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Is Regulation Essential to Stock Market Development? Going Public in London and Berlin, 1900-1913[*]

Carsten Burhop

Seminar für Wirtschafts- und Unternehmensgeschichte
Universität zu Köln
&
Max-Planck-Institut zur Erforschung von Gemeinschaftsgütern
Email: burhop@wiso.uni-koeln.de

David Chambers

Judge Business School
University of Cambridge
Email: d. chambers@jbs.com.ac.uk

and

Brian Cheffins

Faculty of Law
University of Cambridge
Email: brc21@cam.ac.uk

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Abstract:

The received wisdom is that adequate investor protection is pivotal to the development of capital markets. This paper tests this proposition with respect to the market for newly listed firms, a bellwether for the development of public equity markets. We focus on the London and Berlin stock markets just before World War I, based on hand-collected datasets of initial public offerings (IPOs) occurring between 1900 and 1913. Given that Germany was a "first-mover" with respect to IPO regulation whereas *laissez-faire* was the predominant ethos in London, our data provides an apt departure point for a study of the interaction between law, IPOs and financial development. Our results indicate that, measured in terms of firm survival as well stock market returns, Berlin IPOs were more successful than London's. A crucial caveat is that the London Stock Exchange was divided into two "tiers", the officially quoted section and the "special settlement" section. IPOs of companies that became officially quoted performed nearly as well as Berlin IPOs, which indicates statutory intervention was not essential for IPO success.

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Causes of international differences in the size of the stock market have become a much debated topic. The prevailing view is that adequate investor protection is pivotal to the development of capital markets (La Porta et al 1998). This "law and finance" literature has largely ignored the interaction between regulation and initial public offerings (IPOs) (Holmen and Högfeldt 2004: 325), despite the market for newly listed firms being a bellwether for the development of public equity markets (Fama and French 2004: 229). This comparative study of the London and Berlin stock markets just before World War I, based on hand-collected datasets of initial public offerings (IPOs) occurring between 1900 and 1913, tests whether legal regulation was a pre-condition for a successful IPO market, doing so largely by reference to the failure rate of companies going public. The paper thus sheds light upon an unexplored aspect of the relationship between law and stock market development, as the existing literature on IPO survival focuses for the most part on US samples which take the current regulatory framework as given.

Developments occurring in Germany and Britain as the 20th century opened provide an apt departure point for a study of the interaction between law, IPOs and financial development. In Germany, strengthening of German company and securities laws in 1884 and 1896 considerably tightened up the regulation of public offerings of shares (Fohlin, 2002; Burhop 2011). Germany thus became a "first-mover" with respect to IPO regulation. In the US, disclosure requirements were negligible prior to the 1910s, when the New York Stock Exchange's Committee on Stock List began obtaining IPO disclosure agreements from most firms and individual states began to enact state securities regulations in the form of "blue sky" laws (Hilke 1986). The UK lacked extensive statutory regulation of public offerings until after World War II (Cheffins 2006: 1294-95) and a critic observed in 1917 that "our company law is less exacting in its safeguards than that of any other great business community" (Foxwell 1917: 514).

Given that IPOs were more closely regulated in Germany than in the UK at the beginning of the 20th century, the "law matters" thesis implies that Berlin IPOs would be more successful than London's. Our results, measured in terms of IPO survival as well post-IPO stock market returns, show this was in fact the case. Nevertheless, an additional major finding is that statutory intervention was not essential for IPO success. The London stock market consisted of a main market, the Official List, and a second-tier market known as the Special Settlement section. Despite minimal regulation, despite numerous public offerings occurring without the benefit of underwriting and despite a "hot" IPO market during 1909-10, IPOs listing on London's main market performed just about as well as Berlin IPOs. Underperformance was primarily a feature of Special Settlement IPOs, as nearly one out of five of the companies involved had failed by their fifth anniversary of going public.

The inferences to be drawn from our findings depend on assumptions concerning the underlying purposes of a stock exchange and the related regulatory infrastructure. If the aim of regulation is to make outside investors "comfortable" by delaying or denying access to the stock market for companies that present a sizeable risk of failure, then our findings concerning Germany show that even a century ago regulation could help to deliver the desired outcome. On the other hand, if the intent is to provide a marketplace where investors can buy and sell any and all securities they seek to trade, this serves to vindicate the *laissez faire* approach adopted by the London Stock Exchange (Michie 1999: 138-42). Evidence of the LSE's success along this dimension is found both in the greater volume of IPOs and the heterogeneity of IPOs with respect to industrial sector and geographic location in comparison with Berlin. Those investors seeking safety could focus on the main market, whilst those with a higher tolerance for risk could opt for the Special Settlement sector. Special Settlement companies, it appears, were not a particularly good gamble. However, it was only after a further episode of disastrous performance in the late 1920s and early 1930s that concerns about investor dissatisfaction caused the London Stock Exchange to reform its second-tier market in a meaningful way (Chambers 2010).

The layout of the paper is as follows. Section I provides a theoretical overview of the interaction between IPO regulation and IPO performance. Section II compares and contrasts the institutional background in Britain and Germany. Section III sets out the hypotheses we test in this study. The characteristics of London and Berlin IPOs are described in Section IV, whilst Sections V, VI and VII present our main results before Section VIII concludes.

I. Regulation and IPO survival: a Theoretical Overview

When stock market investors cannot distinguish between "good" and "bad" issuers, 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). Information asymmetry is especially problematic for IPOs, where issuers meet with investors for the first time. The fact that equity represents the residual claim on a firm's assets and is higher risk than debt further compounds the problem. Equity IPOs do hold out the prospect of considerable gains should investors correctly select high quality firms. On the other hand, when investors are mistaken about the quality of a firm going public by way of a share issue, they can lose their entire investment. Bad experiences of this sort can cause investors to steer clear of IPOs, thus impairing the efficient allocation of capital (Fama and French 2004: 230).

