

The Value of Regulation and Reputation: Going Public in London and Berlin, 1900-1913*

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Abstract:

The emergence of an active IPO market was essential to the process of capital market development. A well-functioning market required the trust of public investors as ownership separated from control. Previous research has been inconclusive as to how effective were regulation and reputation in establishing the IPO market. In this paper we undertake a comparative study of the IPO markets between 1900 and 1913 in regulated Berlin and *laissez-faire* London, where two-thirds of IPOs occurred by way of the unregulated Special Settlement method. All IPOs on the Berlin stock exchange survived and on average they made money for investors and performed in line with the market. In London, however, as many as one in five Special Settlement IPOs failed and investors were wiped out. Whilst there were some long-term “winners” amongst these London IPOs, investors saw these gains overwhelmed by their losses. Here was early evidence that unregulated and uncertified IPO markets were bad for investor wealth.

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There is a considerable literature claiming that financial development matters for economic growth (Levine 2004) and industrial development (Rajan and Zingales 1998). The decision to go public remains a very important event in the life-cycle of any firm and an active IPO market is an important element in the process of capital market development. The 19th century first saw the emergence of contrasting Anglo-Saxon and German approaches to capital market development and important differences between the two are thought to persist until today. Britain, representative of the Anglo-Saxon “outsider” model, was characterised by arms-length and short-term lending by commercial banks, a multitude of specialist financial institutions and a well-developed equity market with dispersed and weak shareholders; whereas the German “insider” model exhibited such stylised features as closely-monitored bank lending by universal banks and an underdeveloped equity market.¹ Hence, on the eve of WW1 the ratio of deposits to GDP in Britain was five times that of Germany, whilst both the ratio of stock market capitalization to GDP and the number of listed companies per million inhabitants was two to two-and-a-half times higher in Britain (Rajan and Zingales, 2003).

The degree to which German finance lagged Britain appears to have been overdone. The asset structure of British and German banks was quite similar during the late 19th and early 20th century (Fohlin, 2001). German stock markets were quite efficient (Gelman and Burhop, 2008) and well integrated with other European markets (Baltzer, 2006). German investors were constructing diversified portfolios driven by a similar set of fundamental factors as their British counterparts (Esteves, 2009). Furthermore, a recent study of German financial capitalism concludes that a well-developed stock market emerged simultaneously with universal banking around the turn of the 20th century (Fohlin, 2007a, 2007b).

However, this comparative study of the London and Berlin stock markets just before WW1 argues that there were important differences between these two important capital markets not least in the way that their IPO markets operated. These differences had considerable wealth effects on investors and stemmed from the extent to which regulation and reputable capital were felt necessary in the development of an IPO market. In Germany, the substantial strengthening of German securities laws in 1884 and 1896 led to the strict regulation of subsequent IPO activity (Fohlin, 2002; Burhop 2010). Accounting standards exhibited greater transparency after 1884 (Fear and Kobrak, 2006). In complete contrast, there was little improvement on any of these dimensions in Britain in the period up to WW1 (Cheffins, 2008). Equally, the universal

¹ See, e.g., Baliga and Polak (2004) for a stylized exposition.

banks seemingly played a vital role in promoting and screening initial public offerings (IPOs) and in handling any subsequent equity financing. Whilst in London there was no counterpart to be found.

Reputable banks were important in early capital markets because they represent on solution to the considerable asymmetric information problems between issuers and investors. Flandreau and Flores (2009) study how such problems were overcome in the early 19th century sovereign bond issue market in London with the emergence of such a reputable underwriter as Rothschilds to whom investors could turn in an uncertain world. However, the recent empirical evidence on the certification effect is sensitive to the choice of time period. While Carter, Dark, and Manaster (1998) provided empirical support for bank reputation reducing U.S. underpricing in the 1980s, Loughran and Ritter (2004) and others have shown that the opposite was true in the 1990s.

When we move from the world of sovereign finance to that of industrial finance there are other complementary solutions to these problems, namely regulation. The “law matters” thesis claims that the extent of financial development in any country and the regulatory framework on which it is built can be traced back to the legal origin of that country (La Porta, López-de-Silanes, Shleifer and Vishny, 1998). Such view would hold that Britain should have had a stronger regulatory framework than Germany by virtue of its common law roots. This meta-thesis has been challenged both in the case of the development of equity markets and bond markets (Franks, Mayer and Rossi, 2006; Musacchio, 2008) In the same spirit, this paper argues that contrary to the predictions of legal origin, Germany enjoyed stronger regulation with respect to its IPO market than did Britain, resulting in a better experience for local IPO investors.

We test for the impact of differences in regulation and underwriter reputation on both IPO survival and long-run performance. Previous studies have largely concentrated on IPO initial returns or underpricing.² Here, we focus on IPO survival, the ability of a firm to survive over the five year period subsequent to going public, and long-run IPO performance as measures of IPO market efficiency. We find that London in fact consisted of not one but two markets in this period, a main market, or Official List, and a junior market, or Special Settlement section, not dissimilar to today’s market. Whilst the admission to the Official List set tougher listing requirements, the Special Settlement market had no such requirements. In neither of these markets was there systematic evidence of reputable underwriters operating in sharp contrast to Berlin where the big banks dominated.

² Chambers and Dimson (2009), Schlag and Wodrich (2000) and Burhop (2010).

Our results show that virtually all IPOs on the Berlin market and the London Official List survived and their long-term performance over the three and five years following IPO was in line with the overall stock market in each case. However, one in five of IPOs on the unregulated and uncertified London Special Settlement market had failed by their fifth anniversary of going public. Furthermore, despite there being some “winners” in the latter sample, these were overwhelmed by the large number of poorly performing IPOs. Investors suffered considerable overall losses on these IPOs. This represents early evidence that the London stock market at least when left to its own devices failed in its attempts to provide entrepreneurial finance to early stage ventures that would also generate acceptable returns for outside investors. Confirming the value of regulation and reputation for public investors, Berlin appeared not to suffer any disadvantage in passing up the opportunity to structure its stock market in such a way.

Our comparative study also sheds light on the role of IPOs in promoting industrial development by examining the characteristics of the firms going public. We find that the *laissez-faire* British financial system resulted in a more varied distribution across each of these characteristics, in contrast to a German system focussed on delivering access to scarce equity finance to the most deserving of its industrial clients.

The layout of the paper is as follows. Section I compares and contrasts the institutional background in the two countries. Section II discusses a simple model of the impact of regulation and certification on IPO survival. The characteristics of London and Berlin IPOs are described in Section III, whilst Sections IV and V present our main results before Section VI summarises.

