Stock Market Re-Segmentation and Forced Segment Transfer Decisions: An Analysis of IPOs in Germany

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Abstract

Subsequent to the new economy period, the "Neuer Markt" in Germany closed in 2003, creating the very rare event of a market segment closing and a forced transfer of the listed firms to other newly created market segments. The "Neuer Markt" had opened in 1997 as a market segment for start-up companies and initially performed well by attracting many initial public offerings (IPOs). However, the very positive initial performance reversed in 2001, resulting in negative returns and often in IPOs trading below their offering price. When the market closed, firms had to transfer either to the newly created higher ranked "Prime Standard" or to the lower ranked "General Standard". The objective of our study is to analyze the effects that this market closing and the transfer to new market segments at the German stock exchange had on these "new economy" IPOs. With the closing of the "Neuer Markt" segment, most firms did continue to exist and consequently had to transfer to an existing or new market segment. We analyze whether it is possible to predict the segment transfer decision with information that was already available at the time of the IPO and/ or at the re-segmentation date. Evaluating the factors that determine the decision at the re-segmentation, we find empirical evidence that firms switching to the lower ranked market segment improve the performance subsequent to the segment transfer decision. This suggests that these firms are now trading on a market segment that more appropriately matches the firm characteristics with the listing requirements. Furthermore, firms are more likely to change to the higher ranked Prime Standard if they are larger, more profitable, and have more growth opportunities. Nevertheless, firms going public during the hot-issue period and having higher underpricing prefer to move to the lower ranked General Standard, suggesting that the owners and management may have exploited this very optimistic environment for exiting from their investment and issuing new equity at very favorable prices, although the firms were hardly ready for going public.

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1. Introduction

There exists sufficient empirical evidence verifying the importance and benefits of organized securities markets for financing start-up firms, resulting in economic growth, but at the same time offering profitable investment opportunities for institutional and private investors. It is therefore astonishing that the US and Europe are experiencing a dramatic decline in the number of firms Going Public (Initial Public Offerings or IPO) as well an increasing number of firms Going Private (public-to-private transaction) and Going Dark (voluntary delisting to avoid being a reporting company), resulting in smaller number of firms being publicly traded. Moreover, a substantial number of firms were involuntary delisted by the stock exchanges for violating securities laws or rules and regulations. In these cases, the exchanges force the same firms that they had sought attracting before to leave the public equity market. Thus, the challenge is to organize securities markets in such a ways that firms want to list, continue being listing for the long-term, and that exchanges do not have any reason to force firms to delist. The objective of our study is to analyze the "Neuer Markt" in Germany as a very special case that did not force individual IPOs to delist but instead closed the entire market segment, forcing firms to transfer to other market segments. This is a very rare event in securities market organization and it is important to analyze the reasons and consequences. The possible insights may offer suggestions with regard to establishing efficient and successful securities markets for start-up firms, which currently is an intensively debated issue in many countries.

Following the success of US exchanges in attracting many flourishing start-up firms, the European stock exchanges established new market segments in the 1990s to foster the capital market access for high-technology start-up firms, with the aim of providing them with sufficient equity for financing their growth opportunities. Although quite successful at the very beginning, all "new markets" in Europe eventually were resolved. In Germany, the "Neuer Markt" attracted many young and innovative firms from the high-tech, biotechnology, and telecom industries to list. A very special feature of the "Neuer Markt" was that all rules and regulation was private law instead of public law (Zielke and Kronner, 2003). Subsequent to the "new economy" period, stock prices at the "Neuer Markt" declined dramatically, and the market officially closed for varies reasons such as violations of rules and regulations and some scandals. Instead of delisting the trouble firms, which was difficult under private law to implement, the German stock exchange re-segmented the German stock market on September 26, 2002, and the "Neuer Markt" finally closed on June 3, 2003. All "Neuer Markt" IPOs had to decide in which market segment they preferred listing after the closing of the "Neuer Markt", given that they fulfilled all requirements. These firms could transfer either to the

Prime Standard or to the General Standard. Thus, there was no involuntary delisting as in the US or a merging of market segments as in most other European countries. It was a forced transfer of all "new economy" IPOs to the new market segments that had different listing requirements.

First, we empirically analyze the long-run performance effects of the segment transfer decision of "Neuer Markt" IPOs and the determinants that affect the firms' decisions for the new segment. We distinguish between firms transferring to the higher ranked (Prime Standard) and firms moving to the lower ranked market segment (General Standard). We start with analyzing the stock market performance subsequent to the IPO and the performance effects after the re-segmentation to analyze whether the market segmentation decision is performance enhancing. Our results suggest that most firms transferred to the higher ranked Prime Standard. Regarding the financial performance, we find a performance increase after the re-segmentation for those IPOs that switch to the lower ranked General Standard and argue that these firms transferred to the market segment that more appropriately matched the firm characteristics with the listing requirements.

Second, we analyze whether it is possible to predict the segment transfer decision with information that is already available at the time of the IPO and/ or at the re-segmentation date. With the closing of the "Neuer Markt" segment, most firms continued to exist and had to transfer to a new market segment. Our results reveal that the segment transfer decision depends on firm characteristics at the time of the IPO as well as on determinants at the re-segmentation date. We observe that firms have a higher probability of moving to the higher ranked Prime Standard if they are larger, more profitable, and have more growth opportunities. For firms that went public during the hot-issue period and experience a higher underpricing, we observe a higher probability of transferring to the lower ranked General Standard.

The rest of the paper is structured as follows. In section 2, we review the literature on market segment transfers and long-run performance. Section 3 describes our sample and data as well as the methodology for the empirical analysis and the variable definitions. In section 4, we discuss the results of our univariate analyses and in section 5 the findings of the multivariate analyses. Finally, section 6 concludes.

2. Literature Review

2.1. Special Market Segments for Financing of Small and Young Start-up Firms

In the US, the NYSE, AMEX, and NASDAQ are traditionally the three major stock exchanges attracting many firms and providing efficient trading facilities. The traditionally route

for young start-up firms was to go public and list first on the OTC market NASDAQ, later on transferring to AMEX when growth opportunities were realized and investor interest has increased. The final step was a listing on the NYSE. This sequencing did change during the last two decades. Although young start-up firms still went public on NASDAQ, they stayed listed there because the benefits of moving to AMEX or the NYSE decreased due to better quotation and trade dissemination of OTC-markets. Consequently, AMEX launched the Emerging Company Marketplace (ECM) in 1992 to attract young firms for listing at the AMEX, combined with the opportunity to move to the AMEX main market if the firm became successful and mature. This attempt failed and the ECM closed in 1995. The performance of ECM firms was inferior compared to NASDAQ firms (Aggarwal and Angel, 1999). The NYSE acquired AMEX in October 2008. Today the market segmentation in the US is as follows. Larger IPO have the choice either to list on NASDAQ or the NYSE. Consequently, the traditional vertical market segmentation does not exist any longer and there is no special market segment for young and small start-up firms. Different trading behavior (HFT), new trading venues (MTF), a dramatic change in VC exit behavior as well as regulatory changes such as the Sarbanes Oxley Act (SOX) resulted in less small firms going public but instead in more trade sales during the last decade (Weild and Kim 2010). To reverse this downward trend and to increase again the number of young start-up firms going public, the US lowered the listing standards by implementing the JOBS Act (Jumpstart Our Business Startups) as the most recent initiative.

Following the earlier success of NASDAQ in the US, many European countries opened "new market" segments in the 1990s to improve the financing opportunities for young and small firms. However, many markets eventually closed. For example, the French Nouveau Marché opened in 1996 and closed in 2005. It existed beside the Premier Marché as the main market and the Second Marché as a parallel market. Subsequent to the new economy period, the Nouveau Marché and the Second Marché merged. In Italy, the Nuovo Mercato opened in 1997 and closed in 2003. New market segments also opened in the Netherlands, Belgium, Switzerland, Sweden, and Spain. All these European "new markets" closed or merged with other market segments subsequent to the new economy period (Gajewski and Gresse, 2006). More recently, in many countries a new discussion started about opening new stock market segments for young firms to foster economic growth.

2.2. Market Segmentation in Germany

Given the traditionally very few publicly traded firms in Germany, there were many initiatives to increase the number of small and medium sized listed firms (Table 1). This resulted in the opening of the Regulated Market in 1987 (Geregelter Markt). With this new stock market segmentation, firms listed at the regulated open market (Geregelter Freiverkehr) had the choice to transfer either to the new "regulated market" or to the "open market" segment (Schmidt and Schrader, 1993). During the new economy period at the end of the 1990s, the German stock market segmentation consisted of the official market (Amtlicher Markt), which was the market segment with the highest transparency standards and disclosure requirements and the regulated market (Geregelter Markt) with lower requirements (Figure 1). In addition, there was the open market (Freiverkehr). The "Neuer Markt" completed these three market segments. It opened in 1997 and was regulated under private law. The aim of the "Neuer Markt" was to attract small and innovative firms from the high-tech, biotechnology, and internet industries to go public. The disclosure requirements were almost the same as for firms listed in the official market (Amtlicher Markt), with the main difference that the "Neuer Markt" was regulated under private law (Zielke and Kronner, 2003).

<Insert Table 1 and Figure 1about here>

Subsequent to the "new economy" period and the troubles at the "Neuer Markt", the "Deutsche Börse" announced a re-segmentation of the German stock market on 26 September 2002, and the "Neuer Markt" finally closed on 3 June 2003. This resulted in two different market segments, which are both subject to public law: the Prime Standard and the General Standard. The Prime Standard is the uppermost market segment with the highest disclosure requirements and transparency standard (quarterly reports, IFRS, yearly analyst conference, reports, and ad-hoc reports in English). The General Standard is below and has lower listing requirements. In addition, the Entry Standard is the successor of the Neuer Markt" and the First Quotation Board (Open market) of the "Freiverkehr". Due to this re-segmentation, all "Neuer Markt" IPOs had to decide in which market segment they preferred listing after the closing of the "Neuer Markt". Thus, these firms had to find the closes match between the requirements of the Prime or General Standard market segment and their individual characteristics.

The German "Neuer Markt" was a unique market segment with special rules and regulation that are quite distinct from markets in other countries, offering new empirical insights. For example, the rules and regulation required a non-negotiable lock-up period of six months

(Bessler and Kurth, 2006) and mandatory equity issuing at the IPO depending on owners' exit behavior. The later aspect resulted in IPOs issuing more equity then needed and consequently many firms repurchased shares within the first year after going public (Bessler, Drobetz and Seim, 2014; Bessler, Drobetz, Seim and Zimmermann, 2014). Finally, the regulation under private law made it extremely difficult for the exchange operator to enforce fully the rules and regulation so that a forced delisting of individual firms did not occur. Instead, the entire "Neuer Markt" closed and all IPOs transferred to new market segments.

2.3. Segment Transfer Decisions

There are various motives for a publicly listed firm to prefer delisting and re-listing in a different market segment and therefore moving from one market segment to another, to cross-list or de-cross list at another often foreign exchange, or to delist from public securities markets at all. Management may prefer switching to another stock market segment because of lower costs or higher benefits or due to regulatory changes such as SOX in the US. Another example is the delisting of German firms from being cross-listed at US exchanges because the expected benefits did not materialize (lower cost of capital) and stricter regulation (SOX) for foreign firms made cross-listing less attractive and even legally more risky (Bessler, Kaen, Kurmann and Zimmermann, 2013). Furthermore, it is important to distinguish whether the market segment transfer or delisting is voluntary or involuntary. The focus of this study is on stock market re-segmentation, which is a rather rare event, but occurred after the closing of the "Neuer Markt" in Germany in 2003. In fact, it was a decision by the German stock exchange council to close the "Neuer Markt" in 2003 instead of merging it with another market segment as was done in other European "new markets" after the hype of the new economy period came to an end. One of the main reasons for this decision was that the regulation of the "Neuer Markt" was under private law instead of public law. This made it difficult for the exchange operator to force firms that violated exchange regulations to delist or to merge the "Neuer Markt" segment with another market segment. Thus, the German Stock Exchange decided to reorganize its stock market segments as already discussed (Figure 1).

