Geographic Dispersion and IPO Survival

Dimitrios Gounopoulos, Chen Huang[1]

This version:21 May 2018

Abstract

Using a text-based measure of geographic dispersion in 10-K form to proxy the firm's spatial distribution of business interests across the U.S. states, we reveal strong evidence that dispersed firms experience high failure risks in post-offering periods. The effect is more pronounced in a soft information environment (e.g., severer information asymmetry), which confirms that information channel has determinate power on manager's decisions which related to firm performance among geographically diversified firms. Moreover, we find that the post-IPO failure risk is greater if firms have a high similarity of geographic dispersion compared to their industrial competitors; and is lower if firm's dispersed business interests are closely correlated with the local shocks. Further, the study documents that both firms headquarter size and location are equally important to contribute to longer survival times for IPO firms. The results are robust to various alternative tests.

***Keywords*: IPOs, IPO survival, geographic dispersion, firm performance**

[1] Dimitrios Gounopoulos (D.gounopoulos@bath.ac.uk) is from School of Management, University of Bath, Bath, BA2 7AY, UK; Chen Huang (C.Huang@bath.ac.uk) is from School of Management, University of Bath, Bath, BA2 7AY, UK.

1.Introduction

One of the most important firms fundamental characteristics is the spatial distribution of business interests. In general, firms choose to expand operations to different areas becoming more geographically dispersed to access regional resources, such as labour forces, market shares, local customers, and many others. Further, firms usually grow sufficiently large in order to be able to access the public capital market, such as Initial Public Offerings (IPO) (see, Ritter and Welch (2002)). Going public for a firm is a process of the ownership transferred from private to public. Firms often experience different challenges in the market after the offering, such as more rigorous scrutiny from investors. Previous studies show that around 30% newly listed issuers are either acquired or delisted within five years after going public (e.g., Jain and Kini (2000); Ritter and Welch (2002); Ritter (2003)). While various firm and offering characteristics at the time of IPO are deemed as important signals for firm's future performance and therefore have impacts on survival times, such as venture capitalist participation (Jain and Kini, 2000), audit firm's quality (Jain and Martin Jr, 2005), IPO's lock-up period (Ahmad and Jelic, 2014), and CEO's industrial work experience (Gounopoulos and Pham, 2017). However, the relationship between IPO firm's geographic dispersion and post-offering survival remains unexplored.

Recent literature provides evidence that geographic dispersion imposes negative impacts on firms, including discounted firm values (Gao et al., 2008), poor stock returns (e.g., Garcia and Norli (2012); Addoum et al. (2013)), investment and productivity (Giroud, 2013), and reduced corporate social responsibility scores (Shi et al., 2017). In addition, multi-state operated firms are likely to suffer from regional uncertainties, such as political and foreign exchange risks (Duru and Reeb, 2002), which act as potential hazards on corporate performance. Platikanova and Mattei (2016) argue that information asymmetry is the cause of biased earnings forecast issued by analysts to geographically dispersed firms. Moreover, managers are less employee-friendly (e.g., dismiss employees) to remote divisions because they tend to be more familiar with proximity business units (Landier et al., 2007). Therefore, when a firm has dispersed economic interests across different states, the information quality could be compromised, and managers are likely to make detrimental judgements for the firm operations. Further studies also address that geographical reasons influences manager's decision making, such as the preference of local investees around the headquarter location (Coval and Moskowitz, 1999) and manipulate earnings management (Shi et al., 2015).

It is manager's responsibility to make strategic decisions to ensure the IPO firm's growth and survival in post-offering periods. In this study, we argue that information asymmetry emerged from geographic dispersion engenders the principle-agent conflicts (e.g., managers VS shareholders).

Given that dispersed firms tend to incur high external and internal monitoring costs due to inefficient scrutiny of investors in a distance (John et al., 2011) and geographic dispersion makes a firm's information communication more complexed (Bushman et al., 2004), shareholder may not be able to observe managers actions and receive up-to-date information regarding firm performance. Moreover, firms have more operating flexibilities under international dispersion (Duru and Reeb, 2002). Similarly, in the presence of domestic geographic dispersion, managers can exercise their discretion to make decisions which result in misalignment of managerial motivations with shareholder benefits. Since manger's incentives to pursue shareholder's interests are important for firm performance (e.g., Gounopoulos and Pham (2017)), we expect that heavyly dispersed firms are more likely to encounter failures than their less dispersed counterparts. If so, we further question whether information channel is the reason to explain the association between geographic dispersion and IPO firm survivals. We also explore whether firms with high competitiveness measured by dispersed business activities at the industry level and firms that are closely correlated with local economic shocks have impacts on failure risks. Finally, we ask whether the size and location of headquarters can affect survival times.