I. Institutional background

Firms going public are regulated by a combination of company and securities laws, on the one hand, and stock exchange rules specifying listing requirements, on the other. The “law matters” thesis states that stock market development is determined by the degree to which a country possesses regulations to protect minority shareholders from the diversion by directors and dominant shareholders of corporate wealth to themselves (La Porta, López-de-Silanes and Shleifer and Vishny, 1998; La Porta, López-de-Silanes and Shleifer, 2004) (LLS). Regulation is also required to force adequate company disclosure in favour of public investors. LLS suggest two measures of the strength of regulation. One is the “anti-director rights index”, which summarises the ability

of minority investors to resist expropriation by dominant shareholders.³ The other, subsequent measure is the “self-dealing index” which includes both civil remedies (private enforcement) and criminal sanctions (public enforcement) available to minority shareholders in the case of related-party transactions between a company director and the company itself.⁴

Neither Britain nor Germany scores very highly on either of these measures in the period 1900-13. By virtue of never requiring shareholders to deposit their shares prior to a shareholder meeting and after 1900 granting shareholders with 10% of the shares the right to call a meeting, Britain met two out of the six elements of the anti-director index before WW1.⁵ The situation was similar in Germany. Shareholders owning only 5% of the shares had the right to call a general meeting of shareholders after 1884, so that the anti-director rights score was again only one out of six.⁶ On the self-dealing index measure, both countries as might be expected at this time exhibited low scores albeit Germany displayed a higher degree of public enforcement as a result of directors, banks and accountants being criminally liable for omissions of material information in a prospectus.⁷

In the particular case of IPOs, the aim of regulation should be to make new, outside investors comfortable about buying and owning equity when a firm goes public. The previous two measures largely ignore the important mechanism of company disclosure which helps bring this about. Disclosure could be mandated both by company law and under stock exchange rules. In Britain the position once again left a lot to be desired. There was no requirement for companies to disclose a profit and loss account and, although they had to disclose a balance sheet after 1908, there was not a standardised format. The 1900 Companies Act had required companies to appoint an auditor but this was of little use since this person need not be professionally qualified. Later on, the 1908 Act required companies distributing shares to the public to file either a prospectus or “a statement in lieu of a prospectus”, but many firms ignored this

³ The elements of the anti-director index are: 1) the ability of a shareholder to cast votes at a shareholder meeting by mailing in a proxy form; 2) a possible requirement to deposit shares before a proxy vote; 3) the availability of cumulative voting, which permits minority shareholders to “bundle” their votes and thereby increases the likelihood they can elect their representatives to the board of directors; 4) mechanisms offering relief to oppressed minority shareholders; 5) rules obliging a company to give existing shareholders a right of first refusal when new shares are issued (“pre-emptive” rights) and 6) the ability of shareholders owning up to 10% of the shares to call, on their own initiative, a shareholders’ meeting. La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

⁴ The private enforcement elements of the self-dealing index are described in La Porta, López-de-Silanes and Shleifer (2004) and the public enforcement elements in Djankov, La Porta, Lopez-de-Silanes and Shleifer (2005).

⁵ Cheffins (2008), pp.36, Table I.

⁶ Franks et al. (2006), pp. 544.

⁷ Re. Britain see Cheffins (2008), pp.38, Table II. Cheffins estimated a score of 0.14 out of a maximum of 1 for pre-1914 Britain which compares with 0.67 after 1967.; and re. Germany see Franks et al. (2006), Table III, pp.546-551.

requirement in the years immediately preceding WW1.⁸ Just as importantly, investors in IPOs were almost never able to seek redress through the courts for any fraudulent behaviour by companies, directors and their advisors (Cheffins, 2008). In short, any substantial improvement in the disclosure of company accounts and any strengthening of the rights of minority investors had to await the passage of the 1948 Companies Act (Arnold and Matthews, 2002).

In response to the large number of firms de-listing from the stock exchange following the 1873 market crash, the German authorities made a much more concerted effort to protect investors by enacting in 1884 stricter incorporation laws which substantially affected IPOs (Baltzer, 2007; Burhop, 2006; Burhop, 2010). The 1884 corporate law prescribed for the two years preceding incorporation of any firm the disclosure of balance sheets and profit-and-loss statements, both independently and professionally audited. The law also defined the legal personality of the incorporator and the accompanying duties and liabilities to shareholders. If the firm went public within two years of incorporation, the incorporators, the board members and the bank underwriting the issue were all liable for any failure to comply with the law regarding incorporation (Wolff, 1915: 73-76).

Investors can turn to stock exchange listing rules to fill in any gaps in the company law. In London, the first printed edition of the *Rules and Regulations of the Stock Exchange* (LSE Rules) appeared in 1812 and subsequent editions have appeared at irregular intervals. Cheffins (2008: 196-7) summarises the LSE rules relevant to IPOs at this time. The main addition to the force of company law was to require articles of association to be in an approved form and, by 1909, detailed what provisions the articles should contain so that firms were henceforth required to distribute a profit and loss account both to shareholders and the LSE. One other important LSE requirement relating to IPOs was that the firm for which a listing was being sought should be of “sufficient magnitude and importance”. The language was vague and allowed the Committee considerable discretion in admitting securities to an Official Quotation at least. The other important requirement was the “two-thirds rule”, requiring that two-thirds of any newly issued security must have been “subscribed for and unconditionally allotted to the public” before permission to deal was granted. Beginning in the 19th century, company promoters in collusion with brokers and jobbers often created a false market in newly listed securities. By allotting themselves and their friends a large portion of the

⁸ According to Lavington (1921), pp.202, as many as three in five firms did not issue any prospectus or statement.

issue, they made sure that only a very few shares came onto the market and that the price would soar in initial trading. The “two-thirds rule” was introduced to ensure that sufficient shares were released onto the market in initial trading to prevent such manipulation.

Until WWI these rules dealt only with those firms seeking an Official Quotation and firms could easily side step such rules by choosing to apply for a “Special Settlement”. The earliest reference to this practice was in 1829 (Morgan and Thomas, 1962: 152-3). The Committee of the LSE would fix a special day for all bargains in the new security to be settled, outside of the ordinary account calendar. If a Special Settlement day were granted, the security would then be traded for the ordinary account; if not granted, then all bargains were voided and funds returned to the original subscribers to the issue. Jobbers made a market in such securities off the Official List. However, prices were only published from 1916, when a *Supplementary List* of share prices was initiated. This effectively was what would be regarded today as a junior market to complement the main market. In what follows, we regard any firm issuing equity and being granted a Special Settlement along with those firms obtaining an Official Quotation as an IPO.

Listing rules were unquestionably stricter in the case of the Berlin Stock Exchange (BSE), especially following the enactment of the 1897 Stock Exchange Act. The underwriter had to publish a prospectus disclosing among other things the proposed use of the capital, the most recent balance sheet, the most recent profit and loss statement as well as the dividends paid during the last five years. The latter three items were frequently missing in the case of London prospectuses. Moreover, the 1897 Stock Exchange Act prohibited the publication of any information about stocks not officially admitted to a German stock exchange, effectively disallowing any over-the-counter markets. Finally, both the issuer and the underwriter were liable for the accurate and complete information for a period of five years after the IPO.⁹

Investors could, of course, turn to others supposedly better placed than themselves for an opinion in the absence of suitably stringent company law or listing rules. In Britain, unfortunately, company promoters and ennobled directors were of little help in assuring investors of IPO quality.¹⁰ Some firms choose not to have their issues underwritten at all (Lavington, 1921: 212). Those firms that chose to have their IPOs underwritten were unable to attract the most reputable banks as defined by membership of the prestigious Accepting Houses Committee. Even in the interwar period, these banks preferred to concentrate on sovereign or large corporate bond issues (Chambers and Dimson, 2009).