Bharat and Dittmar (2010) argue that firms continuously compare the costs and benefits of a stock exchange listing. If the costs exceed the benefits, firms should delist. Such an analysis is also relevant for the segment transfer decision. Firms switch to another market segment if the costs exceed the benefits of listing in that segment, or if the benefits in the new market segment are higher and the costs are relatively lower. Moreover, previous studies suggest that regulatory changes affect the number of firms going public or private (Johnston and Madura,

2009; Weild and Kim 2010; Leuz, 2007; Engel, Hayes, and Wang, 2007). Jenkinson and Ramadorai (2013) find that a tightening of the regulatory framework results in a down switching of firms to market segments with lower listing requirements. In the US, going dark is another example of escaping from being highly regulated as a reporting company. Firms going dark exit from mandatory disclosure requirements but continue trading on the Pink Sheets.

When a firm transfers from one market segment to another, its stock market valuation as well as its trading volume, liquidity, and bid-ask spreads are affected. In general, the announcement of moving to a market segment with a higher (lower) transparency level and disclosure requirement results in positive (negative) stock markets announcement returns. Firms that voluntarily move to segments with higher requirements usually achieve positive performance and liquidity effects (Kim, 2014). However, the long-run stock market performance can be opposite to the short-run announcement returns. Jenkinson and Ramadorai (2013), for example, find negative announcement returns around a switch to a segment with lower transparency standards and tightened disclosure requirements. However, the stock market performance improves in the log-run. This phenomenon suggests that segment transfers are positively valued by capital markets in the long run if the new market segment is more appropriately matches with the current firm characteristics.

2.4. Empirical Evidence for the US and other Countries

For US stock markets, several studies analyze voluntary and involuntary segment transfers. The earlier studies investigate firms moving from OTC to NASDAQ or the NYSE (Baker and Edelmann, 1990; Kadlec and McConnell, 1994; Cowan, Carter, Dark and Singh, 1992). Firms that switch from the OTC market to NASDAQ exhibit positive announcement return as well as liquidity improvements with announcement returns being stronger for firms with lower liquidity (Baker and Edelman, 1990). In addition, the bid-ask spread narrows (Kadlec and McConnell, 1994). Cowan, Carter, Dark and Singh (1992) investigate firms that move between OTC segments and find that firms have a higher probability of switching if they expect higher benefits such as an increase in liquidity. Later studies investigate firms transfer between the stock exchanges NASDAQ, AMEX, and NYSE (Clyde, Schultz and Zaman, 1997; Tse and Devos, 2004, Yang, Baker, Chou and Lu, 2009; Papaioannou, Travlos and Viswanathan, 2003; Baker and Edelman, 1992). Moving from AMEX to NASDAQ (Clyde, Schultz and Zaman, 1997) generates positive announcement returns especially for high-tech firms (Tse and Devos, 2004). In contrast, firms that move from NASDAQ to AMEX improve the operating performance before switching, which, however, changes to a

negative operating performance afterwards, especially for smaller firms (Papaioannou, Travlos and Viswanathan, 2003). Tse and Devos (2004) report that the spreads increase (decrease) if firms switch from AMEX (NASDAQ) to NASDAQ (AMEX). Overall, when transferring to NASDAQ investor recognition and trading volume improves whereas trading costs increase. In contrast, firms that switch to AMEX exhibit lower transaction costs (Tse and Davos, 2004). Yang, Baker, Chou and Lu (2009) analyze the transfer from NASDAQ to NYSE and find that firms benefit from lower costs of capital for external financing due to higher visibility, liquidity, and reputation. Thus, transferring to another stock market segment resulted in positive or negative valuation effects.

Moving to a market segment with higher disclosure requirements and transparency standard usually results in positive stock market announcement returns. For investors this move is beneficial because firms have to follow stronger disclosure rules and more information becomes available for the investor. For the French stock market Bacmann, Dubois and Ertur (2002) report positive stock returns for firms announcing a move to the main market, resulting in an increase in liquidity and investor attention subsequent to the segment change. Cisse and Fontaine (2013) confirm the positive stock returns around an upward segment switch announcement due to higher liquidity. However, the long-run performance is negative. For for AIM listed firms in the UK Pour and Lasfer (2013) report that firms that change to the main market of the London Stock exchange (LSE) have good investment opportunities are able to raise more equity (SEO) and offer investors positive returns. Firms that switch to special segments (NextPrime and NextEconomy) at Euronext, which have higher listing requirements, also provide positive performance effects (Kim, 2014). For the Japanese stock market Lamba and Ariff (1997) report positive stock returns around the announcement of an involuntarily upward market segment transfer from section 2 to section 1. The stock exchange implements this transfer automatically when the firm fulfills the stronger section 1 requirements. Low liquidity firms accomplish the strongest improvement in the long-run performance and increases in the trading volume.

2.5. Empirical Evidence for Germany

For Germany, Schmidt and Schrader (1993) investigate the transfer of firms from the open market to the regulated open market in the 1980s and find positive announcement returns for these firms. In the context of the closing of the "Neuer Markt" and the re-segmentation of the German stock market, firms had the opportunity to transfer between market segments before the re-segmentation announcement or thereafter (Schiereck and Hart-

mann, 2006). The stock price reaction depends on various factors such as the reasons for the transfer decision. Other factors are whether it is an upgrade or a downgrade, or whether the segment transfer is voluntarily or involuntarily. Schiereck and Hartman (2006) report that voluntarily segment transfers that take place before the announcement of the re-segmentation are associated with negative stock returns.

Based on the empirical evidence provided in the literature so far, we hypothesize that switching to a market segment (downgrade) that has lower transparency standards or lower disclosure requirements, must not always be a value-destroying decision, even if the announcement returns are negative. Moreover, the results also suggest that moving to a more appropriate stock market segment that better matches the individual firm characteristics and the current business situation with the exchange requirements results in positive long-run performance effects. Interestingly, Kim (2014) argues that a self-regulation of firms by choosing an adequate market segment is better than an overall regulation by the stock exchanges. The objective of our study is to provide novel empirical evidence on the valuation effects for "Neuer Markt" IPOs that transfer to newly created market segments in Germany.

3. Data and Methodology

3.1. Data and Sample Description

Our sample consists of all 329 firms that went public at the "Neuer Markt" in Germany between 1997 and 2003. The data is either hand collected from IPO prospectuses or from the website of "Deutsche Börse". For each firm we determine the exact date of the segment transfer using DGAP data.[1] We separate our sample into two groups of firms depending whether the firms transferred on the Prime Standard or the General Standard after the "Neuer Markt" closed. Hence, we differentiate between firms that move either to a higher regulated market segment (Prime Standard) and firms that switch to a market segment with lower requirements (General Standard) and denote them as "Upgrade" and "Downgrade", respectively. We also control for M&A activity and insolvencies. Figure 2 depicts the performance of AIM, Nouveau Marché, NASDAQ, and NEMAX, showing their remarkable increase and decline. Figure 3 presents the annual number of IPOs at the "Neuer Markt" and their listing status at the end of 2012.

Overall, this figure reveals the tremendous increase in the number of firms going public during the "new economy" period in Germany, with a peak of 20 IPOs per month in 1999 and

[1] DGAP Deutsche Gesellschaft für Ad-hoc-Publizität mbH: http://www.dgap.de/.

2000. The figure also highlights the relationship between stock market performance and the number of IPOs. In 1999 and 2000 when the stock market valuation is highest, the number of IPOs increases substantially, which clearly classifies as a hot-issue period. The black solid line represents the "Neuer Markt" index "NEMAX" that increases in the hot-issue period but strongly declines afterwards, signaling the end of the new economy period in 2001.

<Insert Figure 2 about here>

<Insert Figure 3 about here>

Analyzing the listing status of these "Neuer Markt" IPOs at the end of 2012, we observe that the number of firms that went public during the hot-issue period and that eventually declared bankruptcy is larger than in the period before. This supports the hypothesis that during hot-issue periods with higher market valuations, more firms exploited this window of opportunities and went public, although in many cases they were most likely not ready for being a publicly traded firm. Interestingly, we observe that many firms that went public at the "Neuer Markt" continue to operate and still trade publicly, although now in a different market segment. This observation suggests that not all IPOs at the "Neuer Markt" were poor performers, but that the market segmentation and market regulation at that time may not have been optimal (Bessler, Drobetz and Seim, 2014). Interestingly, many firms performed well, offering an adequate return, however, mainly after transferring to a different market segment.

3.2. Methodology: Performance and Probit Analyses

We analyze the financial performance calculating abnormal returns *(AR)* by employing a market-adjusted model. As a benchmark, we use the TecDax or CDAX total market index returns (*rm*)

$$(1) \qquad AR_{i,t} = r_{i,t} - r_{m,t} .$$

To estimate the performance subsequent to the IPO and subsequent to the segment transfer decision, we calculate cumulative abnormal returns. For this we sum up the abnormal returns for each firm *i* over different periods and determine the mean over all events.

$$(2) \qquad CAR_{i,(-t,+t)} = \sum_{\tau=t}^{t} AR_{i,\tau} \qquad \text{with} \qquad CAR_{(-t,+t)} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i,(-t,+t)} .$$

Furthermore, we estimate buy-and-hold returns (BHR) and buy-and-hold abnormal returns (BHAR) subsequent to the IPO and the segment transfer decision. For this, we calculate the BHR for each company *i* and calculate the equally weighted average BHR for the portfo-

lio *P* consisting of all Prime Standard or General Standard firms, respectively, to estimate the average BHR and correct this with the BHR market return to obtain the BHAR.

(3) $\mathrm{dBHR_{P,T}} = \frac{1}{\mathrm{N}}\sum_{\mathrm{i=1}}^{\mathrm{N}} \mathrm{BHR_{i,T}}$ with $\mathrm{BHR_{i,T}} = \left[\prod_{\mathrm{t=1}}^{\mathrm{T}}\left(1 + \mathrm{R_{i,t}}\right)\right] - 1$.

(4) $\mathrm{BHAR} = \frac{1}{\mathrm{N}}\sum_{\mathrm{i=1}}^{\mathrm{N}}\left[\prod_{\mathrm{t=1}}^{\mathrm{T}}\left(1 + \mathrm{R_{i,t}}\right) - \left(\prod_{\mathrm{t=1}}^{\mathrm{T}}(1 + \mathrm{R_{M,t}})\right]_{\mathrm{i},\tau}\right.$.

As a robustness check, we use the calendar-time portfolio approach starting in the month of the event that the firm transfers to the new market segment and adding it to an equally-weighted calendar-time portfolios for holding periods of 12, 24, and 36 months. For each month *t*, we calculate an equally-weighted average of all stock returns, *Ri ,t* , of all *Nt* firms in the portfolio: where *N* is the total number of target firms in the sample, and *zi ,t* is an indicator variable, which equals one if the firm transferred during the holding period, and zero otherwise. *Nt* is the number of stocks for which *zi,t* is equal to one in each trading month.

(5) $R_{CalTime,t} = \frac{1}{N_t}\sum_{i=1}^{N} z_{i,t} \times R_{i,t}$.

Finally, we employ a probit model to estimate the probability that a firm transfers to a higher segment due to the new stock exchange segmentation in Germany. We also estimate the probability that the firm becomes a constituent of the Prime Standard segment at the end of our sample period (2012). The dependent variable is a dummy variable that takes the value of one if a firm lists in the Prime Standard after the re-segmentation or at the end of 2012, respectively.

(6) $Prob(Y = 1|\boldsymbol{x}) = \int_{-\infty}^{\boldsymbol{x'\beta}} \phi(t)dt = \Phi(\boldsymbol{x'\beta})$.

Table 2 contains a description of the variable constructions and sources of all independent variables.

< Insert Table 2 about here >

4. Empirical Univariate Results

4.1. Descriptive Statistics of Segment Transfers

In this section, we focus on analyzing the effects on "Neuer Markt" IPOs subsequent to the decision to close the market segment in September 2002. We start with a description of the univariate results of segment transfers and affiliation analysis, and then present our multi-variate results of the segment transfer decision after the announcement of the re-segmentation by the German stock exchange and the segment affiliation at the end of 2012.