A potential solution to the lemons problem in the IPO context is for the government to standardize the private contracting framework in advance to improve market discipline (La

Porta et al 2006: 2). The most obvious step for lawmakers to take in this regard is to mandate the disclosure of particular information, such as an asset valuation, a balance sheet and a track record of profits generated or dividends paid. Mandated disclosure should make it easier for potential investors operating in an uncertain world to distinguish higher quality shares from their less valuable counterparts, thereby fostering investor confidence in equity markets and promoting a better allocation of an economy's financial resources.

The lemons problem can also be addressed through market mechanisms. Investors can price-protect themselves against the risk of a poorly performing IPO by building a substantial discount into the offer price. It does not appear, however, that the price mechanism provided a meaningful buffer for stock market investors as the 20th century opened. Chambers and Dimson (2009) demonstrate that underpricing in London was significantly narrower during the interwar years than during the period since World War II. Similarly, Schlag and Wodrich (2000) and Burhop (2011) show that German initial returns were low before 1913. Moreover, Chambers and Dimson (2009) and Burhop (2011) find that historically there was little or no relationship between market regulation and underpricing in Britain and Germany respectively. Hence, there is little evidence that underpricing in the two markets alleviated the lemons problem.

A company can also arrange for the public offering to be underwritten by a reputable investment bank experienced in bringing companies to the public markets. The investment bank will typically arrange for underwriting, and, being eager to build and maintain a reputation for reliability amongst potential sub-underwriters and investors at large, will want to ensure the company's shares offer good value in the after-market. Correspondingly, even in the absence of mandatory disclosure, investors can regard a reputable underwriter as certifying IPO quality. Carter, Dark, and Manaster (1998) claimed that US IPOs in the 1980s certified by reputable banks subsequently outperformed post-IPO.

Unpacking the inter-relationship between IPOs and regulation is contingent upon measuring the efficacy of IPO markets. On this count, the survival rates of companies going public constitute a helpful proxy. Some IPO companies will disappear after being acquired, a good outcome for investors so long as the price paid approaches or exceeds the IPO share price. Otherwise, the poorer the quality of an IPO, the more likely it will be that the company will de-list ("fail"), leaving equity investors with nothing. The remaining firms constitute the survivors. Admittedly some, despite continuing to operate and maintaining a listing, will deliver negligible returns to shareholders. The majority, however, should trade satisfactorily both commercially and on the stock market.

Various IPO studies have estimated a failure rate, this being the proportion of all IPOs in a market which fail over a specified number of years following the IPO, or its reciprocal, the survival rate. To our knowledge, only three studies explicitly address the

inter-relationship between regulation and IPO survival. Espenlaub, Khurshed and Mohamed (2009) report that IPO survival rates on AIM, a UK "junior" market operated by the London Stock Exchange, are broadly similar to survival rates on more heavily regulated US stock markets. In contrast, Simon (1989) and Klein and Mohanram (2005) indicate that regulation may help to reduce IPO failures. Simon examines five-year failure rates for IPOs carried out on the NYSE and other less well regulated US stock exchanges before and after the 1933 Securities Act and finds that while only a tiny proportion of NYSE IPOs failed both before and after reform, the failure rate for non-NYSE IPOs did drop substantially. Klein and Mohanram look at non-financial company IPOs on NASDAQ between 1997 and 2000, a period when firms could list according to a minimum pre-tax earnings standard or a laxer market capitalization at IPO standard, and find that survival rates were markedly inferior among the latter cohort

When measuring the robustness of the IPO market, long-run performance is an alternative measure to IPO survival (failure). IPO survival is clearly crucial to managers of the firms involved and to investors who do not diversify. Many investors, on the other hand, focus on portfolio returns and therefore will not be greatly concerned if star performers off-set the failures. In the studies by Simon and Klein and Mohanram, however, the evidence on profitability results conforms with the survival data. According to Simon, with 1926-33 IPOs, non-NYSE companies suffered 5-year cumulative abnormal returns of -52%, compared with returns of -12% for NYSE companies over the same period and returns of +6% for the 1934-40 non-NYSE IPOs. As for NASDAQ IPOs launched between 1997 and 2000, Klein and Mohanram report 3-year raw returns of new listings admitted on the profitability-test of +30.6% compared to -41.4% for firms on the market-capitalization test.

II. Germany and the UK, 1900-13: The Institutional Background

Firms going public are typically regulated by a combination of company and securities laws and stock exchange rules specifying listing requirements. Today it is universal practice for countries to have securities laws in place that require a prospectus to be issued before shares are sold and listed (La Porta et al 2006: 1, 10). The extent of disclosure mandated varies widely by jurisdiction. La Porta et al provide scores for 49 countries based on whether a country requires delivery of a prospectus and mandates disclosure of share ownership by blockholders and directors, executive compensation, contracts outside the ordinary course of business and transactions between a company and its directors (2006, Table I). Scores range from to 0 (Uruguay) to 1.00 (Singapore and the US). The UK (0.83) scores considerably higher than the median (0.60) and Germany (0.42).

La Porta et al report that disclosure regulation is positively correlated with stock market development along a variety of dimensions, including stock market

capitalization/gross domestic product, listed companies/population and IPOs. Their results tally with a broader "law matters" thesis that posits stock market development is determined by the degree to which a country's laws protect minority shareholders and constrain corporate insiders (La Porta et al., 1998; Djankov, et al., 2008). Recoding by lawyers has cast doubt on results supporting the "law matters" thesis derived from La Porta et al's "anti-director rights index", which was intended to capture the ability of minority investors to resist exploitation by directors and dominant shareholders (Spamann, 2010). This criticism does not extend to efforts by La Porta et al to code securities laws.

The UK Companies Act of 1867 (§ 38) required a new issue prospectus to disclose any contracts that would influence whether or not an applicant would take up shares as well as corporate transactions to which directors were parties. Consequently early 20th century UK company law would have scored 0.33 on La Porta et al's disclosure index (Cheffins 2006: 1294-95). Companies, however, were not required to divulge information concerning their financial performance until 1929. The auditors of a company issuing a prospectus were henceforth required to provide a report on the profits and dividends generated by the company for three years or each year the company had been doing business (Cheffins, 2008: 274). At the opening of the 20th century, company promoters would sometimes side-step the prospectus disclosure requirements by distributing shares without a supporting prospectus but a 1908 amendment to companies legislation obliged companies in this position to prepare "a statement in lieu of prospectus" containing much of the same information (Cheffins, 2008: 195-96).