⁹ Pflieger and Gschwindt, 1897: 113, 126, 202; Thiwissen, 1900: 17, 43

¹⁰ Cheffins (2008), pp.208-9.

As late as 1931, the Macmillan Committee was damning in its judgment: “the public is usually not guided by any institution whose name and reputation it knows”.¹¹ We will examine in more detail the underwriting of London IPOs in the pre-WW1 period in the next section.

In Berlin, matters were very different. Both joint-stock credit banks and private banking houses were actively involved in underwriting equity issues and the larger universal banks increasingly came to dominate IPO underwriting (Lehmann 2010). The need to pay-up for and hold shares in advance of floating them on the market cemented the position of these larger banks. Industrial firms connected to a bank via interlocking directorships had a higher probability of going public than unconnected firms (Fohlin, 2007: 230, 260-261). Although this was not an underwriting monopoly guaranteed by law, since anyone could become a member of the stock exchange and underwrite shares (Obst, 1921: 377-378), in practice, barriers to entry increased substantially over time as banks built their reputational capital. Evidence for this can be found in the decreased propensity to switch underwriter post-IPO (Lehmann 2010).

Summarising this section, investors in Berlin IPOs enjoyed both better disclosure and were afforded greater protection under company law and stock exchange rules compared to those in London IPOs. As Lavington put it, in the latter case:

“where a new company is being formed..., the material on which to form an estimate of its prospective yield is so inadequate that the opinion of the ordinary investor is practically valueless and his purchase is an act of faith rather than judgement.”¹²

Investors in firms choosing only to apply for a Special Settling day, were particularly vulnerable given the virtual absence of listing requirements. Those firms seeking an Official Quotation were held to a higher standard. However, no London IPOs were handled by reputable underwriters unlike Berlin where the universal banks helped otherwise hesitant investors to part with their savings. Importantly therefore there was no junior market in Berlin. This absence could be viewed by investors and listing authorities alike as an opportunity lost in that very young or start-up firms with no business record were denied timely access to equity finance. Alternatively, the ability of London IPOs to engage in regulatory arbitrage could have simply allowed weak and fraudulent schemes onto the market to the detriment of investor wealth. We take up this important question in the rest of the paper.

¹¹ Harold Macmillan, *Report of the Committee on Finance and Industry*, Cmnd. 3897 (London, 1931), Minutes of Evidence, Q.1308.

¹² Lavington (1921), pp207.

II. Regulation, reputation and IPO survival: a simple model

Early capital markets faced a considerable asymmetric information problem. How can public investors presented with a new security in which to invest and unable to observe the true characteristics of the underlying issuer become comfortable with making an investment? When investors cannot distinguish between “good” and “bad” issuers, then we are in the world of Akerlof’s market for “lemons” where investors either demand price protection in subscribing for new issues or refuse to invest at all (Akerlof, 1970).

Ameliorating such a fundamental problem is a crucial to capital market development. Flandreau and Flores (2009) argued that the solution in the case of the early nineteenth century sovereign debt market in London emerged in the shape of a reputable bank such as Rothschilds lending their name to new issues in order to “certify” their quality. At the end of the nineteenth century, DeLong (1990) claimed that J.P. Morgan played a similar certification role in enabling US railroad and industrial corporations to access the stock markets and attract a wider investor base. However, as we argued in the previous section, regulation in forcing disclosure and establishing legal liability for failure to disclose material information has as at least as important a role to play as certification in overcoming information gaps between issuers and investors.

Information asymmetry is especially problematic for IPOs, where issuers meet with investors for the first time. Issues of equity are particularly problematic in this regard given that equity represents the residual claim on a firm’s assets and is higher risk than debt. Any misjudgement by investors about the quality of a firm going public by way of a share issue can therefore have dramatic consequences for investor wealth. On the other hand, equity IPOs hold out the prospect of considerable gains should investors correctly select high quality firms.

In the context of an IPO market, the simple model we consider is as follows: investors in an uncertain world who struggle to distinguish between good and bad quality firms are better able to ascertain the true characteristics of a firm, the better is prospectus disclosure (*Disclosure hypothesis*). At the time, investors could scrutinise an IPO prospectus for such critical items as the number of years of historic profits or dividends paid, and an asset valuation or (abridged) balance sheet. The greater the number of years historic profits and the more likely the inclusion of an asset valuation, the higher the quality of the IPO other things equal. In addition, an investor would also look for the presence of a reputable underwriter, as a signal of IPO quality (*Certification hypothesis*). Whilst certification can substitute for poor disclosure, the two are

complementary and investors are likely to be most comfortable about an IPO where disclosure is good and a reputable underwriter is on the tombstone.

Investors can only observe the quality of a firm going public *ex post*. One measure of quality is the initial return or underpricing of an IPO. The poorer the quality of the IPO, the more investors will want to price protect themselves by negotiating a substantial discount in the offer price. However, based on previous studies, underpricing in early capital markets was very low. Chambers and Dimson (2009) demonstrate that underpricing in London was significantly narrower during the interwar years than during the period since WW2. Similarly, Schlag and Wodrich (2000) and Burhop (2010) illustrate that German initial returns were surprisingly low before 1913. Moreover, Chambers and Dimson (2009) and Burhop (2010) find little or no relationship between market regulation and underpricing.

Hence, underpricing is likely to be a poor measure of IPO quality. In this study, we concentrate on an alternative measure namely, IPO survival. The poorer the quality of an IPO, the more likely it will fail in the years following the IPO, where IPO failure is defined as a liquidation or winding-up with shareholders receiving no return on their investment. Some firms will of course be acquired by another firm. The remaining firms will be deemed survivors. Most remain healthy and maintain a stock market listing, but some struggle yet still survive albeit without an active listing. Previous studies have estimated a survival rate, the proportion of all IPOs in a market which survive over the five years following the IPO, or its reciprocal, the failure rate.

According to our two hypotheses, we would expect survival rates to be higher, the better is disclosure and the more reputable is the underwriting in a given IPO market. Based on the discussion in the previous section, Berlin IPOs should therefore display a higher survival rate than London IPOs, especially those going public by way of Special Settlement.