Motivated by the extant literature on the spatial distribution of corporate operations and subsequent consequences, we address forgoing questions by investigating the relationship between IPO firm's geographic dispersion and the probability of failure risks. We obtain a comprehensive sample of newly listed firms from 1993 to 2012 in the U.S. stock market. Following previous studies (e.g., Garcia and Norli (2012)), we use a text-based measure by counting state names in 10-K forms issued in the offering year to link firm's business interests in different states at the time of IPO. Therefore, a firm is defined as dispersed if it operates in more than one state as mentioned in the 10-K form, otherwise is headquarter concentrated. In addition, we construct a normalized Herfindahl-Hirschman Index (HHI) using state citation shares to indicate the level of firm's geographically distributed economic activities. In the empirical analysis, we employ both parametric and non-parametric approaches.

We find strong evidence to support our conjecture. By implementing a Cox Proportional Hazard (CPH) model, we reveal that geographically dispersed firms suffer from high post-IPO failure risks and shorter survival times than headquarter-based firms. Particularly, dispersed firms are 1.588 times more likely to fail compared to their counterparts that only concentrate operations around the HQ location. The effect, as expected, becomes more pronounced along with the increased level of geographic dispersion of firms. The results are consistent when using non-parametric methodology.

Technologies are important to communications and subsequently affect information flows. Petersen and Rajan (2002) argue that distance no longer acts as barriers to the communication between banks and lenders, because the evolution of innovation in information technology reduces such concerns. Particularly, advanced technologies enable the two parties to contact each other in a hard information environment (e.g., information can be easily made by impersonal means). Therefore, we follow Landier et al. (2007) to use the change of distance between borrowers and lenders at the industry level and define firms operate in a soft information environment (e.g., information cannot be transferred and verified efficiently) if the change is below sample median. As expected that information asymmetry is severer in a soft information environment, we find that dispersed firms operating in such an environment face higher failure risks. The evidence suggests that information channel is an important factor affecting IPO firm's survivability.

We further follow Platikanova and Mattei (2016) to construct two measures that are related to geographic dispersion of firms. First, we expect firms that exhibit high similarity of geographic dispersion with industry rivals face more competitiveness in the market. Because collecting competitor's commercial information for managers become easier if firms compete with each other in the same market (e.g., the same U.S. state). We find evidence that is consistent with the conjecture. That is, IPO failure risk is higher for firms that are with the greater similarity of geographic dispersion compared to industry rivals. In contrast, we reveal that firms with the dispersed business units that are closely correlated with local economic shocks experience lower failure risks, which attribute to the better internal information flow of those firms.

Given that the size of firm headquarters matters for the functions, such as allocating resources, coordinating business activities, adding values, and reducing agency costs within the organization (e.g., Eisenhardt (1985); Hill et al. (1992); Collis et al. (2007)), we construct a variable taking the ratio of the citation of IPO firm's headquarter state over all state names in the 10-K form to serve the magnitude of the HQ. Further, we define whether firm headquarters locate in top ten metropolitan cities in the US because centrally located firms incur less agency conflicts and better corporate performance (John et al., 2011). Consistent with the expectation, we find that both the size and location of IPO firm headquarters are important factors which contribute the lower failure risks and longer survival times.

We further control for the endogenous issues. Since the industry and international diversifications may have an impact on the performance of dispersed firms, we include number of industries and international geographic segments of IPO firms in the analysis. Moreover, a firm's decisions to be geographically diversified could be driven by different unobserved firm characteristics. To eliminate this concern, we implement a Propensity Score Matching (PSM)

approach in the analysis. In robustness checks, we first use an Accelerated Failure Time (AFT) model to re-examine the impact of geographic dispersion on IPO firm survival. Furthermore, given that Merge & Acquisitions (M&As) could also represent corporate financial distresses (e.g., Welbourne and Andrews (1996); Jain and Kini (2008)). We, therefore, define failed firms by including M&As and further exclude the acquired firms from our sample. All of those tests are robust to our conclusion that geographic dispersion deteriorates IPO firm's survivability.