< Insert Figure 4 about here >

Figure 4 presents the market segment in which the IPOs were listed during the period from going public at the "Neuer Markt" between 1997 and 2002 until the end of our estimation period in 2012. For every firm we identify the listing status on a monthly basis, especially we analyze which firms delisted at which point in time from the "Neuer Markt" and in which market segment these IPOs transferred after the re-segmentation of the German stock market. IOPs may also have delisted due to a takeover, insolvency, or for other reasons. The green area shows the number of firms that went public at the "Neuer Markt". The blue and yellow areas depict the number of firms that listed in the new market segments Prime Standard and General Standard, respectively, after re-segmentation. IPOs that delisted due to an acquisition, insolvency, or for other reasons are shown as the violet, red, and black areas, respectively. Furthermore, the light blue area indicates firms that transferred to the open market or later to the Entry Standard. The grey area contains firms that moved to the "m:access" open market segment of the Munich stock exchange.

< Insert Table 3 about here >

The number of IPOs spectacularly increased after the opening of the "Neuer Markt" in 1997, and the boom reached its highest level with the peak of the new economy bubble at the end of 2000. Subsequent to the re-segmentation announcement of the German stock exchange in September 2002, the IPOs currently listed at the "Neuer Markt" had to choose between transferring to one of two new market segments. Either to the Prime Standard, the market segment with the highest disclosure requirements and transparency standard, or the General Standard, a market segment with lower listing requirements ranked below the Prime Standard. Figure 4 reveals that firms mainly switched to the Prime Standard (197) whereas a lower number moved to the General Standard (71). Most of the firms disclosed their decision before January 2003, the opening of the new market segments. Only a few firms waited with their decision and decided only after the start of the new market segments. In addition, some firms left the "Neuer Markt" and moved to the regulated market (Geregelter Markt), became insolvent, or merged before the re-segmentation announcement in September 2002. At the time of the re-segmentation, 268 of initially 329 firms that went public at the "Neuer Markt" were still listed. This figure also reveals that the segment transfer decision at the re-segmentation date does not always persist over time.

Prime Standard: The total number of listed firms decreases over time because firms transferred to other market segments, delisted, or were acquired. Since we are interested in analyzing whether the segment transfer decision forced by the re-segmentation persists over time, we also analyze the segment transfers from the time of the re-segmentation until the end of 2012. Table 3 (Panel A) provides an overview of the segment affiliation at the end of 2012 and in September 2007, prior to the start of the financial crisis (Panel B). At the end of 2012, 161 firms that went public more than 10 years ago at the "Neuer Markt" still trade publicly. From the 197 firms that moved to the Prime Standard in 2002, 117 (59.4%) are still listed. From these, 86 IPOs (43.7%) are still constituents of the Prime Standard at the end of 2012. 17 firms moved to the General Standard and 12 (6.1%) firms trade in the open market or entry standard. A large number of firms were acquired before the end of 2012 (48 or 24.4%). Furthermore, 29 (14.7%) firms declared insolvency, 2 (1%) firms transferred to the entry segment m:access of the Munich stock exchange, and 3 (1.5%) firms delisted. Overall, the number of "Neuer Markt" IPOs that are listed in the Prime Standard strongly declines after the re-segmentation decision. Hence, we are interested to analyze whether the segment transfer decision is only short-term signaling instead of the result of firm quality.

< Insert Table 4 about here >

General Standard: Of the 71 firms that initially transferred to this market segment at the end of 2012, only 32 firms (45.1%) are still listed. It is remarkable that only 5 (7%) firms moved from the General Standard to the higher ranked Prime Standard. In contrast, 17 Prime Standard firms made transferred to lower ranked General Standard. This underscores the accuracy of the segment transfer decision of the General Standard firms, suggesting that these firms choose in general the most appropriate market segment. Furthermore, 4 firms (5.6%) transferred to the open market or entry standard and 3 firms (4.2%) moved to the segment m:access at the Munich stock exchange. The percentage of General Standard firms that were acquired is 19.7 % (14) and lower compared to the 24.4 % of Prime Standard firms. Furthermore, 12 firms declared insolvency, and one firm delisted from the stock exchange.

Panel B in Table 3 and Figure 3 reveal that prior to the financial crisis, a much higher percentage of the Prime Standard firms survived. 154 (78.2%) firms, of initially 197 IPOs, still operate, and of these 132 (67%) firms are listed in the Prime Standard, 19 (9.6%) in the General Standard and 3 firms in the open market or entry standard. 43 (21.8%) firms left the Prime Standard due to an acquisition (30), insolvency (11) or delisting (1). Comparing the number of insolvencies within the Prime Standard, we observe a strong increase from 5.5 %

to 14.7%. This suggests that some firms faced additional difficulties due to the financial crisis. The results for the General Standard firm are quite similar. The percentage of insolvencies also increases from 8.5% to 16.9%. This reflects that not only Prime Standard firms faced difficulties, but also all firms faced problems as consequence of the financial crisis. From the 71 firms that moved to the General Standard at the re-segmentation date, 53 (74.6%) still operate in September 2007. Of these IPOs, 47 (66.2%) firms still list in the General Standard. 18 (25.4%) firms no longer list at the stock exchange due to an acquisition (10), insolvency (6), or delisting (2). Table 4 shows the segment transfers after the re-segmentation until the end of 2012. The results reveal 44 downward transfers from the Prime Standard to the lower ranked General Standard and 14 downward transfers to the open market or Entry Standard until the end of 2012. In contrast, we find that only 8 IPOs transferred upward to the higher ranked Prime Standard from the General Standard after the re-segmentation.

Overall, our descriptive analyses suggest that the segment transfer decision is not persistent over time. Even if the majority of the firms still lists in the market segment they transferred to at the time of the re-segmentation, there are many firms switching to another market segment. In particular, firms moved away from the Prime Standard. This suggests that firms' segment transfer decisions are not always persistent and firms correct this decision by switching to a more appropriate market segment later on. Thus, we analyze whether the first segment transfer decision at the re-segmentation date is only short-term signaling resulting later on in a subsequent segment transfer, or whether it is a signal of firm quality. Furthermore, we observe a large number of changes in segment affiliation and a large number of insolvencies during the financial crisis.

4.2. Variable Analysis of IPO and Re-segmentation Data

In this section, we analyze whether there are significant differences between firms that decided to transfer to a higher ranked market segment (Prime Standard) and firms that switch to a lower ranked market segment (General Standard). We begin by focusing on univariate differences in firm characteristics and IPO characteristics and distinguish between variables that we observe at two different points in time (Bharat and Dittmar, 2010). First, we collect data for variables that are available at the time of the IPO, and second data for variables that are available in the year prior to the forced decision to change the market segment. We hypothesize that firm characteristics and IPO related variables at the time of the IPO as well as at the time of the re-segmentation are the main factors that determine the decision to transfer to a specific market segment and subsequently stay listed in this segment. Consequently, it

seems possible to predict the segment transfer decision already at the IPO date which implies that "Neuer Markt" IPO firms are widely heterogeneous.

<Insert Table 5 about here>

In Table 5, we present the results of the univariate analysis for the IPO at the re-segmentation dates. The empirical findings indicate significant differences between IPOs that later on transfer either to the Prime Standard or to the General Standard. These results hold for both the IPO date and the re-segmentation date. In fact, we find that firms that switch to the higher ranked Prime Standard are subsequently more profitable, although returns on assets (ROA) are negative for both groups at the time of the IPO. Furthermore, we observe that Prime Standard firms are older, larger (median), and own more patents when going public. This suggests that these firms are more mature and have more growth opportunities. Moreover, we find initially higher analyst coverage for IPOs that transfer to the Prime Standard later on. This suggests that the interest for these firms is stronger immediately after going public compared to IPOs that later on list in the General Standard. This observation may also reflect the fact that more reputable underwriter provides more analyst coverage during the first year as part of their underwriter services. However, the more intense coverage does not lead to a superior performance during the first year. In fact, the recommendations of the dependent analysts, i.e. analysts of the underwriter, are significantly inferior compared to the independent analysts, which highlights the marketing activities of analysts for their underwriter (Bessler and Stanzel, 2006)

Focusing now on the year prior to the re-segmentation announcement, we again analyze the univariate differences between both groups of IPOs. Our analysis confirms our previous results for the IPO date. Again, we find that firms that opt to switch to the Prime Standard become larger and more profitable shortly thereafter. Furthermore, these IPOs invest more in R&D, indicating that these firms are more mature and have higher growth opportunities than the General Standard firms. Moreover, we observe higher analyst coverage for the later Prime Standard firms at the time of the IPO. Interestingly, we find no difference in free float, although there is a 25% free-float listing requirement in the Prime Standard. Thus, the free-float requirement is not crucial for the decision to move to a specific market segment. This suggests that firms in both market segments have a preference to list publicly, but with different listing requirements.

Overall, the results of the univariate analysis indicate that there are significant differences between Prime Standard and General Standard firms at the IPO as well as later on at the re-segmentation date. Consequently, it is essential to include both groups of variables in our multivariate analyses, controlling for their influences on the segment transfer decision.

4.3. Long-run Post-IPO Performance

We now present our results from analyzing the post IPO long-run financial performance. Again, we distinguish between firms that transferred to the Prime Standard (upgrade) and firms that switched to the General Standard (downgrade) at the time when the German stock market was re-segmented. We calculate the long-run performance to evaluate whether or not the stock market performance after going public affects the segment change decision.

<Insert Figure 5a about here>

<Insert Figure 5b about here>

In Figure 5a, we present the long-run performance, excluding underpricing, over a three-year period subsequent to the IPO. In contrast, in Figure 5b, underpricing is included in the performance measures. IPOs that later on list in the higher market segment (Prime Standard) offer a significantly higher performance relative to the firms that move to the lower ranked market segment (General Standard), calculated for the period from the IPO to the market re-segmentation. Until the expiration of the mandatory lock-up period, which was set at a minimum of 6 months at the "Neuer Markt", both groups exhibit a positive stock market performance. Because of the lock-up period, shareholders that owned shares already prior to the IPO or got shares allocated at the time of the IPO, are allowed to sell their shares immediately or exactly 6 months post IPO, respectively (Bessler and Kurth, 2007). The performance of IPOs that transferred to the General Standard declines subsequently (Bessler, Becker and Wagner, 2007). In contrast, returns of IPOs that switch to the Prime Standard strongly increase after the expiration of the 6-months lock-up period. Thus, the performance is superior compared to firms in the General Standard. From the univariate differences between Prime and General Standard firms, we conclude that the Prime Standard firms have larger growth opportunities, a higher innovation potential, and higher analyst coverage after going public that could positively affect the stock market performance. However, analysts often overestimate firm's growth opportunities (Bessler and Stanzel, 2006). It seems that these firms have advantages compared to the General Standard firms, resulting in the superior post-IPO performance. At this point of time, the firms that later on move to the higher market segment

(Prime Standard) are subsequently more successful and mature compared to the firms that switch to the lower ranked General Standard. One possible explanation is that these firms were not ready for being publicly traded, but rather tried to exploit the opportunity of the high valuations during the hot-issue period. The univariate result of the variables at the IPO date in table 5 support this finding. Overall, the results indicate that the later General Standard firms are performing inferior compared to the later Prime Standard firms.

4.4. Long-run IPO Performance in the New Market Segments

Because we are interested in exploring how to organize stock market segments more efficiently and successfully and in analyzing the impact of the segmentation decision on IPO returns, we calculate the financial performance, beginning after the re-segmentation of the German stock exchange. Most importantly, we are interested in understanding whether the poor financial performance of many "Neuer Markt" IPOs resulted from the fact that many firms went prematurely public exploiting the high valuation during a hot-issue market period. In contrast, we hypothesize that these IPOs were not very successful because the economic environment became less favorable later on and the rules and regulations of this market segment were inadequately constructed. For example, firms going public were required to issue additional equity that often resulted in substantial cash holdings, creating substantial agency problems. Some IPOs dealt with these free cash flow problems by substantial share repurchases (Bessler, Drobetz and Seim, 2014, and Bessler, Drobetz, Seim and Zimmermann 2014). Other firms seem to have wasted these funds in poor investments.

To address these issues, we investigate the market performance of the "Neuer Markt" IPOs subsequent to the re-segmentation of the German stock markets. With the opening of the new market segments, all "Neuer Markt" IPOs got a second chance of being listed in a preferred and more appropriate market segment with either lower or higher listing requirements. As before, we distinguish between IPOs that move to the higher market segment (Prime Standard) and firms that switch to the lower market segment (General Standard).