One small sample study of US IPOs provided evidence that stronger regulation under the 1933 Securities Act resulted in an improvement in IPO survival and long-run performance. The high failure rate of 24% among IPOs on the less well regulated regional exchanges before the 1933 Act, compared to an NYSE IPO failure rate of 5%, halved following the Act (Simon, 1989: 300, Table 2). Whilst no studies of IPO survival have been carried out in Britain or Germany, there have been studies examining survival among newly incorporated firms which includes IPOs. Andrews (1937) conducted analyzed the survival of all newly-registered companies between in Britain and found that approximately 15% of firms registering between 1919 and 1927 failed over the following five years. The failure rate then jumped to 40% for those firms registering in the new

issue boom of 1928 and 1929. In Germany, Baltzer (2007: 68) claims that the failure rate of incorporated firms after the 1870 German corporate law reform was significantly lower than for firms incorporated before 1870. The effects of the 1884 and 1897 Acts on survival have not been investigated. Moreover, in none of the above studies have the benefits of underwriter certification on survival been not evaluated.

Several studies have also examined long-run IPO performance in an historical context. This measure, customarily estimated over periods up to 5 years following listing where performance is calculated in terms of market-adjusted total stock returns, offers more granularity in assessing IPO performance than does a simple dummy variable approach. In the US, Simon (1989) also examined long-run performance of pre- and post-1933 Act IPOs and concluded that market-adjusted returns of the non-NYSE IPOs improved dramatically from underperforming the market by 50% over 5 years to performing in line with the market. These results were however based on only 92 IPOs. A comprehensive large sample study by Gompers and Lerner (2003) covers US IPOs in the period from the Securities Act until the start of NASDAQ in 1972 and concluded that, contrary to post-NASDAQ studies asserting a persistent underperformance “puzzle”, IPOs did not underperform the market. The first study of long-run IPO performance in Britain examined the disastrous performance of the 1928 new issue cohort, with investors in new ventures and in existing businesses disclosing no past profits losing virtually all their money (Harris, 1933).

Therefore, long-run performance is an alternative measure to IPO survival and in this study we examine both when evaluating the value of reputation and regulation.

III. IPO characteristics

Our data allow a unique comparative look at IPO activity across a range of different industries in two of the leading industrial countries of the pre-1914 period. The British sample includes the very type of risky industrial and commercial firm absent from the Edelstein (1982) and the Goetzmann and Utkov (2009) studies of the late Victorian stock market. As discussed above, London IPOs comprised both those firms seeking an Official Quotation and a much less onerous Special Settlement. Only those firms with an Official Quotation on the LSE would have appeared in Edelstein’s data.

Our sample comprises a total of 825 equity IPOs on the LSE, 267 obtained an Official Quotation (OQ) and the remaining 558 a Special Settlement (SS), and 250 IPOs on the BSE. Whilst all Berlin issues were of ordinary shares, those in London were In the

case of ordinary shares, preference shares or both.¹³ London IPOs are identified from *The Times Book of Prospectuses* and then cross-checked against Burdett's *Stock Exchange Official Intelligence* (Burdett's) as well as the LSE record of applications for listing in order to distinguish between an IPO and a seasoned equity offering (SEO).¹⁴ The Berlin equity IPOs are taken from the annual register of security issues published by the Imperial Statistical Office (*Kaiserliches Statistisches Amt*, various issues) and cross-checked using the *Handbuch der deutschen Aktiengesellschaften* (various issues). We again exclude SEOs from the data by consulting the 1901/02 edition of *Saling's Börsenpapiere*, a stock market manual, comprising all companies BSE or provincial stock exchange listings at the end of 1899.

Activity in terms of number of IPOs is similar on the LSE OQ and BSE, but both are substantially surpassed by those on the LSE SS (**Table 1**). The LSE shows evidence of hot (1909-10) and cold (1902-04) periods of IPO activity, whilst the fluctuation in BSE IPO activity is more muted and suggests a more managed IPO process with the exchange authorities and the banks operating a queuing system.

London IPO prospectuses varied considerably in their length and content but typically disclosed the following information to investors about the firm: the type of and the number of shares being issued; the number of shares outstanding; either the firm's registration date or the date of establishment of the business; a description of the business; whether or not the issue was underwritten; and whether the firm was applying for an Official Quotation or just for Special Settlement. The prospectus sometimes disclosed the number of years of historic profits and an asset valuation of abridged balance sheet. Any indication as to the purpose of the issue and the amount of new money raised by the firm as opposed to proceeds going to selling insiders listing was often not clearly stated.

Berlin prospectuses also contained information about the purpose of the issue, the registration date of the firm, a description of the business, as well as without fail historic dividend information, the last balance sheet, and the last profit and loss account. The Imperial Statistical Office published information on the number of shares outstanding, the number of shares admitted to the stock exchange, and the names of the lead and co- underwriters.¹⁵

¹³ In line with previous IPO studies, issues by firms already listed on another stock exchange, investment trusts, and introductions are excluded. Penny shares, or shares with an offer price of 2 shillings or less, are also excluded. Such issues were characteristic of very speculative issues, Thomas (1978), p.37.

¹⁴ This index is held at the Guildhall Library, London. Where necessary, the actual application file was consulted.

¹⁵ The number of shares offered to investors was not published by the Imperial Statistical Office, however, and was only seldom published in the prospectus. Consequently, we are unable to calculate gross

London IPOs were more heterogeneous than Berlin IPOs, both in their choice of listing platform and in security design. All Berlin IPOs were of ordinary shares.¹⁶ A sizeable proportion of British firms went public by issuing preference shares - 224 preference share and 85 combined ordinary and preference share IPOs. Furthermore, preference shares should be viewed as quasi-equity. They received profit participation rights in two out of five instances and carried voting rights in at least eight out of ten cases.¹⁷ Only later on, towards the end of the interwar period, did preference shares begin to lose such rights and become more akin to debt instruments. All securities issued at IPO on the BSE carried the same voting rights.

Based on the above prospectus disclosure, we categorise each IPO by geography and sector (**Table 2**).¹⁸ The differences are striking. All Berlin IPOs were of German corporations, whereas only three-fifths of London OQ IPOs (152) and one-quarter (146) of SS IPOs respectively were domestic firms, with the majority of the remaining IPOs being colonial enterprises. The total number of domestic IPOs was therefore quite similar in both countries, with a small advantage to London. Given that the economies of the two countries were approximately the same size in this period, this summary statistic crudely suggests that neither stock market was lagging behind the other in supporting industrial growth.

German IPOs were much more concentrated in the commercial and industrial sector and in iron, coal & steel. These two groups represented about 63 percent of Berlin IPOs, and 59% of London OQ IPOs but only 27% percent of London IPOs. The London market, especially the SS section, saw a substantial number of IPOs of non-ferrous metal mining companies, oil firms, and plantations, almost all of which were colonial enterprises. This pattern is consistent with the competition for funds between the domestic and overseas industry first documented by Cairncross (1953). Indeed, well over half (160) of the London IPOs in the hot market of 1909-10 were plantations, mainly rubber, seeking to profit from investor excitement about the prospects for bicycle and automobile tyre manufacturing. Berlin, on the other hand, made no capital available for

proceeds for Berlin IPOs. In Table 1 we approximate this figure by the value of shares for which a listing was granted on the BSE.