German legislation did not require disclosure of any of the elements of La Porta et al's disclosure index as the 20th century opened (Franks, Mayer and Wagner, 2006: 547). In other respects, however, German regulation of IPOs was more robust than Britain's. In response to a large number of firms de-listing from stock exchanges following an 1873 stock market crash, German authorities introduced in 1884 a new stock corporation law which substantially affected IPOs (Baltzer, 2007; Burhop, 2006; Burhop, 2011). The 1884 law stipulated that when a business was incorporated, independently audited balance sheets and profit-and-loss statements from the two years preceding incorporation had to be filed publicly. UK companies legislation lacked any equivalent requirement. The 1884 corporate law also required firms to file publicly balance sheet statements and a profits and loss account on an annual basis (Franks, Mayer and Wagner, 2006: 540), requirements not imposed by UK companies legislation until 1908 and 1948 respectively (Cheffins 2008: 196, 356).[1]

[1] The Companies Act 1929 required companies to present to shareholders annually -- but not file publicly -- a profit and loss account (Cheffins 2008: 274).

The 1884 stock corporation law also required companies to have shares with a "par" value of at least 1,000 Mark, meaning shares could not be issued to the public for a lower price. Shares also had to be fully paid up upon issuance. Previously, the minimum nominal value ascribed to shares was 300 Mark and only 40 percent of the face value had to be paid up. Given that the annual per capita income in Germany was about 400 Mark when the 1884 stock corporation law was enacted, the share capital rules effectively excluded a large proportion of potential investors from the stock market. UK company law, in contrast, never prescribed a minimum par value for shares (Gower, 1954: 105).

In grading the quality of securities law, La Porta et al focused on "actual laws, statutes…and any other rule with force of law" (2006: 5). Before the mid-1980s, the Listing Rules governing companies with shares listed on the London Stock Exchange (LSE Rules) did not fall into this category, since the obligations they imposed on listed companies were at most contractual in orientation (Cheffins, 2006: 1293). Nevertheless, from a functional perspective the LSE Rules merit recognition because the London Stock Exchange could decline to quote a company if they were not fulfilled and de-list a quoted company for subsequent non-compliance.

Throughout much of the 20th century, the LSE Rules were often a step ahead of UK company law in regulating companies and assuaging concerns public investors might otherwise have had about purchasing shares (Cheffins 2008: 76, 107-8). However, during the late 19th and early 20th centuries the London Stock Exchange's approach was *laissez-faire* in orientation (Cheffins 2008: 75). Generally, the Stock Exchange was not concerned with the quality of the securities the market handled, leaving its members free to deal in whatever financial instruments they chose (Michie 1999: 86-87).

Despite its generally *laissez faire* approach, the London Stock Exchange would require companies seeking a quotation to have articles of association in a form of which the Committee of the Stock Exchange approved. The precise requirements were not spelled out until 1909, at which point one of the requirements was that the articles had to compel annual circulation of the company's profit and loss account to the shareholders and the Stock Exchange (Cheffins 2008: 197). Moreover, so as to inhibit market manipulation and promote liquidity, from the 1850s until the 1940s the London Stock Exchange prohibited the quotation of a class of securities unless two-thirds of the capital had been allotted to the public (Cheffins 2008: 76, 332). The Committee of the Stock Exchange would additionally require full information, before agreeing to quote a security, on the bona-fide character of the enterprise and would seek to ascertain whether it was of "sufficient magnitude and importance" to merit a full listing. Still, while the Committee had considerable discretion in deciding which firms to quote, "quality control" apparently was exercised sparingly.

According to Gibson (1889: 37-38), the Committee would decline "to admit to quotations the questionable enterprises of 'shady' promoters" but would not:

> "indicate any opinion, personal or official, as to the value of such issues, or their real genuineness or soundness. That is entirely beyond their province, and persons buying issues that have been 'listed' should scrutinize the property and investigate the value for themselves. *Caveat emptor.*"

The LSE Rules only kicked into operation if an Official Quotation was sought. Firms carrying out IPOs that wanted to side step the relevant requirements and yet have the shares traded on the London Stock Exchange could 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 a new security to be settled, outside of the ordinary account calendar. If a Special Settlement day was granted, the security would then become part of the normal account system of Stock Exchange dealings and jobbers would make a market in such securities but off the Official List.

Share prices of special settlement companies were not published until 1916, when a *Supplementary List* of share prices was initiated. Otherwise, the special settlement sector resembled what would be regarded today as a "junior market" complementing the main market made up of officially quoted shares. While a special settlement would not be granted as a matter of course, given that even the rudimentary LSE Rules governing IPOs did not apply to special settlements, this "junior market" was otherwise pretty much entirely unregulated.

In the same way German company law regulated IPOs more rigorously than UK company law as the 20th century opened, the listing rules of the Berlin Stock Exchange (BSE) were stricter than the LSE Rules. The German Exchange Act of 1896, enacted in response to a stock market bust and banking failures occurring at the beginning of the 1890s (Franks, Mayer and Wagner 2006: 542), played a pivotal role in this regard. There was minimal regulation of German stock exchange transactions before the 1896 Act, but it constituted "the most elaborate attempt ever made to regulate speculative markets" (Emery, 1898: 286). Or as Franks, Mayer and Wagner say of the 1896 Act, "Germany had enacted a corporate code that provided more extensive corporate governance than existed in virtually any other country at the time (2006: 583)."

The 1896 Stock Exchange Act required every applicant for listing to issue a prospectus, the character of which the German parliament prescribed in considerable detail (Emery, 1898: 313). Matters that had to be dealt with included the proposed use of the capital to be raised, the most recent balance sheet, the most recent profit and loss statement

and the dividends paid during the five years preceding the proposed IPO. Those who organized an IPO and underwrote it were additionally deemed to be liable for false statements or suppression of facts, either purposely or through gross negligence, with damages being recoverable on the basis of the difference between the existing price and the price at which the issue was first put on the market (Emery, 1898: 313).