<Insert Figure 6 about here>

Figure 6 presents the stock market performance for the period from one year prior to the re-segmentation until 3 years after the re-segmentation. The blue line represents the performance of the Prime Standard firms (upgrade) and the yellow line the performance of the General Standard firms (downgrade). We observe a positive stock performance for the Prime Standard firms prior to re-segmentation. The results of the buy-and-hold abnormal long-run

performance including underpricing (Table 6) and excluding underpricing (Table 7) reveal that the Prime Standard firms have a superior stock market performance subsequent to the IPO. The difference is significant over a 1-year, 2-year, and 3-year period. After the re-segmentation decision, both groups achieve a positive and stock performance. Especially the positive performance of the General Standard firms seems at first surprising, because we observe a negative performance after the IPO. This result suggests that General Standard firms find their appropriate market segment that best fits their needs with regard to listing costs and disclosure requirements only after the re-segmentation. The choice between different market segments was not available at the time of the IPO. Furthermore, this result is consistent with the findings of Jenkinson and Ramadorai (2013), who report positive performance effects in the long-run for firms that switch to a lower ranked market segment. Overall, the performance measures indicate that the organization of the market segment affects the long-run stock performance of IPOs. Especially in the case of re-segmentation and the opening of new market segments, we find positive performance effect for firms that move to the lower ranked market segment that seems more appropriate for them at that time. Furthermore, the upward switching firms (Prime Standard) also achieve positive long-run performance effects subsequent to the segment transfer. Therefore, we conclude that the closing of the "Neuer Markt" segment provides all firms with the opportunity of a fresh start, delisting from the negative encumbered "Neuer Markt". In addition, the results suggest that the capital market welcomes the change in the legal organization and the transfer in EU-regulated market segments.

<Insert Tables 6 and 7 about here>

As a robustness check, we also calculate calendar time portfolios separated by the segment affiliation at the end of 2012. Again, we differentiate between the two starting points at the IPO (Figure 7) and the re-segmentation (Figure 8) of the German stock market. The results suggest that the portfolio of firms that transfer to the Prime Standard has a superior performance that is significantly superior to the portfolio of firms that switch to the lower ranked General Standard. Subsequent to the re-segmentation, however, both portfolios of upgraders and downgraders have a positive performance. The portfolio of firms that transferred to the lower ranked General Standard achieves a superior performance relative to the General Standard firms. Overall, these results support our previous findings of the buy-and-hold abnormal returns. For firms transferring to the General Standard we find negative performance effects after the IPO and positive valuation effects subsequent to the re-segmentation announcement. Given this empirical evidence, we conclude that the organization of the "Neuer Markt" was not optimal for all type of firms going public. Moreover, the new segmentation

was beneficial for smaller IPOs and offered them the opportunity to move to an environment with preferable rules and regulations. Consequently, the firms in the General Standard now trade in a more appropriate market segment that better matches the firm characteristics and objectives with the listing requirements, resulting in positive stock market returns.

<Insert Figure 7 about here>

<Insert Figure 8 about here>

5. Multivariate Results

We now present the results of our multivariate empirical analyses. In section 5.1, we estimate the probability that a firm moves to the Prime Standard, which is the segment with the highest transparency standards. In section 5.2, we estimate the probability that a firm still trades in the highest market segment at the end of 2012.

5.1. Probit Model: Segment Transfer Decision in 2003

We estimate the probability that a firm transfers to the highest market segment (Prime Standard) by using different probit models in which we include variables at different points in time. The dependent variable is a dummy variable that takes the values of 1 if a firm switches to the Prime Standard after the re-segmentation and zero otherwise. We assume that different factors may affect the probability and differentiate between information that is available at the time of the IPO and before the re-segmentation of the German stock exchange (Mehran and Peristiani 2010). Hence, we analyze whether the segment transfer decision was predictable with information that was available already at the time of the IPO and/ or the re-segmentation date. In this model, we include all Neuer Markt IPOs that are still listed at the "Neuer Markt" after the re-segmentation announcement on 26 September 2002 (268). We exclude all firms that delisted due to insolvency or acquisition.

The results of our first model including only information that is available at the time of the IPO suggest that a higher underpricing reduces the probability of a firm transferring to the Prime Standard. There exist different explanations for a higher underpricing: the underwriter (investment bank) incorrectly priced the IPO, the investors were extremely optimistic, or the growth opportunities of these firms were overestimated. Consistent with these findings, firms that went public in the hot-issue period in 1999 and 2000 have a lower probability to change to the Prime Standard. Consequently, firms with a higher valuation at the secondary market or firms that went public in the hot-issue period are usually firms that rather intended to exploit

the window of opportunities than being ready for being a publicly traded firm. Analyzing the fundamental factors of these firms, our results confirm that a higher probability of being successful increases the firm's probability to transfer to the Prime Standard. This result is consistent with the significant difference in the probability in the univariate results between upgrade and downgrade firms. Furthermore, we find that higher analyst coverage in the year after the IPO increases the probability to switch to the Prime Standard after the re-segmentation. Analysts provide information for investors and individuals and are therefore important for the decisions to invest in these stocks. The larger the analyst coverage the better should be the information about the firms. However, if analysts of the underwriter cover the firm, these forecasts are positively biased (Bessler and Stanzel, 2006).

<Insert Table 8 about here>

The second model contains only information that is publicly available before the announcement of the re-organization of the stock market segments in Germany. We argue that not only information at the time of the IPO has an impact on the decision to change the market segment, but also firm fundamentals observable shortly before this announcement. These should well reflect the current economic situation of the firm. To separate these effects, we include only data in our model that is available shortly before the announcement of the stock market re-segmentation. The results in Table 8 reveal that these variables are also important as represented by a higher adjusted R^2 of 22.71 %. In particular, we find that firm size increases the probability that the firm moves to the Prime Standard. This suggests that larger firms have a higher probability to transfer to the Prime Standard. Overall, lager firms more often chose the Prime Standard and smaller firms the General Standard. This is consistent with the idea that different stock market segments are useful in optimally satisfying the needs of different firms (Schmidt and Schrader, 2003). Furthermore, in the year prior to the re-segmentation announcement the probability to switch to the Prime Standard increases. In addition, firms with high R&D expenses, which often is a proxy for long-term growth opportunities, have a higher probability of a listing in the Prime Standard. Overall, our results suggest that larger, more profitable firms with growth opportunities prefer to move to the Prime Standard. Consequently, we conclude that the very special event of re-segmentation offers every single firm a unique opportunity to reflect on their previous going public decision and use the second chance to decide which listing segment satisfies their needs best. In fact, the new market segmentation differentiates and re-groups the firms that all had to list on the "Neuer Markt" segment before.

In model 3, we use both groups of variables simultaneously to estimate the effects jointly. If information on certain variables is available at both points in time, we use the variables at the re-segmentation date. The results in model 3 strongly corroborate the findings in model 1 and 2. Deal characteristics at the IPO date are important information to explain which firms upgrade with respect to the segment. In addition, firm characteristics in the year prior to the re-segmentation announcement are important as well. In summary, the results in model 3 confirm the result of model 1 in that the IPO environment affects the segment change decision. Underpricing and the fact that the IPO occurred in the hot-issue period, still reduces the probability to move to the Prime Standard. We also find that firms that offer stock options to their employees have a higher probability for a listing in the Prime Standard, although this holds only in the full model. A possible explanation for this observation is that stock options are widely used by larger firms that more often transfer to the Prime Standard.

Overall, we find that IPO variables such as the magnitude of the underpricing and the hot-issue dummy are well suited to explain the segment transfer decision. This holds also for firm characteristics such as profitability and growth opportunities. Consequently, we conclude that the segment change decision not only depends on the characteristics at the time of the IPO, but also on the firm specific situation shortly before the market segments are reorganized. This suggests that it was to some extent possible to predict segment transfer decisions at the IPO date because firms differ in their IPO characteristics, but firm characteristics at the restart date representing the current firm characteristics are also relevant. These findings indicate that firms choose the Prime Standard that were profitable and had growth opportunities, and that did not go public during the hot-issue period. In contrast, this suggests that the other firms most likely would not have satisfied all the listing requirements in normal periods and consequently would not have been able to go public in a normal market environment. Thus, they used the once in a lifetime "window of opportunities" to go public. Most likely, they realized only after being public that going public at the "Neuer Markt" and required to fulfill all the listing requirements was in hindsight not the optimal decision to maximize the value of the firm in the long-run.

5.2. Probit Model: Segment Affiliation at the End of 2012

We now analyze first whether the decision to transfer from one to another market segment after the re-segmentation announcement persists and then the factors that determine this decision. To analyze the determining factors, we split our sample in upward-switching and downward-switching firms that list after re-segmentation in the Prime Standard or in the Gen-

eral Standard, respectively. We first concentrate on all firms that decided to move to the higher segment level (Prime Standard). The objective of our analysis is to examine whether the segment decision at the re-segmentation date persists or whether other factors such as short-term signaling determined the decision. We include all firms that transferred to the Prime Standard at the re-segmentation date and estimate the probability that this decision persists and that the firms are still listed in the Prime Standard at the end of 2012.

We estimate a probit model where the dependent variable "Prime Segment 2012" attains the value of 1 if the firm is listed in the Prime Standard at the end of 2012 and the segment transfer decision at the re-segmentation was Prime Standard, and zero otherwise. The procedure is the same as before and the results are presented in Table 9. In model 1 we include IPO setting variables and in model 2 variables we observed shortly before the re-segmentation announcement. The results of model 1 show that the IPO setting variables are no longer important in explaining the segment affiliation. Nevertheless, we find a negative effect of underpricing, albeit insignificant. The only significant effect in this model is the risk factor. Firms with a higher risk after their IPO have a higher probability to continue being listed in the Prime Standard after their re-segmentation decision. In model 2, we add firm characteristics at the re-segmentation date. The results confirm that these variables have a higher explanatory power than the IPO setting variables separately. Firm size also increases the probability to persist trading in the highest market segment in Germany. Furthermore, the leverage-effect is negative, suggesting that leverage decreases the probability of a prime listing at end of 2012. In reference to the segment requirements, we find that free float increases the probability to persist trading in the Prime Standard. Because a free float of 25 % is one of the listing requirements to the Prime Standard, the positive effect is not surprising. This result implies that these firms were able to meet the requirements of Prime Standard listing, whereas other firms did not. In addition, the effect of profitability is positive, albeit insignificant. Overall, the results confirm the effects of the segment change probit model in section 5.1. The findings suggest that the firm characteristics at the re-segmentation date are more important than at the IPO date in explaining the persistence of Prime Standard listing and sustainability of the segment change decision. Large, profitable firms with a low-leverage ratio that meet the listing requirements change to the Prime Standard and persist their listing in the highest market segment.

<Insert Table 9 about here>

6. Conclusion

This study analyzes the effects of the new market segmentation of the German stock exchange introduced in 2003 on firms that earlier on went public at the "Neuer Markt". After scandals, frauds and insolvencies of some "Neuer Markt" IPOs, and due to the private law regulation, which made exchange initiated or forced (involuntary) delisting difficult, the German stock exchange council decided to close the "Neuer Markt" and instead introduced new market segments. Consequently, this decision created the special case in which all firms listed at the "Neuer Markt" either had to transfer to the higher ranked Prime Standard or the lower ranked General Standard. These two market segments differ in disclosure requirements and transparency levels as well as in the costs of going public and being publicly traded. The closing of a recently introduced new stock market segment and a re-segmentation forcing firms to move to a different market segment is a rare event in securities markets and therefore worth analyzing. This is particularly important in view of the current discussion in many countries on again creating new market segments for start-up firms. The objective of our study is first to analyze the performance of firms at the German "Neuer Markt" after going public and subsequent to the firms' segment transfer decision. Second, we analyze the determinants that affect the segment transfer decision at the re-segmentation date and analyze if it is possible to predict segment transfer decision already at the IPO date and/ or before the re-segmentation date. We follow the approach of Bharat and Dittmar (2010) and analyze for the IPO date and shortly before the re-segmentation announcement the determinants that affect the probability of a change to the higher ranked Prime Standard.