¹⁶ As of 1906, only 3% of the share capital issued by all German corporations to date was in the form of preference shares (Moll, 1909: 311).

¹⁷ The remaining preference shares only carried votes in certain limited circumstances such as when dividends were in arrears.

¹⁸ The location of a firm is defined by its main centre of operations as described in the prospectus rather than the place of registration or incorporation.

natural resource enterprises reflecting the economic irrelevance of Germany's colonial empire.¹⁹ Domestic firms enjoyed a captive domestic capital market.

Next we compare riskiness of firms going public in the two markets in terms of their size, age and the degree of prospectus disclosure. IPOs on London OQ are larger, in terms the market capitalization of shares outstanding post-IPO valued at the offer price, than those IPOs by Special Settlement with Berlin IPOs somewhere in between (**Table 3**). Firm age, estimated from the date of establishment of the business or the registration date whichever is earlier, shows London OQ firms to be the most mature.²⁰ Our main summary measures of prospectus disclosure at the time of IPO are track record, the number of years of historic profits or dividends paid, and asset value, or the proportion of IPOs which disclosed a balance sheet or asset valuation. Reflecting the previous discussion of the legal reforms introduced in Germany in the late 1890s, Berlin clearly comes out ahead of London OQ with London SS trailing well behind on both disclosure dimensions.

Jovanovic and Rousseau modelled firm age as waiting time to listing with technology shocks at the beginning and end of the 20th century contributing to relatively short times to listing compared to the middle of the century. In London, almost half of the SS IPOs were firms that had just been set up according to the prospectus. This was not possible under Berlin listing rules. One potential advantage of a "junior" market with less strict listing requirements is that it can fulfill an incubator function supplying the main market with a pipeline of viable new listings and startup enterprises with timely risk capital. We shall return to this argument when evaluating the performance of London SS IPOs below.

Turning our attention to underwriting, there are also substantial differences across the London and Berlin IPO samples lending support to the earlier discussion of institutional differences between the two markets. Firstly, in London, only slightly more than one-third of IPOs on both the OQ and SS markets were underwritten by a third party, whereas all Berlin IPOs were so underwritten (**Table 4**). At least as many London IPOs were not underwritten as were underwritten. Related parties of the newly listed firm (directors and vendors) underwrote 25% and 15% on the OQ and SS respectively. Secondly, the London market, where 126 firms underwrote 302 IPOs, was very

¹⁹ In 1912, the German colonies had less than 12 million inhabitants. In 1913, only 101 corporations (German and British joint-stock companies, limited liability companies, and chartered companies) with a capital of 106 million Mark were active in the German colonies. Most of these companies were in the legal form of a GmbH, which could not be listed on a stock exchange (Schinzinger, 1984: 37, 60).

²⁰ Firm age is most likely understated for Berlin IPOs since in some cases the registration date occurs after the business was established.

fragmented compared to Berlin. The largest underwriters with only six IPOs each were Emile Erlanger & Co. (foreign bank), Linton Clarke & Co. (broker) and Central Industrial Trust. Furthermore, there was not much certification going on. The accepting houses and merchant banks were noticeably and virtually absent from this market with Brown Shipley & Co, C.J. Hambro & Co., J. Henry Schroder & Co. and Speyer Brothers only handling a single IPO each. Robert Fleming which had not yet become a merchant bank, underwrote three North American firms going public in London. The reputable merchant banks were not to engage seriously with equity IPO underwriting until after 1945 (Chambers, 2009).

In contrast, Berlin IPO underwriting was concentrated among the large and reputable universal banks. More than half of Berlin IPOs were underwritten by fourteen members of the Imperial Loan Syndicate, whose reputation was established by its monopoly of German and Prussian government bond issues (**Table 4**). Most of the remaining IPOs were underwritten by private banking houses. Almost 30% by number and 50% by value of all IPOs were handled by the four large 'D-Banks' (Deutsche Bank, Dresdner Bank, Discontogesellschaft, and Darmstädter Bank). Furthermore, according to Lehmann (2010), the share of the D-Banks increased towards the end of the period and the propensity to switch underwriter in the years immediately following IPO dropped substantially. Thus, the IPO business was to a large degree managed by the largest universal banks.

In summary, whilst Berlin IPO investors were reassured by the reputation of the strongest banks, London investors were largely left to their own devices in assessing any new listing, a situation well-known at the time.²¹

IV. IPO survival

An IPO can delist as a result of being wound up or a merger. Delistings were identified by searching *Burdett's* and the *London Gazette* for London IPOs and *Saling's Börsenpapiere*, a stock market manual, and *Handbuch der deutschen Aktiengesellschaften*, a joint-stock company manual for Berlin IPOs. Accordingly, we classified each IPO as failing (FAIL), being acquired (ACQUIRED), or being liquidated where shareholders receive a payoff (LIQUIDATE).²² The remaining firms are deemed as surviving (SURVIVE).²³

²¹ See for example Lavington (1921) and a little later Finnie (1934).

²² Care must be taken to distinguish between a voluntary and a compulsory winding-up. In the former case, a firm might be wound up even though a going concern because the owners wished to retire or sell out. Such instances are not treated as failures since cash or securities were offered to shareholders. Where

Failure rates across the three markets are dramatically different. Whereas all Berlin IPOs survive and only 7 firms fail out of the 267 London OQ IPOs, the failure rate of London SS IPOs is almost one in five (**Table 5**). In accordance with our two hypotheses, the market with the poorest regulation and disclosure and the least reputable underwriting, namely the London SS market, suffered the highest IPO failure rate.

We next match the three IPO sub-samples by carrying out a two-way sort on firm size and industry sector (**Table 6**).²⁴ Again we can see that Berlin IPOs are concentrated in the commercial and industrial and the iron coal and steel sectors with no IPOs in the resource sector. Small German firms do not appear to be unduly disadvantaged with IPOs evenly distributed from the smallest to the largest quartile. In comparison, the London OQ is biased against small firms, only 9 firms fall in the smallest quartile, whereas 197 (35%) of the London SS IPOs are small on this definition. There is a clear relationship between firm size, industrial sector and failure rates. Two-fifths and two-thirds of London SS IPO failures were concentrated in the smallest quartile and the bottom half of the market respectively. Half these failures (54) were of natural resource firms, and the majority of these (44) were in the bottom half of the market. As expected, the smaller the IPO, the more risky it was likely to be other things being equal and therefore the more likely it was to fail. There is also the possibility that the resource business was intrinsically risky at this time and left IPOs in this sector particularly vulnerable.