There were 22 other stock exchanges in Germany as the 20th century opened. The Berlin Stock Exchange was by far the dominant stock market, as a majority of companies with publicly traded shares were listed in Berlin, representing more than 80% of the overall market capitalization of companies listed on German stock markets. Otherwise, very little is known about the history of these stock exchanges, but they would not have offered an unregulated alternative to the Berlin Stock Exchange. The fact that the 1884 corporate law and the 1896 stock market law applied generally, rather than specifically targeting companies listed on the Berlin Stock Exchange, precluded this from occurring. The 1896 Stock Exchange Act also prohibited the publication of any information about stocks not officially admitted to a German stock exchange. This effectively precluded the development of an over-the-counter market in shares.

III. Hypotheses

Based on the overview of IPOs in section I and the summary of the institutional context in Britain and Germany in section II, we formulate three main hypotheses to further our understanding of the comparative workings of the IPO markets in London and Berlin in the early 20th century. Using as a departure point the proposition that government regulation helps to foster IPO markets, our first two hypotheses are as follows:

H1: The failure rate of IPOs on the BSE between 1900 and 1913 would have been lower than on the LSE, including both officially quoted (OQ) and special settlement (SS) IPOs.

H2: Among IPOs on the LSE between 1900 and 1913, the failure rate of OQ companies would have been lower than SS companies.

Clearly, factors other than regulation could help to determine IPO survival patterns. Firm size, industry classification and geographic location spring to mind as risk factors to be taken into account. Likewise, extensive voluntary disclosure could mimic the performance effects of tougher regulation, so there needs to be analysis of the extent to which companies carrying out IPOs voluntarily disclosed years of historic profits and an asset valuation. Correspondingly, section VI assesses the impact of these various explanatory variables on

IPO survival. Given that underwriting can function as a substitute for regulation in certifying IPO quality, section VII discusses its impact on LSE and BSE IPOs.

Even if our data confirms H1 and H2, a potential qualification to our findings is that a "junior" market with modest listing requirements can fulfil a valuable "incubator" function by supplying the main market with a pipeline of viable new listings and by providing timely access to risk capital to very young or start-up enterprises lacking a financial track record. With the London Stock Exchange's special settlement market, it therefore might have been the case that, notwithstanding a higher failure rate of IPOs on this junior market, it provided firms with a valuable salutary opportunity to go public promptly. Correspondingly, enough SS IPOs could have turned out to be "winners" for public investors to more than offset the failed IPOs. Section VIII of the paper tests whether this might have been the case by examining the long-run performance of each set of IPOs over periods of up to 5 years post-IPO.

IV. Identifying IPOs

To test for a relationship between regulation and IPO performance, we make use of two hand-collected datasets, one for IPOs occurring on the London Stock Exchange and the other focusing on the Berlin Stock Exchange. We first searched *The Times Book of Prospectuses* for equity issues on the LSE between 1900 and 1913. In order to distinguish between an IPO and a seasoned equity offering, we then cross-checked these issuing firms with the *Stock Exchange Official Intelligence*, often referred to as Burdett's, as well as the LSE records of applications for listing.[2] We included IPOs of ordinary shares, preference shares or both.[3] Preference shares in this period resembled ordinary shares more than debt instruments. IPOs of preference shares carried full voting rights in approximately four of out five IPOs and participated fully in profits with the ordinary shares in two out of five instances.[4]

London IPO prospectuses varied considerably in their length and content. They normally disclosed the type of and the number of shares being issued, the number of shares outstanding, 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. While prospectuses sometimes disclosed the number of years of historic profits and an asset valuation of abridged balance sheet, they typically failed to indicate clearly the extent to which the public

[2] This index is held at the Guildhall Library, London. Where necessary, the actual application file was consulted.
[3] 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.
[4] The remaining preference shares only carried votes in certain limited circumstances such as when dividends were in arrears.

offering would yield fresh capital for the firm as opposed to generating proceeds to compensate insiders selling out partially or fully.

We identified Berlin equity IPOs between 1900 and 1913 from the annual register of security issues published by the Imperial Statistical Office (*Kaiserliches Statistisches Amt*, various issues) and then cross-checked them against the *Handbuch der deutschen Aktiengesellschaften*, a joint-stock company manual. We again exclude seasoned equity offerings 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.

Berlin prospectuses all contained information about the purpose of the issue, the registration date of the firm and a description of the business. The prospectuses also provided historic dividend information and the most recent balance sheet and 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. Companies were not required, however, to specify the number of shares offered to outside investors, meaning it was not possible to calculate gross proceeds for Berlin IPOs.[5]

V. IPO Data Characteristics

Our UK sample comprises a total of 825 equity IPOs, divided between 267 firms obtaining an Official Quotation (OQ) and the remaining 558 going public by way of a Special Settlement (SS). Our BSE sample comprises 250 IPOs. The fact our relative sample sizes indicate IPOs occurred with considerably greater frequency in London than in Berlin could be taken to confirm that anti-speculation measures introduced by the 1896 Stock Exchange Act and dramatic increases in the taxation of securities transfers in the 1890s stunted the development of German securities markets and thereby helped to ensure Germany's economy would develop along bank-oriented lines (Coffee 2001: 55-58). On the other hand, the German IPO market was in no sense moribund, corroborating research indicating that pre-World War I German stock markets were in fact well-developed in global terms (Rajan and Zingales, 2003: 7; Gelman and Burhop, 2008).

Whilst the number of IPOs occurring between 1900 and 1913 on the LSE OQ and the BSE is similar, 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

[5] In Table 1 we approximate, however, this figure by the value of shares for which a listing was granted on the BSE.

with the exchange authorities and the banks responsible for underwriting IPOs operating a queuing system.

LSE IPOs were more heterogeneous than Berlin IPOs along various dimensions. One was security design. All Berlin IPOs were of ordinary shares, with shares carrying the same voting rights.[6] In contrast, among the 825 London IPOs, 224 were of preference shares only and 85 combined ordinary and preference share IPOs.