Our empirical analysis provides evidence that the performance of IPOs that later on transferred to the lower ranked General Standard have negative buy-and-hold abnormal returns during their time at the "Neuer Markt". In contrast, for IPOs that later on moved to the Prime Standard we observe positive returns for the same period. This means that firms that went public at the "Neuer Markt" in Germany are widely heterogeneous. Some firms are ready for being public and some others only exploit the window of opportunities and the high market valuation of IPOs in this hot-issue period. Subsequent to the decision to change the market segment, we observe that the performance of IPOs that transfer to the lower ranked market segment improves. We argue that the firms now trade in a market segment that better matches their own characteristics with the listing requirements of that segment. Furthermore, we conclude that the closing of the "Neuer Markt" segment provides all firms with the opportunity of a restart leaving the negative association with the "Neuer Markt" behind. Consequently, the positive performance subsequent to the re-segmentation results from the fact that

the capital market appreciates the change in the legal organization and the transfer in EU-regulated market segments. Overall, the performance results suggest that the market segment in which a firm trades has an effect on the long-run stock performance. Especially in case of the re-segmentation and the introduction of new market segments, we observe positive performance effects for firms that move to the lower ranked market segment that seems more suitable for them.

The results of the probit model indicate that the decision to change the market segment not only depends on firm characteristics at the time of the IPO but also on the firm specific situation shortly before the stock exchange announced a reorganization of the market segments. Therefore, it was possible to predict segment transfer decisions already at the IPO date and before the re-segmentation date. Overall, our findings suggest that firms choose the Prime Standard that did not go public during the hot-issue period, had lower underpricing, and furthermore are profitable and have growth opportunities. In addition, the analysis of the segment affiliation at the end of 2012 suggests that the firm characteristics at the time of the re-segmentation are more important than at the time of the IPO in explaining the persistence of Prime Standard listing and sustainability of the segment change decision. Large, profitable firms with a low leverage-ratio that meet the listing requirements change to the Prime Standard and persist in listing in this highest market segment.

Overall, we provide convincing empirical evidence that not all firms that went public during the new economy period at the "Neuer Markt" in Germany are poor performing firms. Subsequent to the re-segmentation, the stock market performance of firms that transferred to the lower ranked General Standard starts improving, which may be surprising at first. Furthermore, we provide evidence that the Prime and General Standard firms differ in their IPO firm characteristics. Consequently, based on our empirical findings, is seems that appropriate market segmentation is important for attracting firms with different characteristics. This places different demands on the structure of market segments depending on the firms' cost-benefit relation and business situation. In addition, the JOBS Act in the US improved the going public conditions for small firms, resulting in more small-firm IPOs (Dambra, Field, and Gustafson 2014). Whether a change in listing regulation and the opening of new market segments for young start-up firms in Europe would attract more firms to go public is currently open for debate and left for future research.

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Appendix

Figure 1: Market Segments at Deutsche Börse before and after March 2003

This figure shows the German market segments before and after the re-segmentation.

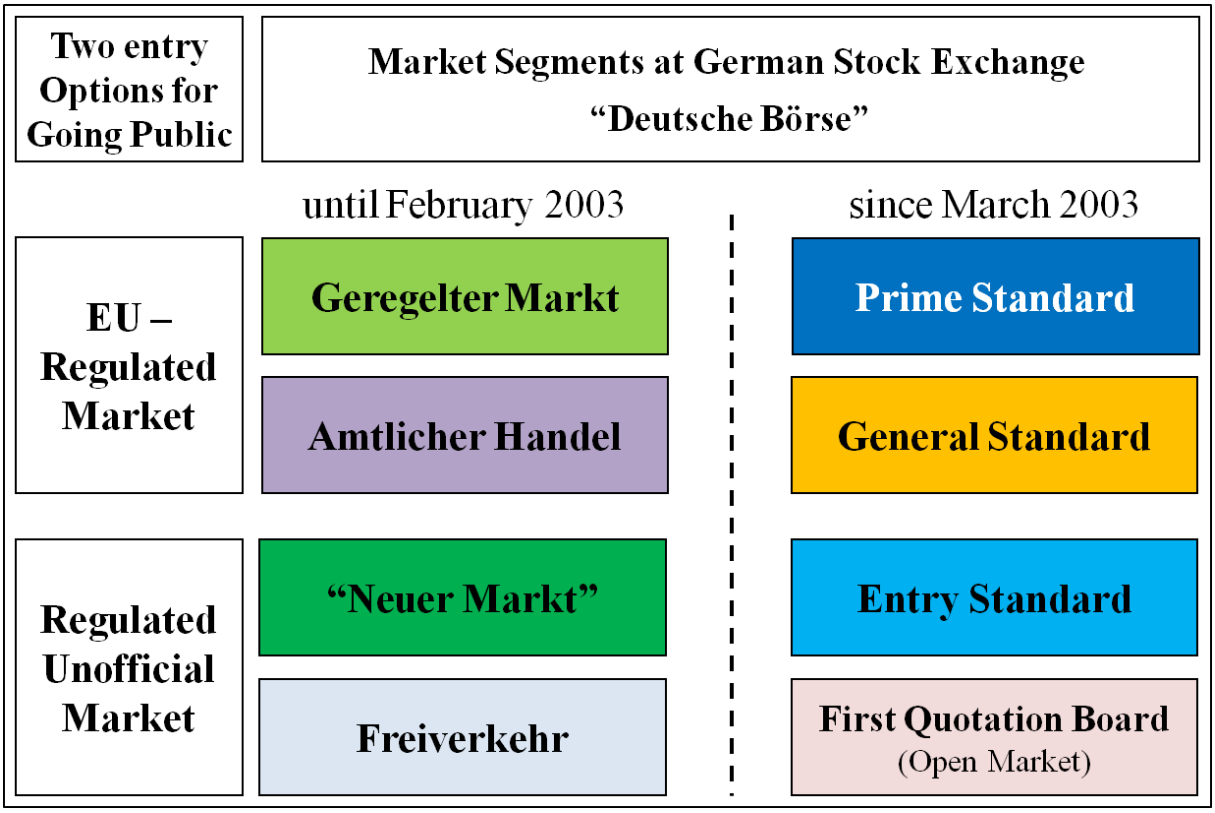

Figure 2: Performance of European New Markets and NASDAQ 1997-2003

This figure shows the index development of the German "Neuer Markt", the French "Nouveau Marché, London's AIM and the NASDAQ during the new economy period.

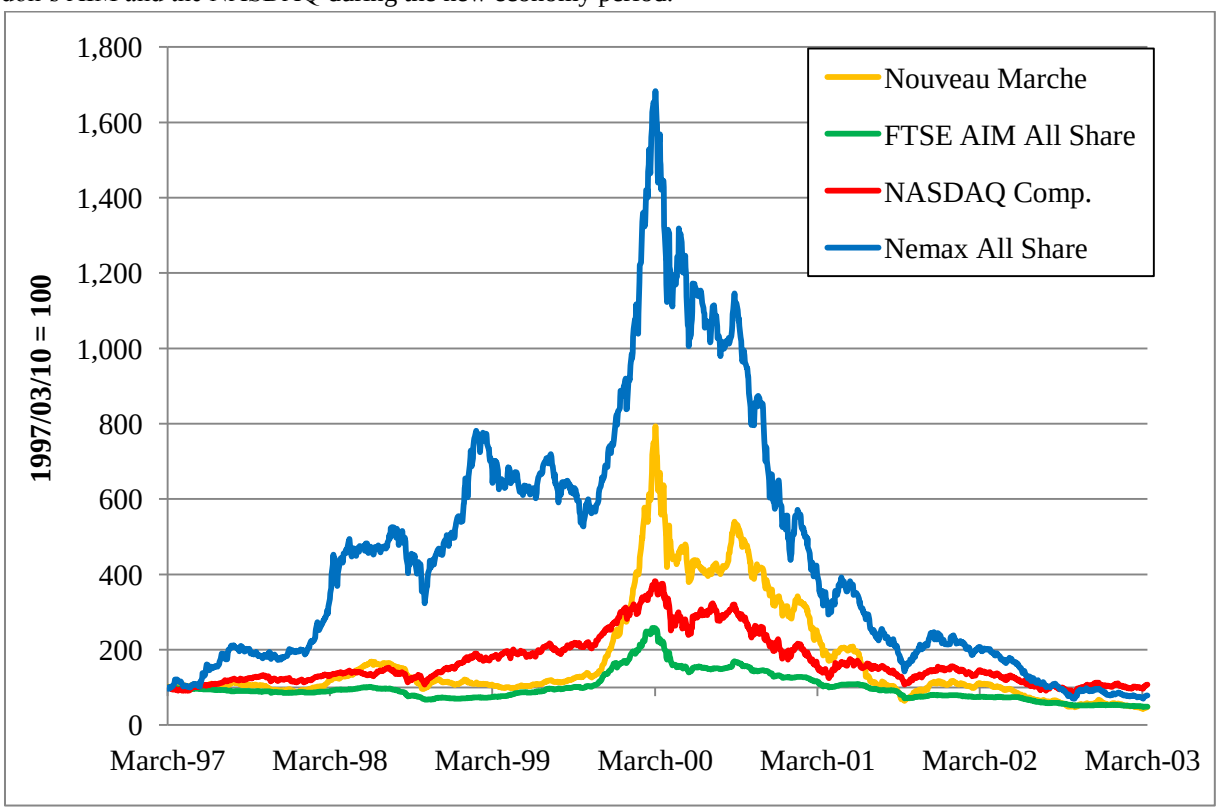

Figure 3: Number of IPOs and their listing status

This figure shows the number of "Neuer Markt" IPOs in Germany between 1997 and 2003 differentiated by their listing status at the end of 2012.

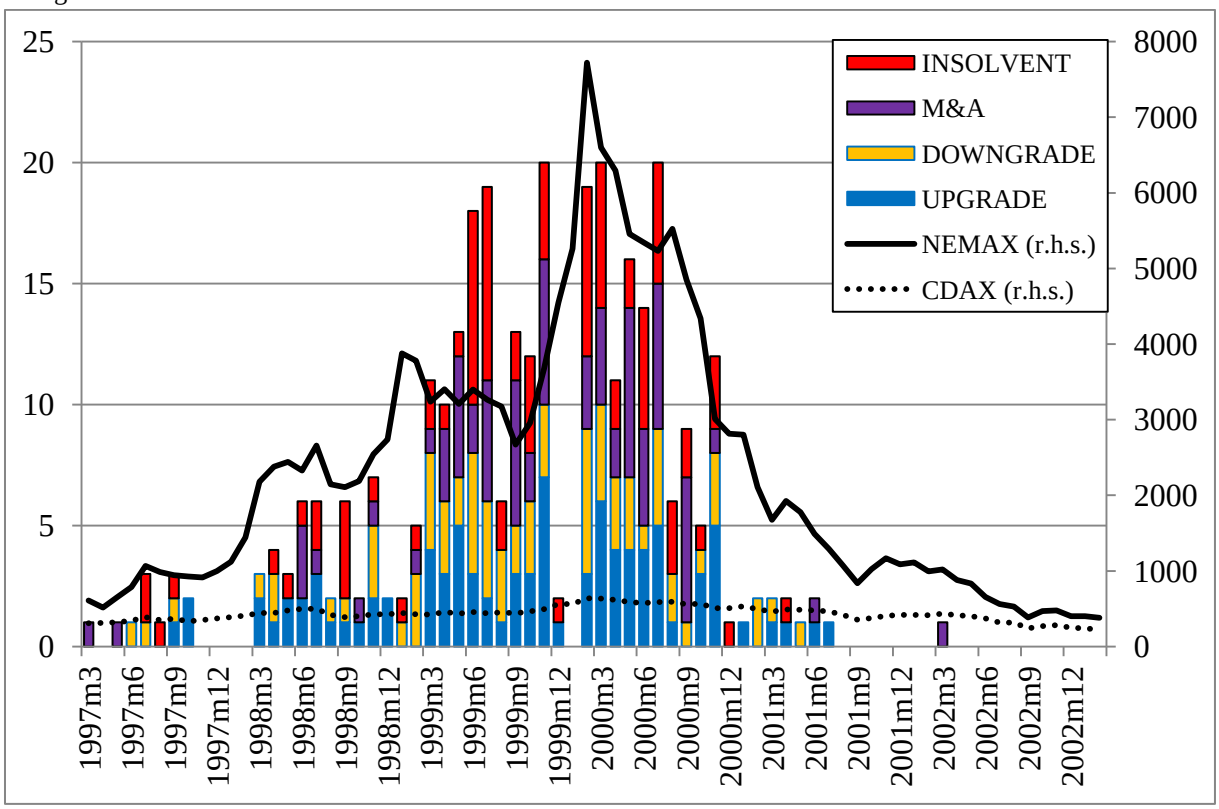

Figure 4: Segment Changes of Neuer Markt IPOs

This figure shows the segment affiliation of "Neuer Markt" IPOs in Germany between the IPO date and July 2013.