Furthermore, we use alternative measures of geographic dispersion. We take number of different state names mentioned in the 10-K form. Next, we classify number of different regions that firms have business activities. We also follow Garcia and Norli (2012) to define the firm is localized if one or two states referred in the 10-K form. Further, since geographically diversified firms may face various local hazards, we construct two variables which are GPD weighted and political corruption weighted HHI indices. Those two measures, therefore, are expected to capture the local economic and corruption impacts on IPO firm's geographic dispersion. The results continuously support our main findings.

Our work makes significant contributions to geography and IPO based literature. Previous studies document that various negative impacts on firms stemmed from the geographic dispersion (e.g., Gao et al. (2008); Platikanova and Mattei (2016)), including manager's decision making caused by information asymmetry (e.g., Landier et al. (2007)). We provide the first study that addresses ultimate consequences stemmed from geographic dispersion on firm performance in IPO context. Particularly, we show that newly listed firms with geographically diversified business interests across different U.S. states experience high failure risks in post-offering periods, which results in firms being bankrupted or liquidated. In addition, previous studies focus on offering and firm characteristics that affect IPO firm survivals, such as firm age, size (e.g., sales), and risk factors (Hensler et al., 1997); venture capital (Jain and Kini, 2000); earnings management (Alhadab et al., 2015); and CEO work experience (Gounopoulos and Pham, 2017). We further provide new evidence using a novel firm characteristic on the geographical level to explain possible reasons for IPO firm's failure.

Our study is related to the work of Platikanova and Mattei (2016) document that firms share similar geographical business interests with their industry competitors enable analysts to gather information to provide more precise earnings forecasts. Our evidence using IPO setting extend their study to show the negative effects that firms with high similarity in terms of geographic dispersion with rivals are likely to suffer from failures. Landier et al. (2007) find that firm's divisions out of the HQ state negatively affects manager's decision making (e.g., dismiss employees). We extend their work by using pure geographic dispersion (e.g., without distance measure) to reveal that firms

with dispersed economic interests at the time of IPO encounter high failure risks. Thus, our results support Landier et al. (2007)'s argument that managers in the dispersed firm are likely to make decisions which are detrimental to firm value.

Finally, our results provide several implications which are applicable in the financial market. First, public traded firms should take responsiblity for investors. Failures could result in tremendous losses for market participants (e.g., venture capitalists). Likewise, when assessing firm performance, investors need to consider actual value of highly geographically dispersed firms, including the corporate governance aspect. Second, even though rapid expanding of the business to different areas brings some financial benefits to firms, such as larger sales and higher revenues, managers need to take the side effects into account. For instance, compromised information from remote business units deviates manager's judgements from rationale. While closer proximity or convenient transportations between headquarters and divisions enable managers to make frequent business trips to offer constructive advice for the firm development (see, e.g., Giroud (2013)). Therefore, going public for firms should not be a rash decision. Alternatively, as suggested by Giroud (2013), firms can benefit from having divisions that are closer to headquarters. Likewise, IPO failure risks are likely to be reduced if firms are less geographically dispersed at the time of going public.

The rest of paper is organized as follows. Section 2 summarizes relevant literature. Section 3 develops the primary hypothesis. Section 4 discusses data and methodologies used in this study. Section 5 presents our findings including robustness checks. Finally, section 6 provides a conclusion for the study.

2. Geography and firm performance

There is extensive literature that has revealed the relationship between firm's geography and performance. Gao et al. (2008) find that firms with subsidiaries operated in different regions in the U.S. suffer from a significant valuation discount. They further document that the effect only applies to dispersed firms with lower corporate governance quality. Garcia and Norli (2012) conclude that localized firms generate monthly excessive stock returns than geographically dispersed firms. Their finding is consistent with the local investor recognition hypothesis, and not easily altered by the change of geographic dispersion of firms. Giroud (2013) uses airline routes as proximity between headquarters and plants. He documents that firm's efficient monitoring and information acquisition to remote plants increases investments and total productivities. Giroud's (2013) findings complement Garcia and Norli's (2012) by showing that distance may not be a barrier for firm performance, as long as there are convenient transportations which enable managers to visit remote business units frequently. Addoum et al. (2013) present that geographic dispersion causes stronger

post-earnings-announcement drift and momentum in returns. Platikanova and Mattei (2016) find that corporate geographic variation increases information costs for analysts, and reduces accuracy and fairness of earnings forecasts. They also reveal that dispersed firms are less likely to report detailed segment disclosure and provide filings on time. Similarly, Shi et al. (2017) show that firm's geographic dispersion negatively affects its corporate social responsibility scores.