LSE IPOs also displayed considerably greater geographic variation.[7] All Berlin IPOs involved German-based corporations, whereas only three-fifths of London OQ IPOs (152) and one-quarter (146) of SS IPOs respectively involved domestic firms (**Table 2**). Among remaining London IPOs, the majority were enterprises based in self-governing Dominions or colonies. Special settlement IPOs were much more geographically diverse than OQ IPOs, with SS IPOs involving Empire companies and foreign companies both outnumbering IPOs of domestically based companies.

In addition, LSE IPOs covered a wider range of business activities than German IPOs (**Table 2**). Special settlement IPOs were particularly diverse. 63% of Berlin IPOs were concentrated in the commercial and industrial sector and in iron, coal & steel, as were 59% of London OQ IPOs. Only 27% of London SS IPOs fell into these sectors. In contrast, while only 3% of LSE OQ and no BSE IPOs were mining and oil companies, one in four SS IPOs involved firms operating in these resource sectors. A further 35% of SS IPOs were of firms operating in rubber, tea or coffee plantations, sectors completely by-passed by the BSE, most probably due to the economic irrelevance of Germany's colonial empire.[8] Well over half (160) of the London IPOs in the hot market of 1909-10 were of plantations, mainly rubber, seeking to exploit investor excitement about the prospects for bicycle and automobile tire manufacturing.

LSE IPOs also exhibited more variation than BSE IPOs in terms of size and age. Measured in terms of the market capitalization of shares outstanding post-IPO valued at the offer price, OQ IPOs were on average more than twice as large as SS IPOs, with Berlin IPOs somewhere in between (**Table 3**). There were similar disparities with firm age. London OQ IPOs were the most mature, with their prospectuses indicating they had been in business on average for nearly 23 years before the IPO, estimated from the date of establishment of the business or the registration date, whichever was earlier. In contrast, the average age of SS IPOs was under a year with almost half of these firms having just

[6] 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).

[7] 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.

[8] 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).

been established according to the prospectus. With the German Exchange Act of 1896 mandating that companies going public disclose a financial track record, it was not possible for an IPO to occur as quickly on the BSE. Whilst, on average, companies carrying out IPOs on the BSE apparently were in operation less than one-third as long as OQ IPO companies, the figures are not directly comparable. Berlin firms typically only disclosed their registration date rather than the earlier date when the business began but when the prospectus contained both dates, the firms were in operation on average about five years before becoming a joint-stock company.

Prospectus disclosure, measured in terms of the proportion of IPOs revealing the number of years of historic profits or dividends paid and a balance sheet or asset valuation, displayed considerable variation too (**Table 3**). All IPOs on the BSE complied fully with the reforms in the Stock Exchange Act of 1896 discussed earlier and provided such data. Just under half of LSE OQ IPO companies divulged information on their assets and financial track record, with the proportion falling to just one-quarter in the case of SS IPOs.

VI. IPO survival

To ascertain the fate of the LSE IPOs in our sample, we searched *Burdett's* and the *London Gazette*. For BSE IPOs we relied on *Saling's Börsenpapiere* and *Handbuch der deutschen Aktiengesellschaften*. We ascertained for each IPO whether the company "failed" in the sense it was delisted without investors receiving any sort of pay-off (FAIL), was acquired (ACQUIRED), or was liquidated with shareholders being entitled to cash payments reflecting undistributed profits (LIQUIDATE).[9] The remaining firms are deemed as surviving (SURVIVE).[10]

The BSE survival experience was flawless – none of the companies that carried out IPOs between 1900 and 1913 delisted (**Table 4**). Only one was acquired. Despite less rigorous regulation and patchy underwriting practices, the LSE OQ sector performed almost as well. Only seven of the 267 companies carrying out a London OQ IPO were delisted within five years of the IPO, a failure rate of just 3%. 10 companies, or 4%, were acquired and one was liquidated. In contrast, the failure rate of London SS IPOs was almost one in five. A further 47 of the 558 SS IPOs were acquired and 12 were liquidated. The survival data therefore confirms our first (H1) and second (H2) hypotheses above, namely, that BSE

[9] 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*. 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 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.

IPO failure was lower than the LSE and that the failure rate of OQ IPOs was lower than that for SS IPOs).

Since we expect firm size and industry sector to influence IPO survival patterns, **Table 5** matches the three IPO sub-samples by carrying out a two-way sort on firm size and industry sector. The quartile breaks for Berlin IPOs are the same as those for the sample of London IPOs, where OQ and SS IPOs are combined for this purpose.

Firm size was irrelevant for Berlin. Some German firms raising comparatively small sums did gain market access -- Berlin IPOs were evenly distributed from the smallest to the largest quartile -- and none failed. On the other hand, with London IPOs failure rates were clearly related, with smaller IPOs being more likely to fail. Two-fifths and two-thirds of London SS IPO failures were concentrated in the smallest quartile and the bottom half of the market respectively. The survival rate of London OQ IPOs apparently was improved by a dearth of smaller IPOs, as only nine firms fell into the smallest quartile, three of which failed.

The most striking feature of the relationship between failure rates and industry sector is that just over half of the IPO failures in our samples (54) were natural resource firms (i.e. mining, oil and plantations). This helps to explain the zero failure rate of BSE companies, as there was not a single natural resource company IPO on the BSE between 1900 and 1913. It is possible that the natural resource business was intrinsically risky at this time and left IPOs in this sector particularly vulnerable. Certainly, of the 332 natural resource firms that carried out SS LSE IPOs, 107, or nearly one in three, failed. Yet, 43 out of 267 London OQ IPOs (16%) were natural resource firms and none failed. In addition, since most of the natural resource firms that failed (44 of the 54) were in the smallest half of the market, there is again evidence of the size effect.

To disentangle the relationships between disclosure, firm risk and industry risk on the one hand and IPO survival on the other, we run a logistic regression on the whole sample of 825 London IPOs (**TABLE 6**). At the same time we assess the extent to which firms may have been taking the initiative to address the lemons problem, as we ascertain which firms were voluntarily disclosing their asset value and financial track record.