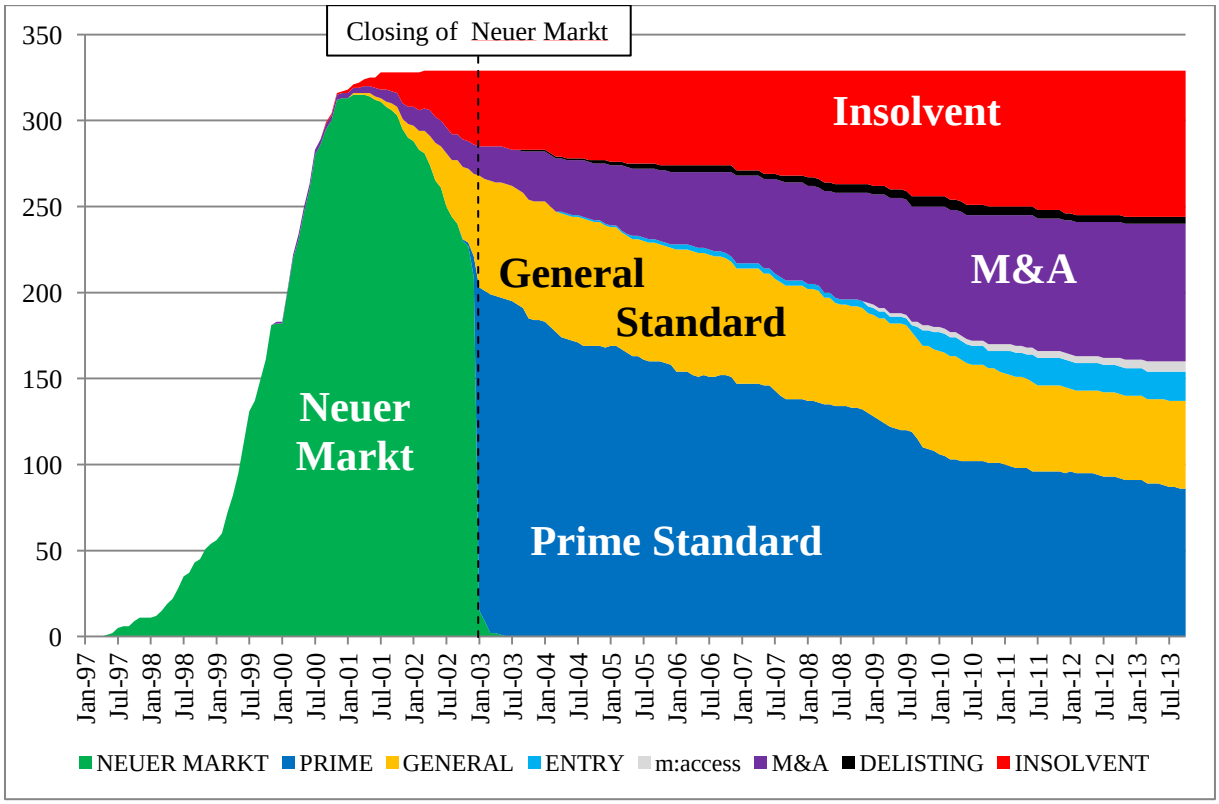

Figure 5a: Post-IPO Performance excluding Underpricing

This figure shows the buy-and-hold abnormal returns of "Neuer Markt" IPOs subsequent to the IPO date excluding underpricing differentiated by their segment transfer decision.

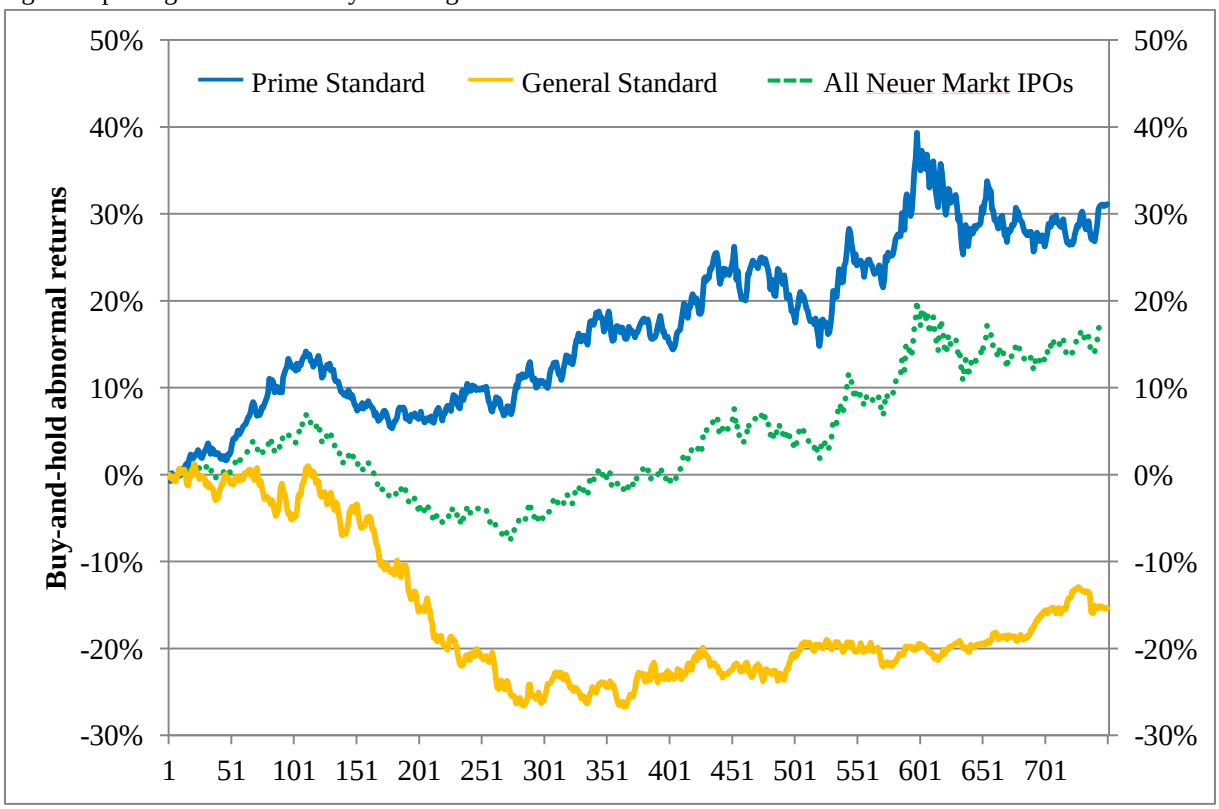

Figure 5b: Post-IPO Performance including underpricing

This figure shows the buy-and-hold abnormal returns of "Neuer Markt" IPOs subsequent to the IPO date including underpricing differentiated by their segment transfer decision.

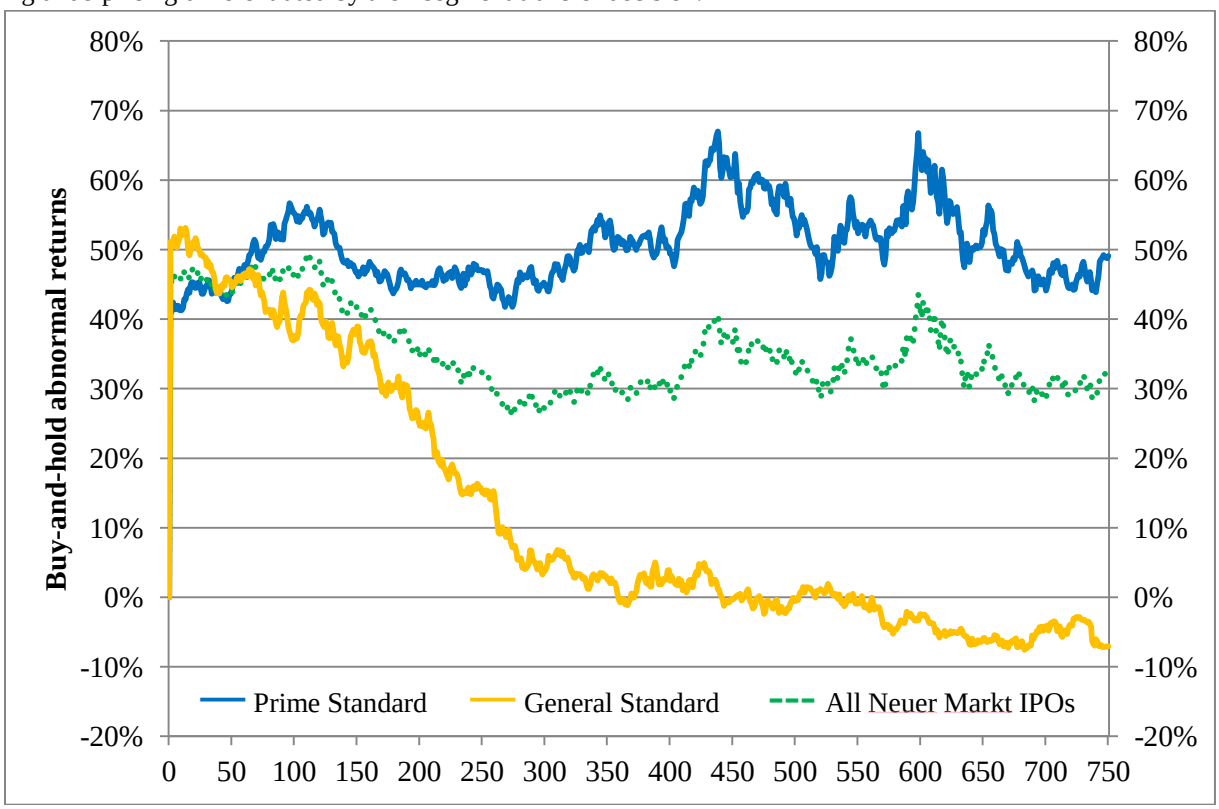

Figure 6: Performance around the Re-segmentation Decision

This figure shows the buy-and-hold abnormal returns of "Neuer Markt" IPOs subsequent to the restart date differentiated by their segment transfer decision.