Some studies argue that manager's decision making can be affected due to geographical reasons. Coval and Moskowitz (1999) demonstrate that the U.S. investment managers prefer investees headquartered in the same city. Landier et al. (2007) document that distance matters for managers to receive information from divisions. They find that dispersed firms are more likely to dismiss employees if divisions are further away from the headquarter location. Thus, managers tend to be more familiar with the market where the headquarter locates than the market in remote divisions and make inefficient investment decisions for the firm. Shi et al. (2015) find that firms with dispersed operations nationwide tend to decrease accrual-based earnings management but increase real-based earnings management. To sum up, those studies address that information asymmetry plays an important role in the relationship between geography and firm performance.

3. Hypothesis development

Bushman et al. (2004) argue that geographically dispersed firms are associated with organizational information complexities. Consequently, those firms may incur high internal and external monitoring costs, and negatively influence managerial functions within the organization. In addition, Duru and Reeb (2002) suggest that internationalization of firms is associated with operating flexibility. John et al. (2011) argue that shareholders cannot monitor manager's behaviours efficiently in a distance. Thus, in the presence of geographic dispersion, managers with discretionary rights are apt to make decisions in favour of themselves rather than shareholders objective, which causes principle-agency conflicts (e.g., Landier et al. (2007); John et al. (2011)). Moreover, managers may not be efficient to collect and summarise relevant operating information if the firm is geographically dispersed, resulting in less or fragmentary historical financial performance records (Addoum et al., 2013). Under this scenario, managers may not be able to possess up-to-date information of the financial performance of firms and make strategic decisions for the future development. Moreover, shareholders also experience difficulties in assessing the actual value of geographically dispersed firms, which exacerbate agency problems.

Furthermore, international diversified firms take risks of being exposed to market challenges, such as foreign exchange hazard (e.g., Duru and Reeb (2002)). Garcia and Norli (2012) argue that that local firms draw less attention and attract a small number of investors compared to dispersed

firms. Thus, geographically dispersed firms are more likely to be exposed to the public, such as media attention and financial regulator's monitoring. Alternatively, firms with businesses in multiple states have to deal with various uncertainty factors, such as political and policy risks. Those factors, for example, when political risk takes the form of corruption, which can deteriorate management and productivity outputs, making firm less inefficient (e.g., Dal Bó and Rossi (2007); Athanasouli and Goujard (2015)).

Therefore, we incorporate insights from the above discussions to structure our study focused on identifying the impact of geographic dispersion of IPO firms on the survivability. Since manager's decision choice is particularly important to firm performance, Gounopoulos and Pham (2017) demonstrate that CEOs with industry experiences extend IPO survival times. Because those CEOs are likely to pursue shareholder's interests due to their expertise and the limitation to switch jobs to other firms, and therefore make efficient decisions leading to positive effects on firms which could remain viable in the future.

Overall, an IPO firm that is geographic dispersed may not present financial, operational, and corporate governance advantages over less dispersed counterparts. The main purpose for firms to go public is often to seek advanced investment opportunities. Thus, if a firm has geographically diversified business interests across different U.S. states at the time of going public, it is more likely for the firm to expand the business to other areas in later stages. Consequently, the inherent negative impacts for a firm being geographically dispersed could remain longer in post-offering periods and therefore impose significantly adverse effects on firm survivals. Based on the above arguments, we should expect that *firms that are geographically dispersed at the time of going public are negatively related to post-IPO survival times.*

4. Data and methodology

4.1 IPO data

We collected the share of common stock in the US from 1st January 1993 to 31st December 2012 from the Security Data Corporation's (SDC) New Issue database. To eliminate the negative impacts from specific offerings, we follow previous studies to exclude the following cases in our sample: 1) the IPO with the offer price below $5; 2) closed-end funds, unit offerings, real investment trust (REITs), and American depositary receipts (ADRs). We further obtain firm financial information from Compustat and stock price data is from the Centre for Research in Security Prices (CRSP).