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, NATRES, EMPIRE, and FOREIGN. As expected, the likelihood of IPO failure was inversely correlated with firm size. Voluntary disclosure (TRACK, ASSET VALUE) also helps to explain failure rates. The longer the track record disclosed and the greater the likelihood of a disclosed asset value, the more likely an IPO was to survive, other things being equal (regressions 1 and 2).

Even controlling for firm size and voluntary disclosure, OQ IPOs were much less likely to fail than SS IPOs (regression 3). The OQ dummy variable indicating whether an

IPO was officially quoted is both economically and statistically significant, with an Official Quotation reducing the probability of failure by 13% as compared with a special settlement other things being equal.

How did exposure to natural resources and foreign markets affect survival controlling for firm characteristics disclosure and admission to an Official Quotation (regression 4)? Surprisingly, notwithstanding nearly 60% of SS IPOs being natural resource companies, an exposure to the natural resource sector (NATRES), actually *reduced* the probability of failure by around 8%. There was nothing intrinsically risky about investing in natural resource plays. Geographic location, proxied by the two dummy variables for overseas firms (EMPIRE, FOREIGN), did not add to the risk of IPO failure. These overseas firms were no less likely to fail than domestic firms, once other risks are controlled for.

Taken together the IPO survival analysis confirms that investors in a BSE IPO occurring between 1900 and 1913 could be confident their investment would not be wiped out within 5 years of the IPO. This seemingly validates the decision of German authorities to upgrade regulation of new listings in the mid-1880s and the mid-1890s. However, the performance of London OQ IPOs indicates that detailed regulation was in fact not a necessary pre-condition for a low IPO failure rate. An investor in an OQ IPO could, as with an investor in a BSE IPO, be confident the firm would survive for at least five years, particularly if the firm was large relative to others carrying out IPOs and voluntarily disclosed information concerning its asset value and financial track record.

Investors in London SS IPOs occurring between 1900 and 1913 had considerably greater cause for concern, as with one out of every five rolls of the dice their investment was wiped out within five years. The likelihood of a seriously adverse outcome cannot be attributed to IPOs by natural resource firms and by overseas companies dominating the special settlement market. Instead, the key risk factor for investors was whether post-IPO trading occurred through the main market or by way of special settlement, albeit with the odds improving if an IPO involved a larger company that disclosed its financial track record.

Why was the failure rate of SS IPOs dismal as compared with OQ IPOs? It apparently did not matter that from 1909 onwards the LSE Rules required companies carrying out an OQ IPO to provide in their articles for the annual disclosure of the company's profit and loss account, as the failure rate with LSE OQ IPOs was the same both before and after the change to the rules.[11] More plausibly, London Stock Exchange officials may have lowered the failure rate for OQ IPOs by screening out particularly risky IPOs based on the requirement that an OQ IPO had to be of "sufficient magnitude and importance" and had to comply with the two-thirds rule. They apparently relied on these rules primarily to ensure

[11] Results available upon request.

that quoted securities would generate active trading as opposed to only occasional bursts of buying and selling (Michie 1999: 96). Since there is no LSE trading volume data available for this period, it is impossible to gauge how successful the Committee of the Stock Exchange was on this count. However, a plausible side-effect of efforts made to restrict the OQ sector to actively traded securities was to reduce the failure rate for OQ IPOs. In this sense, self-regulation in this period appeared to work.

VII. Underwriter reputation

As discussed in section 1, underwriter reputation can certify IPO quality and hence act as a substitute for regulation as far as public investors are concerned. There were substantial differences between underwriting practices across the London and Berlin IPO samples.[12] Whilst all Berlin IPOs were underwritten by a third party, only 37% of LSE OQ IPOs and 35% of SS IPOs were so underwritten (**Table 7**). Related parties of the newly listed firm (directors and vendors) underwrote 25% and 15% of the IPOs on the OQ and SS respectively. Correspondingly, 37% of OQ IPOs and half of SS IPOs were not underwritten at all.

As well as underwriting being more common in Berlin, the quality of underwriters was also likely higher (**Table 7**). More than half of Berlin IPOs were underwritten by large and established joint-stock credit banks, including Deutsche Bank, Dresdner Bank, Discontogesellschaft, and Darmstädter Bank. Nearly all of the remaining BSE IPOs were underwritten by private banking houses. Most of the Berlin IPOs were underwritten by members of the Imperial Loan Syndicate, whose reputation was established by its monopoly of German and Prussian government bond issues. In contrast, the London underwriting market was highly fragmented, with 126 firms underwriting 302 IPOs. The most prolific underwriters -- Emile Erlanger & Co., a foreign bank, Linton Clarke & Co., a stockbroker, and Central Industrial Trust -- each handled only six IPOs each. With leading London-based merchant banks declining to engage seriously with equity IPO underwriting until after 1945 (Chambers, 2009), only four IPOs were organized by first-tier merchant banks, one each by Brown Shipley & Co, C.J. Hambro & Co., J. Henry Schroder & Co. and Speyer Brothers.

While the fact that underwriting quality was apparently superior in Berlin conceivably contributed to the BSE's lower IPO failure rate, the fact the failure rate was zero means that statistically we cannot distinguish between the relative contribution of regulation and underwriter reputation. In any case, regulation and reputation in Berlin were inextricably linked. Legal reforms in 1896 created conditions in which German banks controlled access by their industrial clients to the stock market (Emery 1898),and firms with bankers on their

[12] See for example Lavington (1921) and Finnie (1934).

supervisory boards were more likely to become listed than other firms (Fohlin, 2007: 260-261).