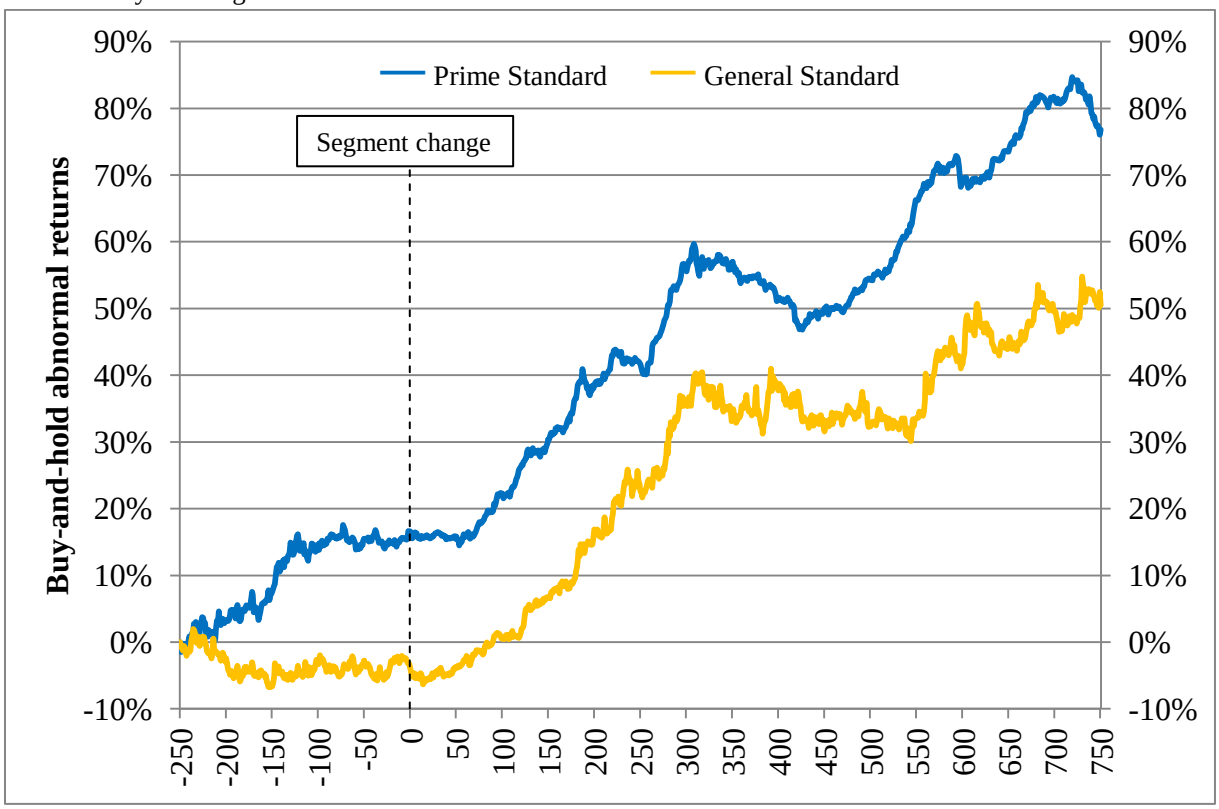

Figure 7: Calendar Time Portfolios (36 months) formed by Listing Status

This figure shows the calendar time portfolios of "Neuer Markt" IPOs subsequent to the IPO date differentiated by their segment transfer decision.

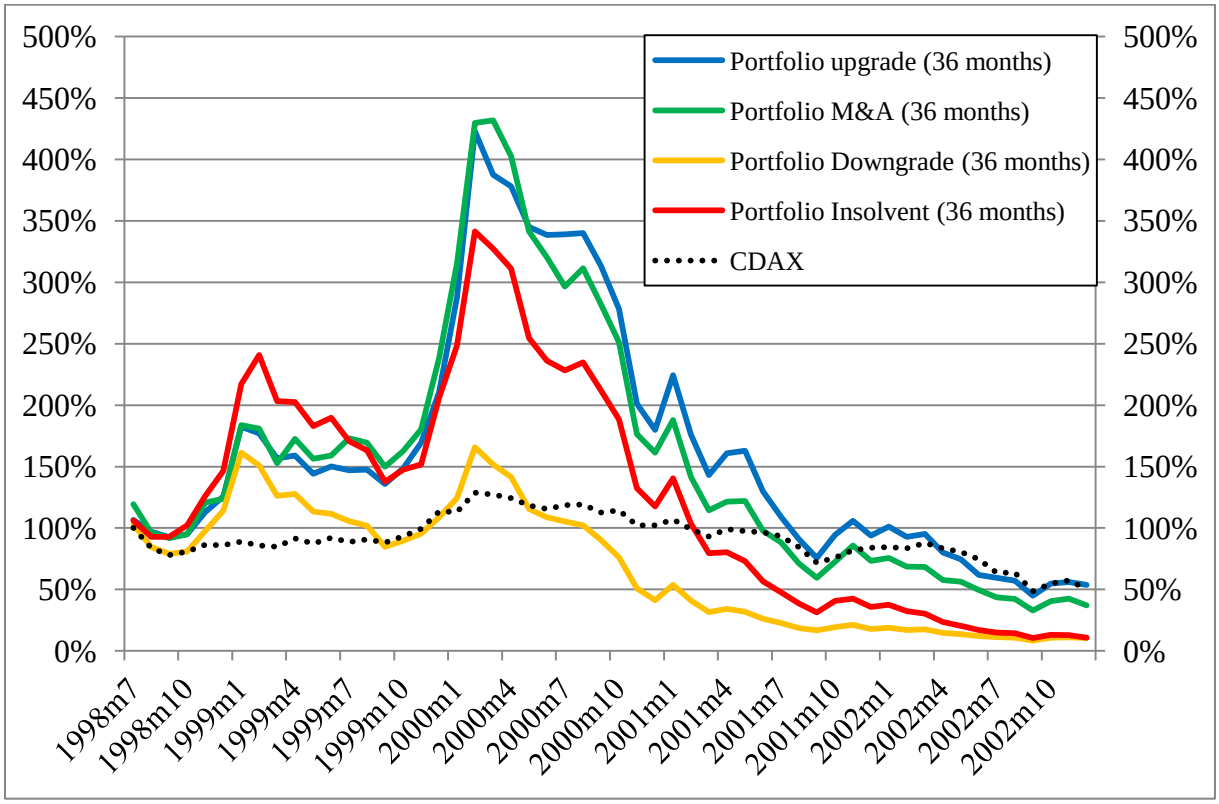

Figure 8: Calendar Time Portfolio (no holding period limit) formed by Listing Status, since Restart Date

This figure shows the calendar time portfolios of "Neuer Markt" IPOs subsequent to the restart date differentiated by their segment transfer decision.

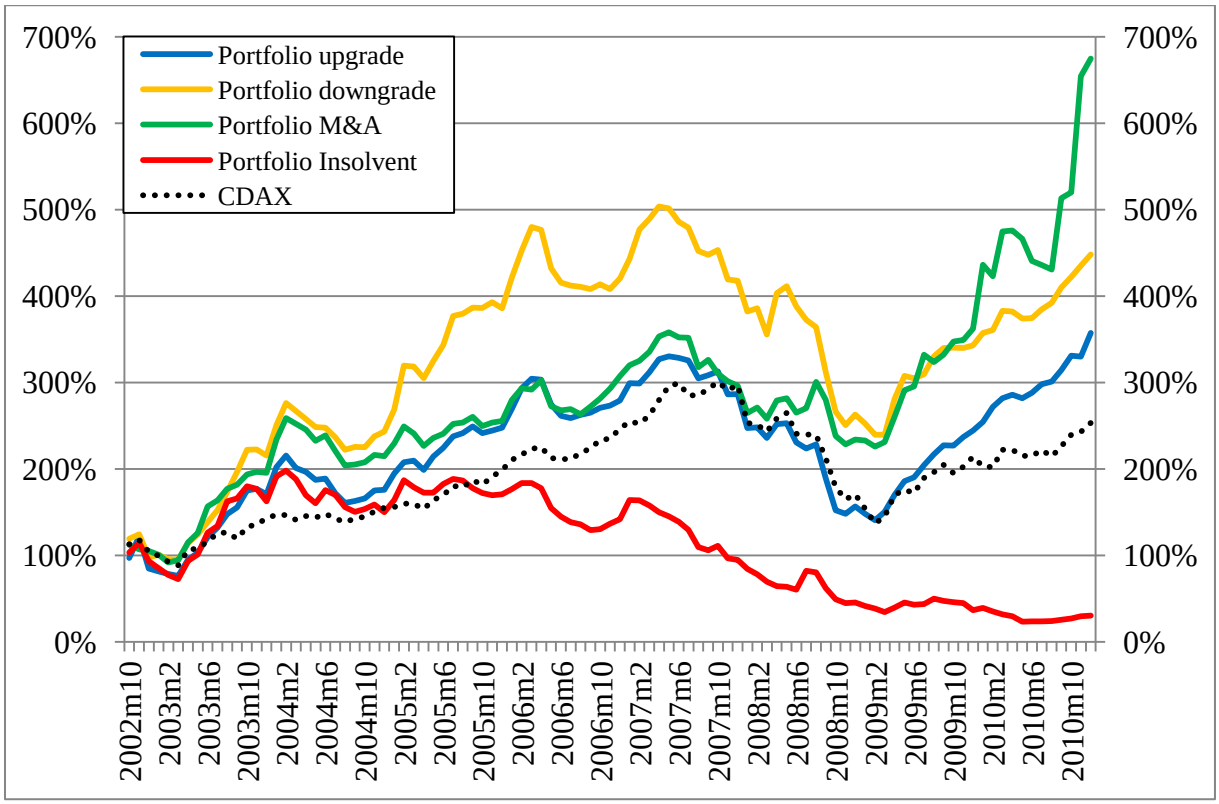

Table 1: Resegmentation of the German Stock Exchange

This table describes the events from the announcement of the stock market re-segmentation until the final closing of the "Neuer Markt" in Germany between September 2002 and June 2006.

26.09.2002	Announcement of the re-segmentation of the German stock market
16.10.2002	Frankfurt Stock Exchange Council resolves the re-segmentation of the German stock exchange
25.11.2002	Re-segmentation of the German stock exchange will be realized at January 1 2003. From now on firms can make an application to list in the Prime Standard.
26.11.2002	Stock Exchange Council approve the re-segmentation and the start of the new market segments at January 1, 2003.
13.12.2002	German stock exchange decides further details to the indexation of the DAX-family after the re-segmentation.
11.02.2003	German stock exchange decides on the constitution of the stock indices. The DAX keeps unchanged. The TecDax forces as benchmark index for technology firms. Changes are active as of March 24.
24.03.2003	Start of the new market segments.
03.06.2003	Final closing of the Neuer Markt. The re-segmentation of the German stock market is completed. Overall, 382 firms are listed in the Prime Standard and 411 firms in General Standard. The "Neuer Markt" and the SMAX were finally closed at June 5 2003.

Table 2: Variable Definitions

This table describes the variable construction and data source.

Variable	Data Source	Description and Construction Principles
Underpricing	Thomson Reuters Financial Datastream	Difference between the first price in the secondary market less the IPO offer price relative to the IPO offer price.
Underwriter reputation	Thomson One	Market share of each underwriter in the IPO year.
Analyst Coverage IPO	Fact Set	Number of analysts that cover the firm in the first subsequent to the IPO or the year before the re-segmentation.
Hot Issue Dummy		Dummy variable, 1 for all firms that went public in the hot issue period between 1999 and 2000, zero otherwise.
Venture Capital	IPO Prospectus	Fraction of shares that is held by venture capitalists at the IPO date.
Management Ownership	IPO Prospectus	Fraction of shares that is held by the management at the IPO date
Risk	Thomson Reuters Financial Datastream	Standard deviation of stock returns from day 11 to day 40 after the IPO weighted with the number of days with zero returns (Amihud 2002).
Stock Options	IPO Prospectus	Dummy variable, 1 for firms that provide stock options to their employees, zero otherwise.
Number of Patents	Derwent Innovation Index (Thomson Financial)	Number of patents at the IPO date.
Age	IPO Prospectus	Number of years from the foundation to the IPO year.
Size / Size Restart	Thomson Reuters Financial Datastream	Natural logarithm of total assets at the IPO date or the year before the re-segmentation date.
Return on Assets / Return on Assets Restart	Thomson Reuters Financial Datastream	Net income to total assets, represents the profitability at the IPO date or the year before the re-segmentation date.
Cash-to-Assets / Cash-to-Assets Restart	Thomson Reuters Financial Datastream	Cash position of the bidder firm relative to total assets at the IPO date or the year before the re-segmentation date.
Leverage / Leverage Restart date	Thomson Reuters Financial Datastream	Total debt to total assets of a firm profitability at the IPO date or the year before the re-segmentation date.
Fee Float	Thomson Reuters Financial Datastream	Number of shares that is not held by blockholders.
Bid-Ask Spread	Thomson Reuters Financial Datastream	Spread of bid price and the ask price.
Dividend	Thomson Reuters Financial Datastream	Dummy variable, 1 for firms that pay dividends before the re-segmentation in the year 2003, zero otherwise.
M&A	Thomson One	Number of successful M&As of a firm before the re-segmentation in the year 2003.
Return on Assets Restart	Thomson Reuters Financial Datastream	Total debt relative to total assets
M/B Ratio	Thomson Reuters Financial Datastream	Market-to-book value of the each firm based on the year before the resegmenation in the year 2003.

Table 3: Segment affiliation after re-segmentation

This table shows the segment affiliation of the "Neuer Markt" IPOs in December 2012 (Panel A) and in September 2007 (Panel B). Firms that are acquired or insolvent at these points in time are considered in the groups M&A or Insolvent, respectively.