Following previous studies (e.g., Gounopoulos et al. (2017)), we track each IPO firm from the date of listing to the delisting date or the end of 2017, whichever is earlier. To distinguish each firm's listing status, we obtain the delisting codes from CRSP and classify firms as survived if the code is 100 (e.g., continue to trade at the end of 2017), and acquired if the IPO firm has assigned the code between 200 to 299. Previous studies, such as Espenlaub et al. (2012), Ahmad and Jelic (2014), and Gounopoulos et al. (2017), define the failed firms as those that delisted from the market due to negative reasons (e.g., liquidation, bankruptcy, insufficient capital, failure to meet financial regulation, or delinquent in filings), other than delisting motives with less harmful impact on investors (e.g., M&A). Therefore, the failed firms in our sample are those with the code equal or greater than 300. Finally, our sample of 3035 IPOs constitutes 726 survivors, 1441 acquired firms, and 868 failed firms.

4.2 Geographic dispersion data

Following Garcia and Norli (2012), we measure the geographic dispersion of an IPO firm's business interests using 10-K reports provided by the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database. The U.S. Securities and Exchange Commission (SEC) requires firms to submit such a report annually within 90 days at the end of a fiscal year. Thus, we download the 10-K report for each firm from EDGAR that reported for the IPO proceeding year[2]. Since the structure of a report is standardized, we count the number of times that each state is mentioned in the following sections: "Item 1: Business," "Item 2: Properties," "Item 6: Consolidated Financial Data," and "Item7: Management's Discussion and Analysis". Addoum et al. (2013) and Bernile et al. (2015) also confirm that those four sections outline a firm's geographically diversified operating activities, such as properties and equipment, store and office locations, and M&A activities, which are associated with stock and corporate performances. Therefore, it is appropriate to use 10-K reports to proxy firm dispersed economic interests across different U.S. states. We merger our data with Garcia and Norli (2012)[3] to improve data availability and reliability.

4.3. Data description

Table 1 displays IPO distributions. In Panel A, when tracking from offering date to the end of 2017, failed, acquired, and survived firms in our sample occupy 28.6%, 47.48%, and 23.92%, respectively. When tracking up to five years after going public, 17.63% of firms were failed, 24.84% were acquired, and 57.53% were survived. Panel B and Panel C report IPO distributions by year and

[2] In the case of 10-K report is missing, we follow Garcia and Norli (2012) to use alternative reports: 10k/A, 10-K405, 10-KSB, 10-KT, 10KSB, 10KSB40, 10KT405 and the amendments to these forms. We require all used reports are issued in the IPO year, which considers the time constraint for a firm to fill the report.

[3] We thank Garcia and Norli for providing the data, which is available from their website.

industry, and firm's delisting status is tracked for up to five years after IPO. According to Panel B, given the background of relevant financial crises in 2000 and 2008 (e.g., Internet Bubbles and Sub-mortgage Financial Crisis), firms that conducted the IPO around those two events exhibit relatively high proportions (24.86% and 15.79%, respectively) of delisting. The percentage of acquired (survived) firms are the highest in 1993 (2008) and the lowest in 2008 (1997) within five years from offering date, which accounts for 38.46% (73.67%) and 10.53% (45.71%), respectively. In Panel C, Health services and Chemical products industries consist of the highest (26.58%) and the lowest (9.8%) failed firms. High-tech industries, including chemical products, computer equipment and services, electronic equipment, and scientific instruments, show the relatively high percentage of acquired IPO firms (ranging from 18.82% to 29.38%). In the majority of industries, more than 50% of firms were survived within five years.

[Please insert Table 1 about here]

In Table 2, we report Kaplan-Meier survival rates of sub-group of firms up to five years after going public by year and industry. The five-year survival rates for the overall sample from 1993 to 2012 is 79.92, which is close to the finding of Ahmad and Jelic (2014). Dispersed firms exhibit lower survivability within five years after IPO than HQ-based firms, except in 2002 and 2004. Panel B displays the survival distribution by industries. Similar to Panel A, the survival rates among dispersed firms are lower than the survival rates for HQ-based firms in most industries. Moreover, the majority of HQ-based IPO firms are concentrated in high-tech sectors. Finally, the overall survival rates within five years after the IPO for HQ-based firms are higher than geographically dispersed firms (83.1% vs 79.7%), corresponding to our primary hypothesis.