In the case of London IPOs, we examine the marginal impact of having a London IPO underwritten by a third party (UNDERWRITTEN) on IPO survival by returning to our logistic regression (Table **6**). The coefficients on UNDERWRITTEN are statistically insignificant in regressions 5 and 6, indicating that underwriting was of no benefit to an IPO's survival prospects. Hence, with LSE IPOs, the involvement of underwriters did not substitute for the lack of regulation. This is not particularly surprising, given that those when intermediaries did underwrite IPOs they were typically staking little reputational capital and thus had little incentive to scrutinize IPO quality carefully. Indeed, as late as 1931, the Macmillan Committee was damning in its judgment of those acting as underwriters for public offerings occurring on the London Stock Exchange, saying 'the public is usually not guided by any institution whose name and reputation it knows'.[13]

VIII. Long-run IPO performance

Failure rates of firms going public necessarily provide only a partial picture of the overall quality of an IPO market. A "junior" market such as the Special Settlement sector can perform a salutary "incubator" function, providing timely access to risk capital to very young or start-up enterprises lacking a financial track record. From an investor perspective such a market could be expected to deliver a sufficient number of "winners" to compensate for an inferior survival rate. Correspondingly, following Gompers and Lerner (2003), we estimate 3-year and 5-year total returns for BSE and LSE IPOs where price and dividend data is available.

Stock prices of officially quoted London IPOs are available from the digitised *Investors Monthly Manual* (IMM) database and from the *Stock Exchange Daily Official List*. Dividend data was obtained from IMM and from Burdett's *Stock Exchange Official Intelligence.* Berlin stock prices and dividends were derived from *Saling's Börsenpapiere* and *Berliner Börsenzeitung*, a financial daily. 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.[14]

[13] H. Macmillan, *Report of the Committee on Finance and Industry*, Cmnd. 3897 (London, 1931), Minutes of Evidence, Q.1308.

[14] 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.

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:

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

and the cumulative raw return is then:

$$\text{Raw Return}_T = \Sigma R_t \text{ for } t=1,.....,T$$

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

Cumulative abnormal returns (CARs) for each IPO were 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:

$$AR_{i,t} = R_{i,t} - R_{benchmark,t}$$

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).[15]

The cross-section of mean returns for time period *t* is then given by:

$$AR_t = 1/N * \Sigma AR_{i,t} \text{ for } i = 1,.....,N$$

and the Cumulative abnormal return (CAR) is:

$$CAR_T = \Sigma AR_t \text{ for } t = 1,.....,T$$

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

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.

Table 8 summarizes the long-run returns for Berlin and London OQ IPOs. Panel A covers the performance over the following 5 years of Berlin IPOs floated between 1900 and 1908 and of IPOs between 1900 and 1910 over the following 3 years. The choice of periods reflects the fact that the Berlin Stock Exchange was closed from August 1914 until November 1917 and only traded sporadically until 1920.[16] Panel B presents returns on a sample of London OQ IPOs matching the same time periods. In event time, average raw returns, before adjusting for the total return on the market, over 3-years and 5-years for

[15] 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.

[16] The London Stock Exchange was only closed for six months from August 1914.

Berlin IPOs (+13.0%, +24.4%) exceeded those on London OQ IPOs (+10.3%, +16.4%) on an equally weighted basis whilst displaying considerably lower volatility. Hence, Sharpe ratios which precisely calibrate the trade-off between risk and return in Berlin are at least twice those of London.[17] Calendar time raw returns, risks and Sharpe ratios are quite similar to the event time statistics.

Turning to CARs, while there is some suggestion of modest underperformance of the overall market in both Berlin and London both in event and calendar time (Panel A, Panel B), these returns are not statistically significantly different from zero.[18] Moreover, the results for the entire sample of London OQ IPOs between 1900-13 (Panel C) are similar to those for the truncated sample (Panel B).[19] Hence, London OQ IPOs between 1900 and 1913 did no worse than the overall London market over either 3 or 5 years post-IPO.[20]

The lack of share price data for firms opting for Special Settlement in London before WW I prevents our estimating 3-year and 5-year returns for these IPOs. These prices first appeared in a *Supplementary List* attached to the LSE's *Daily Official List* in July 1916. In an attempt to obtain a sense of the performance of these IPOs and hence of the "upside" potential a successful junior market, we estimate for the 325 of the 558 SS IPOs occurring from 1909 to 1913, the total return as the sum of the capital gain (loss) plus the accumulated dividends received from its IPO date to mid-1916. We then examine both equally-weighted (EW) and value-weighted (VW) mean returns for each of the 5 IPO cohorts from 1909 to 1913, and finally deduct the market return over the same period to obtain market-adjusted returns. The fate of the 325 IPOs by mid-1916 was as follows: 119 appeared in the first Supplementary List; 32 had graduated to the Official List; 45 were listed in ***Burdett's*** but were not included in the Supplementary List; 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 ascribe to the 45 IPOs with no price quote but with an entry in ***Burdett's*** a share price equal to par value plus any dividends received.

Notwithstanding a few individual winners -- ten IPOs generating gains of between 150% and 250% -- the average performance for the annual SS IPO cohorts was disastrous overall (**Table 9**). The 1910 cohort of 144 IPOs fared worst, as the companies underperformed the market by 57% and 67% on an EW and VW basis respectively, and the 1911 and 1912 cohorts were nearly as bad. Only the 1909 cohort came close to matching the market on an EW basis (-2.5%) but on a VW basis even this cohort underperformed the

[17] The Sharpe ratio in this context is defined as the mean IPO return in excess of the risk-free return relative to the standard deviation of the IPO returns.
[18] 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.
[19] We were unable to find a sufficient number of prices for 23 London OQ IPOs.
[20] We also calculated buy-and-hold returns. The results, which did not differ materially from our CAR findings, are available on request.

market by 24.6%. Hence, while theoretically a lightly regulated "junior" market could deliver a sufficient number of IPO "winners" to compensate for an inferior failure rate, .judging by the poor performance of the 325 IPOs occurring between 1909 to 1913 the Special Settlement market did not come close to meeting this standard.

VII. Conclusion

Our study of IPOs occurring between 1900 and 1913 indicates that the IPOs on the Berlin Stock Exchange, a more tightly regulated stock market than the London Stock Exchange, suffered zero failures and most likely delivered better returns for investors overall than the LSE. These findings seemingly vindicate the "law matters" thesis, which hypothesizes that "better" corporate and securities law fosters stock market development. The story, however, is more complicated than this.