Panel a: Segment affiliation in December 2012

		Segment after re-segmentation				
	Segment	Prime Standard	General Standard	M&A	Insolvent	Total
Segment in December 2012	Prime Standard	86	5	0	0	91
	General Standard	17	32	0	0	49
	Open market / Entry Standard	12	4	0	0	16
	m:access	2	3	0	0	5
	M&A	48	14	17	0	79
	Delisting	3	1	0	0	4
	Insolvent	29	12	0	44	85
	Total	197	71	17	44	329

Panel b: Segment affiliation in September 2007

		Segment after re-segmentation				
	Segment	Prime Standard	General Standard	M&A	Insolvent	Total
Segment in September 2007	Prime Standard	132	6	0	0	138
	General Standard	19	47	0	0	66
	Open market / Entry Standard	3	0	0	0	3
	m:access	0	0	0	0	0
	M&A	30	10	17	0	57
	Delisting	2	2	0	0	4
	Insolvent	11	6	0	44	61
	Total	197	71	17	44	329

Table 4: Segment changes after re-segmentation

This table shows the segment affiliation of the "Neuer Markt" IPOs in at the re-segmentation date.

		Segment after segment change		
	Segment	PRIME	GENERAL	OPEN MARKET/ ENTRY
Segment at re-segmentation date	PRIME	-	44	14
	GENERAL	8	-	6

Table 5: Descriptive statistics

This table shows the descriptive statistics of the IPO variables and the variables at the restart date differentiated between firms that switch to the Prime Standard (upgrade) and firms that switch to the General Standard (downgrade).

	Upgrade to Prime Standard			Downgrade to General Standard			Difference in	
Variable	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**	**Mean**	**Median**
IPO data								
Underpricing	197	44.05	18.18	80	55.34	12.92	-11.29	5.27
Underwriter reputation	197	10.07	7.00	80	11.43	8.00	-1.36	-1.00
Analyst coverage IPO date	197	1.71	1.00	80	1.09	1.00	**0.62****	0.00
Hot issue dummy	197	0.48	0.00	80	0.63	1.00		
Venture capital	197	8.16	0.00	80	5.08	0.00	3.09	0.00
Management ownership	196	52.34	56.65	80	54.03	55.55	-1.70	1.10
Risk	197	0.14	0.12	80	0.16	0.12	-0.01	0.00
Stock options	197	0.75	1.00	80	0.66	1.00	0.08	0.00
Number of patents	197	10.30	0.00	80	2.40	0.00	**7.90****	**0.00****
Age	197	10.21	8.38	80	8.05	6.73	**2.16***	**1.66****
Size	183	10.94	10.86	76	10.72	10.65	0.22	**0.20***
Return on assets	153	-3.88	2.30	65	-10.91	-2.98	**7.02****	**5.28****
Leverage	183	0.07	0.03	76	0.07	0.02	0.01	0.01
Cash-to-assets	183	0.43	0.41	75	0.48	0.50	-0.04	-0.08
Restart date								
Free float	185	52.72	47.62	57	49.42	44.00	3.29	3.62
Bid-ask-spread	188	0.29	0.11	69	0.75	0.11	-0.46	**0.00****
Dividend	197	0.19	0.00	80	0.06	0.00		
M&A	197	2.75	2.00	80	2.89	2.00	-0.14	0.00
Size restart date	187	11.01	10.85	62	10.22	9.80	**0.79*****	**1.05*****
Return on assets Restart date	181	-9.22	-1.82	62	-27.03	-19.09	**17.81*****	**17.27*****
Leverage Restart date	185	0.14	0.07	61	0.18	0.06	-0.04	0.01
Cash-to-assets	187	0.27	0.22	62	0.30	0.23	-0.02	-0.01
M/B ratio	188	1.24	0.85	66	2.09	1.18	**-0.85****	-0.34
R&D expenses	187	6.98	1.48	62	3.55	0.00	**3.43****	**1.48*****
Analyst coverage Restart date	197	2.31	1.00	80	0.48	0.00	**1.84*****	**1.00*****

Table 6: Long-run Performance after Going Public with Underpricing

This table shows the buy-and-hold-abnormal return of the "Neuer Markt" IPOs for 1-year, 2-years and 3-years subsequent to the IPO date including underpricing. The results are differentiated between firms that switch to the Prime Standard (upgrade) and firms that switch to the General Standard (downgrade).

BHAR 0,250	**all**	**upgrade (1)**	**downgrade (2)**	**diff (1) - (2)**
mean	**32.26%*** **	**47.05%*** **	15.05%	**32.00%***
median	**4.10%** **	**12.12%*** **	-2.96%	**15.09%** **
sd	143.92%	166.43%	110.45%	
N	323	195	128	

BHAR 0,500	**all**	**upgrade (1)**	**downgrade (2)**	**diff (1) - (2)**
mean	**32.48%*** **	**53.44%*** **	-0.57%	54.01%
median	-4.54%	1.09%	**-9.14%*** **	**10.23%*** **
sd	292.37%	348.45%	118.91%	
N	307	195	112	

BHAR 0,750	**all**	**upgrade (1)**	**downgrade (2)**	**diff (1) - (2)**
mean	**32.31%*** **	**49.06%*** **	-7.03%	56.08%
median	**-3.35%** **	-0.55%	**-11.04%*** **	**10.50%*** **
sd	296.00%	334.81%	57.81%	
N	275	194	81	

Table 7: Long-run Performance after going public without underpricing

This table shows the buy-and-hold-abnormal return of the "Neuer Markt" IPOs for 1-year, 2-years and 3-years subsequent to the IPO date excluding underpricing. The results are differentiated between firms that switch to the Prime Standard (upgrade) and firms that switch to the General Standard (downgrade).

BHAR 1,250	**all**	**upgrade (1)**	**downgrade (2)**	**diff (1) - (2)**
mean	-3.93%	9.91%	**-20.35%** **	**30.26%** **
median	**-7.56%*** **	-2.29%	-21.10%	**18.81%*** **
sd	112.06%	127.25%	90.88%	
N	324	195	129	

BHAR 1,500	**all**	**upgrade (1)**	**downgrade (2)**	**diff (1) - (2)**
mean	3.57%	18.82%	**-20.87%***	39.68%
median	**-7.84%*** **	-5.29%	-13.40%	**8.11%*** **
sd	231.83%	268.85%	79.28%	
N	307	195	112	

BHAR 1,750	**all**	**upgrade (1)**	**downgrade (2)**	**diff (1) - (2)**
mean	17.29%	**30.98%*** **	**-15.33%** **	46.31%
median	**-4.51%*** **	-2.71%	-12.56%	**9.85%*** **
sd	253.98%	286.25%	32.93%	
N	275	194	81	

Table 8: Probit segment change at re-segmentation

This table shows the result of the probit model to estimate the likelihood of a segment change to the higher ranked Prime Standard. Prime is a dummy variable that takes the value of one if a firm switches to the Prime Standard and zero otherwise. In model I we include only independent variables that are important at the IPO date and in model II variables that are relevant at the restart date. Model III includes both groups of variables.

Model	I		II		III	
Sample	all Neuer Markt IPOs		all Neuer Markt IPOs		all Neuer Markt IPOs	
IPO data	*yes*		*no*		*yes*	
Resegmentation data	*no*		*yes*		*yes*	
Dependent variable: Prime	**Coeff.**	**[t-stat.]**	**Coeff.**	**[t-stat.]**	**Coeff.**	**[t-stat.]**
IPO data						
Underpricing	**-0.0033****	[-2.4241]			**-0.0029***	[-1.8919]
Underwriter reputation	-0.0053	[-0.6020]			-0.0034	[-0.2708]
Analyst coverage IPO date	**0.1333****	[2.0450]				
Hot issue dummy	**-0.4986****	[-2.3581]	**-0.5624****	[-2.3744]	**-0.4618***	[-1.8390]
Venture capital	0.0037	[0.5366]			0.0020	[0.2282]
Management Ownership	0.0001	[0.0225]			0.0024	[0.6711]
Risk	0.1031	[0.1087]			-0.1720	[-0.1813]
Stock options	0.2152	[0.9515]			**0.5559****	[2.1197]
Number of patents	0.0096	[1.5144]			0.0048	[0.7474]
Age IPO date	0.0157	[1.0402]				
Size IPO date	-0.0430	[-0.4101]				
Return on assets IPO date	**0.0115****	[2.4249]				
Leverage IPO date	0.6385	[0.5666]				
Cash to assets IPO date	-0.0973	[-0.2039]				
Restart data						
Free float			0.0063	[1.0980]	0.0094	[1.4923]
Bid-ask-spread			-0.0450	[-0.6580]	-0.0540	[-0.7052]
Dividend			0.2937	[0.8546]	0.4134	[1.1237]
M&As			0.0487	[1.1938]	0.0640	[1.4497]
Age restart date			0.0143	[1.0207]	0.0189	[1.3323]
Size restart date			**0.1984***	[1.7666]	**0.2348****	[1.9777]
Return on assets restart date			**0.0097****	[2.2417]	**0.0092****	[2.0551]
Leverage restart date			-0.5466	[-0.9939]	-0.7063	[-1.2321]
Cash to assets restart date			-0.7439	[-1.4592]	**-0.9340***	[-1.7642]
M/B ratio restart date			-0.0513	[-1.3910]	-0.0486	[-1.3327]
R&D expenses restart date			**0.0477*****	[3.1984]	**0.0419*****	[2.5999]
Analyst coverage restart date			0.0361	[0.6657]	0.0127	[0.2308]
Constant	1.0401	[0.8034]	-1.3861	[-1.1198]	-2.2887	[-1.6353]
Adj. R^2	11.52%		22.71%		26.24%	
F-test	30.5308		54.0993		62.3683	
N	217		220		219	

Table 9: Probit prime segment affiliation in the end of 2012

This table shows the result of the probit model to estimate the likelihood to be listed in the Prime Standard end of 2012. Prime is a dummy variable that takes the value of one if a firm is a constituent of the Prime Standard and zero otherwise. In model I we include only independent variables that are important at the IPO date whereas in model II variables are included that are also relevant at the restart date.

Model	I		II	
Sample	all Neuer Markt IPOs		all Neuer Markt IPOs	
IPO data	*yes*		*yes*	
Resegmentation data	*no*		*yes*	
Dependent variable: Prime	**Coeff.**	**[t-stat.]**	**Coeff.**	**[t-stat.]**
IPO data				
Underpricing	-0.0004	[-0.2184]	-0.0022	[-1.226]
Underwriter reputation	0.0141	[1.1251]	0.0044	[0.3483]
Analyst coverage IPO date	0.0234	[0.5444]		
Hot issue dummy	0.2841	[1.1657]	0.2959	[1.2398]
Venture capital	0.0045	[0.6872]	0.0004	[0.0533]
Management Ownership	0.0004	[0.0968]	0.0002	[0.0510]
Risk	**3.4519*** **	[2.7957]	**4.0435*** **	[3.4730]
Stock options	-0.0677	[-0.2355]	0.2246	[0.7628]
Number of patents	0.0015	[0.4523]	-0.0009	[-0.2401]
Age IPO date	-0.0124	[-0.7758]		
Size IPO date	0.0522	[0.4703]		
Return on assets IPO date	-0.0018	[-0.2968]		
Leverage IPO date	-1.2592	[-0.9961]		
Cash to assets IPO date	-0.8367	[-1.5322]		
Restart data				
Free float			**0.0135** **	[2.1832]
Bid-ask-spread			0.1845	[1.2426]
Dividend			-0.0347	[-0.1169]
M&As			-0.0111	[-0.3137]
Age restart date			-0.0113	[-0.8063]
Size restart date			**0.2890** **	[2.3275]
Return on assets restart date			0.0083	[1.3314]
Leverage restart date			**-1.3495***	[-1.8463]
Cash to assets restart date			0.3349	[0.5737]
M/B ratio restart date			0.0191	[0.3328]
R&D expenses restart date			0.0058	[0.4508]
Analyst coverage restart date			-0.0127	[-0.3878]
Constant	-0.9480	[-0.6583]	**-4.5762*** **	[-2.8696]
Adj.R^2	7.71%		16.02%	
F-test	16.1215		37.1822	
N	152		168	