We can disentangle the relationships between regulation, reputation, firm risk and industry risk, on the one hand, and IPO survival on the other, by running a logistic regression on the whole sample of 825 London IPOs (**TABLE 7**). Our dependent variable (FAIL) takes the value 1 if the IPO fails and zero otherwise, and our explanatory variables as defined above are FIRM SIZE and a series of dummy variables, TRACK RECORD, ASSET VALUE, OQ, UNDERWRITTEN, NATRES, EMPIRE and FOREIGN. As predicted by the disclosure hypothesis, a firm is more likely to survive, the better the quality of disclosure at IPO (TRACK, ASSET VALUE). These marginal effects are statistically significant at the 5% level. On the other hand, the coefficient on UNDERWRITTEN is consistently statistically insignificant in all six regressions. This is

firms failed to pay dividends and were delinquent in filing company accounts followed by disappearance from the following edition of *Burdett's*, they are counted as IPO failures.

²³ Surviving firms maintain their share listing. However, since their share prices were not recorded by the LSE until 1916, we define the survival of London SS IPOs in terms of their continuing to operate as a going concern according to *Burdett's*.

²⁴ The quartile breaks for Berlin IPOs are the same as those for London IPOs, OQ and SS IPOs taken together.

consistent with the certification hypothesis, namely, whether or not an IPO is underwritten by a third party is of no benefit to an IPO's survival prospects since there is an absence of reputable capital.

In terms of the other explanatory variables, the likelihood of IPO failure decreases with firm size at IPO as expected. However, a natural resource exposure reduces the probability of failure by around 8% when other risks are controlled for. Natural resource IPOs were failing because they were small firms with poor disclosure not because they were natural resource businesses. The OQ dummy variable is both economically and statistically significant and any IPO with an Official Quotation was much less likely to fail. This benefit may flow from the additional scrutiny to which OQ applications were subject prior to IPO or to the ongoing obligations and benefits of an OQ listing post-IPO, or both. Finally, overseas firms (EMPIRE, FOREIGN) were no less likely to fail than domestic firms. Importantly, as regressions (5) and (6) show, even after controlling for these other relationships and for IPO year fixed effects, the effects of disclosure and reputation are as expected.

Taken together the IPO survival analysis clearly shows that any public investor in a Berlin IPO could be relatively relaxed that they would not see their investment wiped out at least in the 5 years after IPO. The German authorities following a disastrous experience with new listings in the 1870s had elected by the end of the 19th century for a well-regulated and well-certified IPO market, and the pay-off from this strategy in the period up to 1913 is apparent in the results above. London, on the other hand, had allowed its stock market to evolve without government interference such that it comprised a main and a junior market, the latter effectively unregulated and uncertified. Any public investor buying into an IPO in the latter was risking his money and in one of every five rolls of the dice lost all his money.

V. Long-run IPO performance

IPO survival (failure) rates whilst informative are somewhat crude and lack the precision of estimating the returns to investing in an IPO over the immediate post-IPO years. Following Gompers and Lerner (2003), we estimate the 3-year and 5-year total returns for those IPOs, where prices and dividends are available, in both event time and calendar time. We examine calendar time returns since they suffer less cross-sectional correlation than do event time returns.

The raw return for an individual security i for the time period t is $R_{i,t}$ and the cross-section of mean returns for time period t is then given by:

$$R_t = 1/N * \sum R_{i,t} \text{ for } i=1, \dots, N$$

and the cumulative raw return is then:

$$\text{Raw Return}_T = \sum \text{AR}_t \text{ for } t=1, \dots, T$$

which is the sum of the average performance in each year over a given time period T , in this case, 3 or 5 years where T can be defined in either calendar or event time.

Cumulative abnormal returns (CARs) for each IPO are obtained by deducting the market return from the raw return for each year and summing the annual abnormal returns over 3-years and 5-years respectively, again in event and calendar time. More formally, we define the abnormal performance of an individual security i for the time period t as follows:

$$\text{AR}_{i,t} = R_{i,t} - R_{\text{benchmark},t}$$

and the cross-section of mean returns for time period t is then given by:

$$\text{AR}_t = 1/N * \sum \text{AR}_{i,t} \text{ for } i = 1, \dots, N$$

and the Cumulative abnormal return (CAR) is:

$$\text{CAR}_T = \sum \text{AR}_t \text{ for } t = 1, \dots, T$$

which is the sum of the average abnormal performance in each year over a given time period T , in this case, 3 or 5 years.

Stock prices of officially listed London IPOs were obtained from the digitised *Investors Monthly Manual* (IMM) data base and from the *Stock Exchange Daily Official List*, and dividends from IMM and Burdett's *Stock Exchange Official Intelligence*. Berlin stock prices and dividends are from *Saling's Börsenpapiere*. For each IPO we collected up to 11 stock prices, including the end of the first month stock price following the IPO, the five prices on each anniversary of this initial month, and the five end of December stock prices and five stock prices.²⁵ The lack of share price data for firms opting for Special Settlement in London before WW1 prevents our estimating 3-year and 5-year returns for these IPOs. When an IPO fails, we assume a -100% return in the year of delisting. When estimating returns for those IPOs which were acquired, we use the exit price to calculate the return in that year and assume that the return on the firm and the benchmark are equal for any remaining years. The benchmark returns in each case are the London stock market returns taken from Moore (2010) and the Berlin market returns from Gelman and Burhop (2008).²⁶

²⁵ We exclude any IPO where we cannot find a stock price within 18 months of the date of the prospectus offering. Where prices do not appear either at the required month end, we take the average price of the previous and following months. When estimating returns for those IPOs which were acquired, we use the exit price to calculate the return in that year and assume that the return on the firm and the benchmark are equal for any remaining years.

²⁶ For simplicity we assume all IPO stock market betas are 1. We are unable to adjust performance by using the relevant sector industry index returns since these are unavailable. Modern studies would also control for firm size as well as sector when estimating CARs.

Table 8 summarises the long-run returns for 244 London OQ IPOs (Panel A) and 159 Berlin IPOs (Panel B).²⁷ In event time, average raw returns, before adjusting for the total return on the market, over 3-years and 5-years are +8.4% and +13.2% for London OQ IPOs and +15.0% and 24.2% for Berlin IPOs on an equally weighted basis. Calendar time raw returns are quite similar to event time returns.²⁸ Examining CARs, although there is some suggestion of a slight underperformance, the returns are not statistically significantly different from zero.²⁹ Both IPO samples appear to generate market performance.

Finally, **Table 9** summarises the alternative method of estimating performance, namely, buy and hold returns which compound the annual returns to the IPO over the 3 (5) -year holding period. We define the buy-and-hold abnormal return as follows:

$$BHAR_i = \prod (R_{i,t} + 1) - \prod (R_{benchmark,t} + 1) \text{ for all } t = 1, \dots, T.$$

The mean buy-and-hold return equivalent to the average of the compounded abnormal returns of each security is then given as:

$$1/N * \sum BHAR_i \text{ for all } i = 1, \dots, N.$$

Although they are thought to best represent the returns experience of investors, they suffer from severe positive skewness in that even compounding a single period of bad returns can magnify underperformance as, for example, in the case of the 5-year CAR for Berlin IPOs. With this proviso, these results support those already reported.³⁰

Overall, both London OQ and Berlin IPOs appear to have generated positive absolute returns which are in line with the market.

