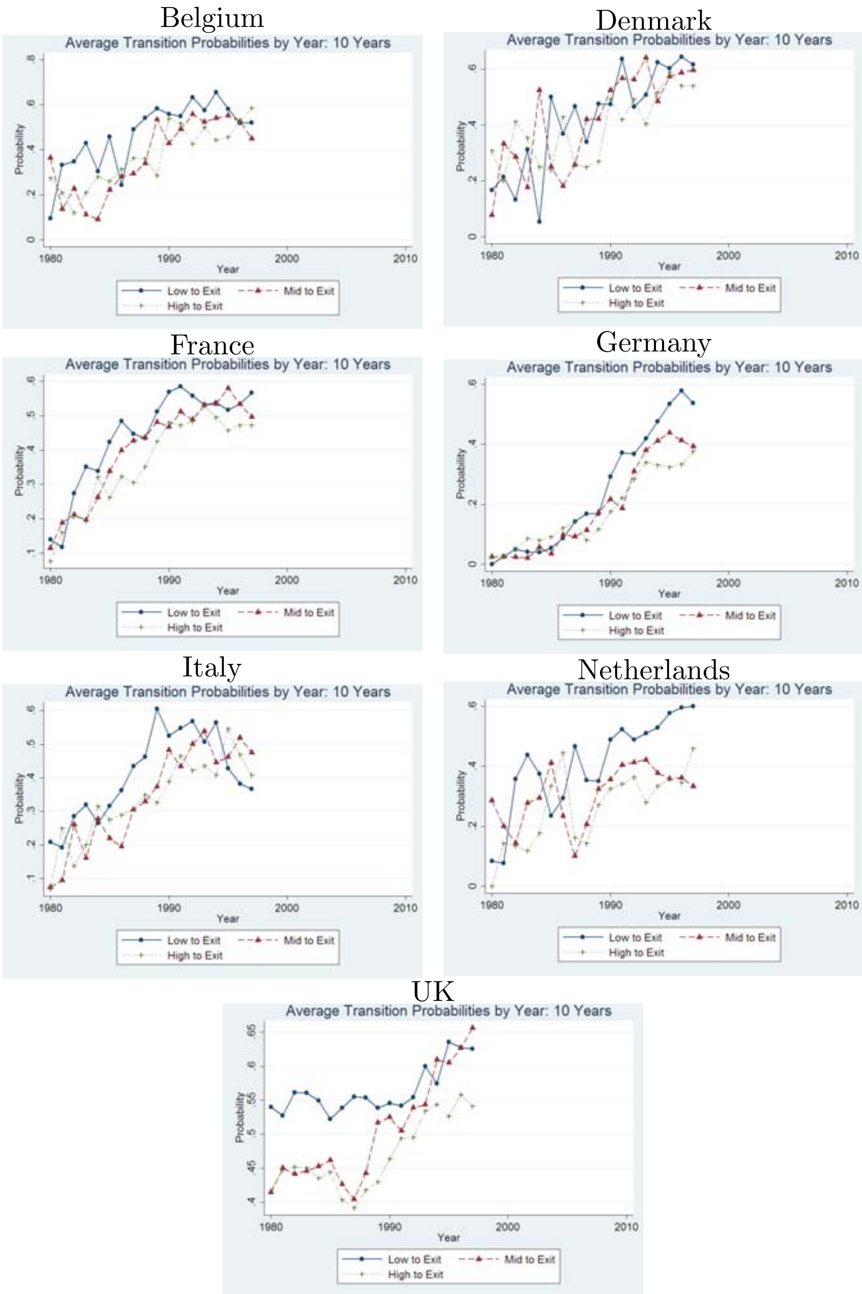

FIGURE 13. Average Transition Probabilities by Year: 10 Years

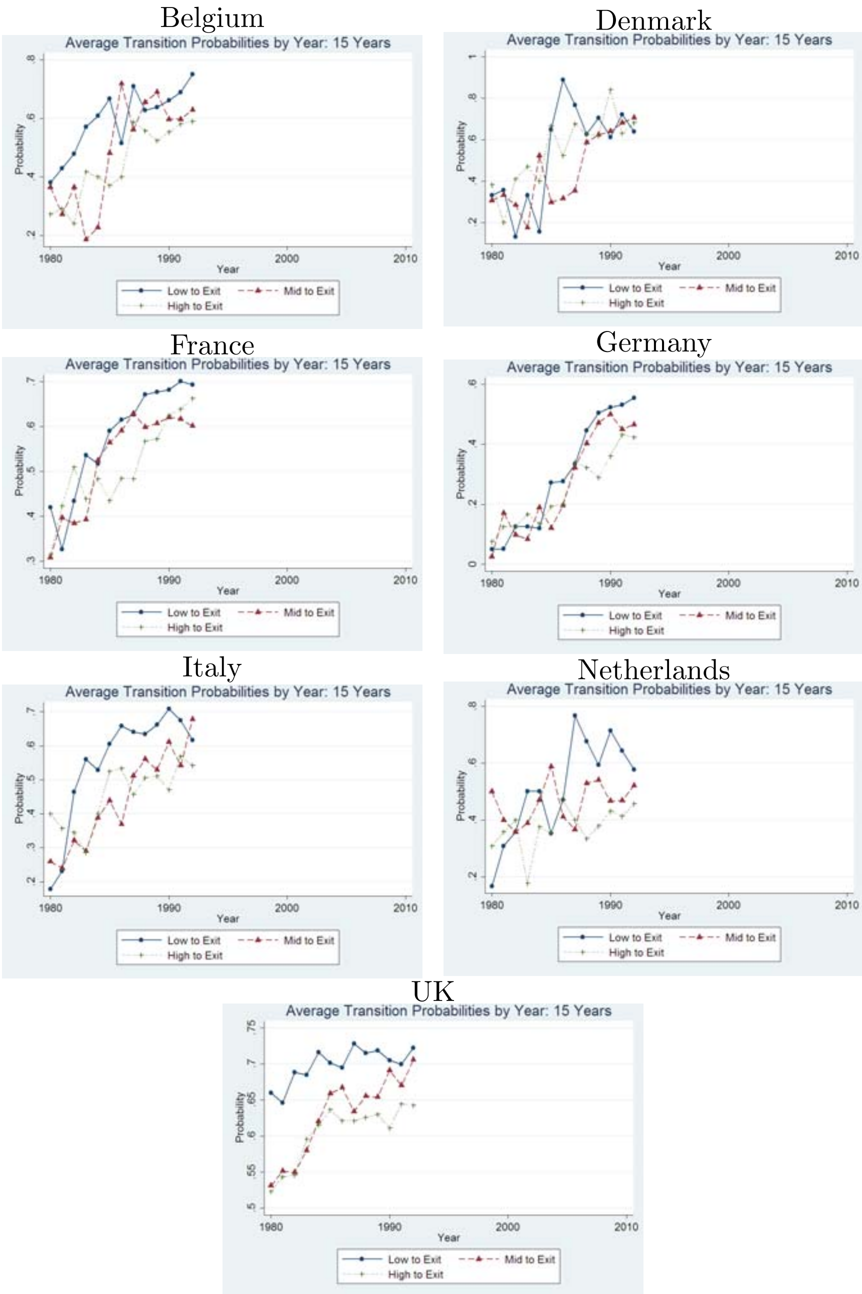

FIGURE 14. Average Transition Probabilities by Year: 15 Years