While stock market regulation in Germany may have fortified IPO performance, it did not set the stage for stock market-oriented corporate governance. The available data indicates that during first half of the 20th century share ownership in companies traded on German stock markets did not become more diffuse in the same way as ultimately occurred in the UK but instead was increasingly intermediated by banks casting proxy votes and by large corporate blockholders (Franks, Mayer and Wagner 2006). Regulation may have played a role here via the Exchange Act of 1896 reputedly strengthening the control of banks over German securities markets (Emery 1898). The German experience shows that even if legislative protection afforded to investors improves the odds that IPOs will get off the ground successfully, there is no guarantee stock markets will subsequently flourish.

Our study also demonstrates that tight regulation is not a necessary pre-condition for a successful IPO market. IPOs carried out on the London Stock Exchange between 1900 and 1913 by way of an official quotation were lightly regulated and yet performed pretty much as well as IPOs on the Berlin Stock Exchange. This may have been due to London Stock Exchange officials artfully deploying the few regulatory instruments available to them to engage in successful quality control,.

Our results do not provide, however, any sort of unqualified endorsement of deregulation. IPOs carried out between 1900 and 1913 using the Special Settlement procedure demonstrate that a *laissez faire* approach could work out badly, as the failure rate was considerably higher than it was for Berlin IPOs and for Official Quotation IPOs. Moreover, the companies that survived were unable to deliver returns anywhere good enough to offset the failed IPOs.

Why did the special settlement system persist in its unregulated form, given the problems apparently afflicting it? One reason may have been lack of awareness of just how bad things were. As our study indicates, it was impossible to assess on a collective basis

the performance of special settlement IPOs until prices were listed in 1916. As a result, neither investors nor stock exchange officials may have realized how badly special settlement IPOs were faring.

Another possibility was competitive pressure. If the London Stock Exchange had exercised close control over the special settlement procedure, trading activity in tea and rubber companies may have been lost entirely to the Mincing Lane Tea and Rubber Broker's Association, formed in 1909 to provide a market in plantation company shares (Michie 1999: 82, 85, 271). Given the dearth of regulation of public offerings by UK company and securities law and given the absence of German-style rules precluding off-market trading in company shares, investors may therefore have been seriously at risk whatever stance the London Stock Exchange took concerning initial public offerings.

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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 characteristic		**London OQ**	**London SS**	**Berlin**
IPO 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 disclosed	47%	25%	100%

TABLE 4: 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%

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TABLE 5: 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 6: PROBIT REGRESSION OF IPO FAILS

The dependent variable takes the value 1 of an IPO fails by its fifth anniversary of going public, and zero otherwise.

	(1)		(2)		(3)		(4)		(5)		(6)	
	dF/dx	p-value	dF/dx	p-value	dF/dx	p-value	dF/dx	p-value	dF/dx	p-value	dF/dx	p-value
FIRM SIZE	-0.053	(0.000)	-0.039	(0.000)	-0.023	(0.018)	-0.027	(0.007)	-0.027	(0.007)	-0.020	(0.012)
TRACK			-0.022	(0.013)	-0.012	(0.030)	-0.021	(0.017)	-0.021	(0.018)	-0.015	(0.021)
ASSET VALUE			-0.079	(0.003)	-0.065	(0.008)	-0.049	(0.059)	-0.048	(0.065)	-0.039	(0.087)
OQ					-0.115	(0.000)	-0.127	(0.000)	-0.127	(0.000)	-0.095	(0.000)
NATRES							-0.071	(0.008)	-0.071	(0.008)	-0.062	(0.003)
EMPIRE							-0.014	(0.631)	-0.015	(0.617)	-0.013	(0.548)
FOREIGN							-0.011	(0.714)	-0.013	(0.669)	-0.013	(0.702)
UNDERWRITTEN									0.018	(0.398)	0.014	(0.404)
IPO Year fixed effects									No		yes	
pseudo-Rsqd	0.037		0.080		0.108		0.126		0.128		0.168	
#obs	825		825		825		825		825		825	

TABLE 7: 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 8: LONG-RUN IPO PERFORMANCE

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

	Event time 3-year EW	Event time 5-year EW	Calendar time 3-year EW	Calendar time 5-year EW
Panel A: BERLIN				
IPO cohorts	1900-10	1900-08	1900-10	1900-08
Raw returns				
mean	13.0%	24.4%	13.6%	27.3%
sd	40.7%	46.7%	40.7%	46.7%
t-stat	4.42	6.57	4.62	7.34
Sharpe ratio	0.29	0.50	0.31	0.56
N	190	158	190	158
CARs				
mean	-2.8%	-2.2%	-3.9%	-6.7%
sd	36.3%	41.6%	39.7%	46.8%
t-stat	-1.053	-0.657	-1.343	-1.799
N	190	158	190	158
Panel B: LONDON				
IPO cohorts	1900-10	1900-08	1900-10	1900-08
Raw returns				
mean	10.3%	16.4%	4.7%	14.5%
sd	60.3%	75.0%	60.5%	73.4%
t-stat	2.33	2.52	1.06	2.28
Sharpe ratio	0.15	0.20	0.06	0.18
N	187	133	187	133
CARs				
mean	0.5%	-2.7%	-5.5%	-4.0%
sd	60.1%	75.2%	60.1%	72.5%
t-stat	0.121	-0.414	-1.251	-0.633
N	187	133	187	133
Panel C: LONDON				
IPO cohorts	1900-13	1900-13	1900-13	1900-13
Raw returns				
mean	8.4%	13.2%	5.6%	17.0%
sd	60.4%	74.6%	60.1%	73.4%
t-stat	2.19	2.76	1.45	3.61
Sharpe ratio	0.12	0.16	0.07	0.21
N	244	244	244	244
CARs				
mean	0.8%	-3.7%	-3.3%	-0.6%
sd	60.0%	75.8%	59.8%	72.7%
t-stat	0.198	-0.753	-0.868	-0.127
N	244	244	244	244

TABLE 9: LONG-RUN PERFORMANCE OF LONDON SS IPOs

The table below shows the average buy and hold returns including dividends for each IPO cohort up to July 1916 when prices were first quoted in the Supplementary List. The average is expressed both in equally-weighted (EW) and value-weighted (VW) terms.

	IPO cohort				
Performance to July 1916	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