Whilst as stated above we cannot estimate returns in the same way, we can track how the SS IPOs performed up to July 1916 when they first appeared in a *Supplementary List* to the LSE's *Daily Official List*. This is an important question. Although the Special Settlement market hosted a large number of failures, it might at the same time have contained some success stories. This junior market might have acted as an incubator for the main market, somewhat in the same way that London's Alternative Investment Market fulfils that function today. Furthermore, these "winners" may have compensated investors for the "losers". We therefore estimate the total return for each SS IPO as the sum of the capital gain (loss) plus the accumulated dividends received

²⁷ We were unable to find a sufficient number of prices for 23 London OQ IPOs. The Berlin Stock Exchange was closed from August 1914 until November 1917 and as a result we were unable to estimate returns for the later IPOs in the sample.

²⁸ On a value-weighted basis (VW), where the weights are based on firm size at IPO, raw returns are all larger.

²⁹ CARs are again larger on a value-weighted basis. The 5-year returns are 1.7% and -1.7% in event and calendar time respectively.

³⁰ Due to data limitations we are unable to report skewness-adjusted t-statistics, see Gompers and Lerner 2003: 1374-76.

from its IPO date to mid-1916. We then examine both equally-weighted and value-weighted mean returns for each IPO cohort from 1909 to 1913, totalling 325 IPOs in all, and finally deduct the market return over the same period to obtain market-adjusted returns. Of the 325 IPOs, 119 appeared in the first Supplementary List and another 32 graduated to the Official List, 45 were listed in *Burdett's*, 19 were acquired, 8 were liquidated for value, 65 went bust and 37 were “living dead”. We assume that the living dead were worthless, and the 45 IPOs with no price quote but with an entry in *Burdett's* were valued at par plus any dividends received.

Notwithstanding a few individual winners, ten IPOs generating returns between 150% and 250%, the average performance for all cohorts is disastrous (**Table 10**). The worst was the 1910 cohort of 144 IPOs which underperformed by 57% and 67% on an EW and VW basis. Only the 1909 cohort comes close to matching the market on an EW basis (-2.5%), thanks to the smallest IPOs doing well. On a VW basis, this cohort underperforms the market by 24.6%.

VI. Summary

The emergence of an active IPO market is essential to the process of capital market development. Yet, this market is characterised by classic asymmetric information problems and a well-functioning market requires the trust of stock market investors as ownership separates from control. Regulation and the reputation of intermediaries are vital to the building of such trust. Previous research as to the effectiveness of regulation and reputation in improving the functioning of the IPO market is inconclusive. This paper undertakes a comparative study of the IPO markets before WWI in regulated Berlin and *laissez-faire* London. The tougher regulation and presence of the reputable universal banks contributed to all IPOs on the Berlin stock exchange surviving. On the LSE, however, one in five firms going public in London by way of the unregulated and uncertified Special Settlement method failed.

Public investors in Berlin IPOs made money in absolute terms and their IPO portfolios performed in line with the market. London investors in Officially Quoted IPOs also did similarly well, thanks to the internal regulatory and listing process of the LSE which weeded out those companies that were not of “sufficient magnitude and importance” and unable to comply with the “two-thirds” rule. The rejected firms were at liberty to list on the Special Settlement market. Was it possible that notwithstanding the IPO failures, this market shortened the time to listing for some promising firms and thereby incubated some success stories that compensated investors for these losses? Not a bit. The losers overwhelmed the winners and, as a result, the average performance

of these Special Settlement IPOs was extremely poor. Hence, here was early evidence that regulation and reputation were of considerable value to IPO markets and their absence could be disastrous for investor wealth.

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TABLE 1: IPO ACTIVITY IN LONDON AND BERLIN, 1900-1913

OQ and SS are Official Quotation and Special Settlement respectively and London All is the sum of OQ and SS IPOs. N is the number of IPOs and GP is the gross proceeds of IPOs respectively in a given calendar year. The Berlin GP figure is approximated by the value of shares for which a listing was granted on the exchange.

Year	London All		London OQ		London SS		Berlin		
	N	GP £m	N	GP £m	N	GP £m	N	GP Mk m	GP £m
1900	72	18.1	41	8.5	31	8.3	24	111.4	5.5
1901	57	7.2	18	2.7	39	4.0	13	50.0	2.4
1902	27	8.7	14	3.6	13	2.0	13	50.6	2.5
1903	27	6.0	11	3.7	16	2.1	20	60.9	3.0
1904	14	1.7	6	0.7	8	0.9	27	122.1	6.0
1905	42	7.6	18	3.1	24	4.0	25	122.3	6.0
1906	65	8.8	20	2.2	45	4.6	30	323.1	15.8
1907	51	5.1	13	1.6	38	3.2	5	39.3	1.9
1908	32	5.6	18	4.1	14	1.1	5	56.3	2.8
1909	99	10.6	19	5.1	80	4.9	28	175.7	8.6
1910	179	23.7	33	5.5	146	14.8	5	25.7	1.3
1911	63	12.1	21	4.8	42	4.9	18	135.5	6.6
1912	67	13.3	24	4.9	43	6.5	23	119.5	5.9
1913	30	8.1	11	4.1	19	3.0	14	89.9	4.4
Total	825	136.7	267	54.6	558	64.3	250	1482.2	72.5

Source: see text. Exchange rate: 1 Pound = 20.43 Mark.

TABLE 2: GEOGRAPHIC AND SECTOR BREAKDOWN OF IPOs 1900-13

OQ and SS are Official Quotation and Special Settlement respectively. N is the number of IPOs.

	Ldn OQ		Ldn SS		Berlin	
	N	%	N	Percent	N	%
(i) Geographic breakdown						
Domestic	152	59%	146	25%	250	100%
Empire	79	31%	273	47%	0	0%
Foreign	28	11%	158	27%	0	0%
(ii) Sector breakdown						
Commercial, Industrial	131	51%	145	25%	131	52%
Financial	34	13%	39	7%	27	11%
Iron, coal, steel	20	8%	14	2%	27	11%
Mining (Colonial & foreign)	3	1%	82	14%	0	0%
Oil	6	2%	61	11%	0	0%
Tea, Coffee, Rubber Plantations	30	12%	200	35%	0	0%
Breweries	1	0%	2	0%	12	5%
Other	34	13%	34	6%	53	21%

TABLE 3: COMPARISON OF LONDON AND BERLIN IPO CHARACTERISTICS

OQ and SS are Official Quotation and Special Settlement respectively. All values are simple averages. Firm age is the number of years since establishment or incorporation, whichever is earlier, to the year of IPO. Track record is the number of years of historic profits or dividends paid. Asset value is the proportion of IPOs which disclosed a balance sheet or asset valuation.

IPO		London	London	Berlin
characteristic		OQ	SS	
Firm risk	firm size (£000)	425	205	290
	firm age (years)	22.5	5.8	6.7
Disclosure	track record (years)	2.5	0.6	2.7
	asset value	47%	25%	100%

TABLE 4: IPO UNDERWRITING 1900-13

Market shares by category of underwriter are measured by number of IPOs. No. of underwriters is the number of entities underwriting an IPO in this period in each category. Anonymous signifies that the prospectus indicates that the IPO was underwritten but the underwriter identity not disclosed.

(i) London (N=825)

	OQ No IPOs	SS No IPOs	No of underwriters
Underwritten	37%	35%	
Broker	12%	6%	60
Investment Trust	5%	8%	22
Syndicate	4%	8%	1
Foreign Bank	2%	1%	4
Corporate	0%	1%	21
Merchant bank	1%	0%	4
Anonymous	8%	13%	-
Other	2%	0%	14
Not underwritten	37%	50%	
Directors/Vendors	25%	15%	
Total	100%	100%	126

(ii) Berlin (N=250)

	No IPOs	No of underwriters
Joint-stock credit bank	56%	14
Private banking house	41%	39
Mortgage bank	0%	1
Corporate	3%	5
Underwritten / Total	100%	59

TABLE 5: FIRM SURVIVAL OVER THE 5 YEARS FOLLOWING IPO 1900-13

	No IPOs	FAIL	ACQUIRED	LIQUIDATED	SURVIVE
London OQ	267 100%	7 3%	10 4%	1 0%	249 93%
London SS	558 100%	107 19%	47 8%	12 2%	392 70%
Berlin	250 100%	0 0%	1 0%	0 0%	250 100%

TABLE 6: FIRM SURVIVAL OVER THE 5 YEARS FOLLOWING IPO BY SIZE AND INDUSTRY 1900-13

Fails is the number of firms going bankrupt by the 5th anniversary of the IPO. RES, CI, ICS and FIN denotes any firm in the Mining, Oil and Plantation, Commercial and Industrial, Iron Coal and Steel, and Financial and Property sectors. OTHER is any firm in another sector. Firms are classified into four size quartiles from smallest to largest based on market capitalisation at IPO. Each panel shows the no. of IPOs

	No. IPOs		FAILS									
	ALL	RES	CI	FIN	ICS	OTHER	TOTAL	RES	CI	ICS	FIN	OTHER
(i) Ldn OQ												
smallest	9	3	3	1	1	1	3	0	3	0	0	0
Q2	56	15	30	3	2	6	3	0	3	0	0	0
Q3	87	11	50	12	6	8	1	0	1	0	0	0
Largest	115	14	52	17	20	12	0	0	0	0	0	0
	267	43	135	33	29	27	7	0	7	0	0	0
smallest	3%	1%	1%	0%	0%	0%	43%	0%	43%	0%	0%	0%
Q2	21%	6%	11%	1%	1%	2%	43%	0%	43%	0%	0%	0%
Q3	33%	4%	19%	4%	2%	3%	14%	0%	14%	0%	0%	0%
Largest	43%	5%	19%	6%	7%	4%	0%	0%	0%	0%	0%	0%
	100%	16%	51%	12%	11%	10%	100%	0%	100%	0%	0%	0%
(ii) Ldn SS												
smallest	197	138	35	13	4	7	42	23	10	1	6	2
Q2	150	95	38	7	2	8	30	21	5	2	2	0
Q3	119	63	34	13	3	6	23	9	9	0	3	2
Largest	92	36	27	11	6	12	12	1	6	0	1	4
	558	332	134	44	15	33	107	54	30	3	12	11
smallest	35%	25%	6%	2%	1%	2%	39%	21%	9%	1%	6%	2%
Q2	27%	17%	7%	1%	0%	2%	28%	20%	5%	2%	2%	0%
Q3	21%	11%	6%	2%	1%	2%	21%	8%	8%	0%	3%	2%
Largest	16%	6%	5%	2%	1%	3%	11%	1%	6%	0%	1%	4%
	100%	59%	24%	8%	3%	9%	100%	50%	28%	3%	11%	7%
(iii) Berlin												
smallest	72	0	42	1	4	25	0	0	0	0	0	0
Q2	59	0	32	7	5	15	0	0	0	0	0	0
Q3	62	0	30	8	9	15	0	0	0	0	0	0
Largest	57	0	27	11	9	10	0	0	0	0	0	0
	250	0	131	27	27	65	0	0	0	0	0	0
smallest	29%	0%	17%	0%	2%	10%	0%	0%	0%	0%	0%	0%
Q2	24%	0%	13%	3%	2%	6%	0%	0%	0%	0%	0%	0%
Q3	25%	0%	12%	3%	4%	6%	0%	0%	0%	0%	0%	0%
largest	23%	0%	11%	4%	4%	4%	0%	0%	0%	0%	0%	0%
	100%	0%	52%	11%	11%	26%	0%	0%	0%	0%	0%	0%

TABLE 8: LONG-RUN IPO PERFORMANCE – RAW AND CUMULATIVE ABNORMAL RETURNS

All returns are equally weighted. Cumulative abnormal returns (CARs) adjust for market performance.

Panel A: London OQ IPOs (N=244)

	<u>Event time</u>		<u>Calendar time</u>	
	3-year	5-year	3-year	5-year
(i) Raw returns				
Mean	0.084	0.132	0.056	0.170
t-stat	2.187	2.761	1.452	3.613
(ii) CARs				
mean	0.008	-0.037	-0.033	-0.006
t-stat	0.198	-0.753	-0.868	-0.127

Panel B: Berlin IPOs (N=159)

	<u>Event time</u>		<u>Calendar time</u>	
	3-year	5-year	3-year	5-year
(i) Raw returns				
Mean	0.150	0.242	0.137	0.271
t-stat	4.563	6.679	4.182	7.459
(ii) CARs				
Mean	-0.025	-0.021	-0.041	-0.066
t-stat	-0.885	-0.662	-1.299	-1.840

TABLE 9: LONG-RUN IPO PERFORMANCE – BUY AND HOLD RETURNS

Buy and hold returns are defined in the text. All returns are equally weighted means.

Holding period	<u>Event Time</u>		<u>Calendar Time</u>	
	Raw returns	CARs	Raw returns	CARs
(i) London IPOs (N=244)				
3-years	0.112	0.035	0.069	-0.023
5-years	0.163	-0.009	0.159	-0.036
(ii) Berlin IPOs (N=159)				
3-years	0.156	-0.014	0.160	-0.041
5-years	0.277	-0.043	0.251	-0.092

TABLE 10: LONG-RUN PERFORMANCE OF LONDON SS IPOs

Performance to July 1916	IPO cohort				
	1909	1910	1911	1912	1913
No IPOs	79	144	41	43	18
EW returns	0.262	-0.388	-0.426	-0.397	-0.141
VW returns	0.040	-0.479	-0.433	-0.424	-0.146
VW market returns	0.287	0.191	0.148	0.120	0.076
EW market-adjusted_returns	-0.025	-0.578	-0.573	-0.516	-0.217
VW market -adjusted_returns	-0.246	-0.670	-0.581	-0.544	-0.222