[Please insert Table 2 about here]

Figure 1 exhibits the distribution of different state names mentioned in the 10-K form. Interestingly, in Panel A, we witness that IPO firms are less geographically dispersed before Internet Bubbles (e.g., 2000) than after. Moreover, according to Table 2, IPO firms that are headquarter-based mainly concentrated before 2001. This could be caused by the market shocks from the bubble collapse and the significant adverse impact imposed on those less dispersed firms (HQ-based) firms, and therefore negatively affect those firm's decisions to go public. After all, less dispersed firms are usually in a smaller size (Garcia and Norli, 2012). In Panel B, majority IPO firms had their businesses in up to around eight states. The most frequently mentioned states in our sample (% of firms) are California (8.4%), Delaware (7.8%) and New York (6.1%), and the least frequently cited states are North Dakota (0.29%), South Dakota (0.31%), and Vermont (0.35%).

[Please insert Figure 1 about here]

Table 3 provides descriptive statistics of variables associated with geographic dispersion of offering firms as well as IPO and firm characteristics grouped by dispersed and HQ-based features. About 94% of IPO issuers are geographically dispersed in our sample. The headquarter concertation levels (*HQ%*) and the state citation based HHI measure (*Concentration*) are 87% and 0.42 for the overall sample, respectively. As for dispersed firms, those two measures are 43% and 0.38 respectively. 62% of IPO firms are classified as having a central location, which is similar to John et al. (2011). Geographically dispersed firms prefer to be headquartered in large metropolitan cities than HQ-based firms (62% vs 55%). The average cosine similarity of geographically dispersed business activities relative to the industry competitors is 0.24. The correlation between the economic shocks from the local state and firm business activities is 0.2. In particular, HQ-based firms are highly correlated with the local shocks (1.00) than dispersed firms (0.14), supporting the intuition that fully concentrated firms are closely associated with the regional economic environment around headquarters.

The average IPO firm age is 14.67 years with mean proceeds (sales) of $ 119.02 million ($ 384.69 million). There are 43% of IPO firms that were supported with venture capitalists, 37% employed prestigious underwriters, and 68% hired big four auditing firms. In addition, the mean leverage, profitability, and market to book ratio are 0.39, -0.02 and 5.55, respectively. When focusing on the subgroups, dispersed firms have longer operating history on average than HQ-based firms (14.96 years vs 10.43 years). Firms with operations across different states raise more than doubled proceeds ($ 123.99 million VS $ 45.89 million) and reach more sales ($406.85 million VS $58.26 million) than HQ-based firms. The finding is in align with Garcia and Norli (2012) arguing that firms with multi-state operations tend to be larger in terms of size. Moreover, VCs are more likely to invest in HQ-based firms than dispersed firms (47% vs 42%). Geographically diversified firms prefer to hire prestigious underwriters and auditors than HQ-concentrated firms. Regarding financial performance, dispersed firms enjoy higher leverage (0.39 vs 0.33) and higher market to book ratio (5.66 vs 3.97) than firms that are fully concentrated in headquarters. Lastly, firms with dispersed business interests tend to be more diversified in terms of industry (*IndustrySEG*) and international geographic (*Intl.SEG*) segments than HQ-based firms (1.74 vs 1.57, and 1.73 vs 1.66, respectively). T-tests show that most offering and firm characteristics are significantly different between two group of firms.

[Please insert Table 3 about here]

4.4 Methodology

Survival analysis has been wildly applied to predict events such as bank and corporate failures (e.g., Lane et al. (1986); Keasey et al. (1990)), employee turnover (Somers, 1996), and venture capitalists' participation in firms and subsequent M&As after IPOs (Gill and Walz, 2016). Previous studies also use the survival analysis to investigate the determinants of firm post-IPO failures (e.g., Jain and Kini (2000); Jain and Martin Jr (2005); Jain and Kini (2008); Ahmad and Jelic (2014); Espenlaub et al. (2016); Gounopoulos and Pham (2017)). Compared to conventional econometrical models (e.g., logistic or probit regressions) which only predict the occurrence of an event, survival analysis is capable of incorporating time horizon factors before the event occurs, and also taking censored observations into account. An observation is treated as censored if the event has not yet taken place for the study period. Therefore, our sample is right censored because many IPO firms continue to trade at the end of tracking period (e.g., 31 December 2015). Also, the time horizon window is different for each firm depending on the time that the IPO takes place in the market. For example, we track a firm for ten years if it went public in 2005, compared to a firm that we track only for five years if it went public in 2012.

Our analysis of the relationship between geographic dispersion and IPO firm's survival is comprised of two stages. We first use non-parametric approaches. By implementing survival (hazard) function, we are able to access the newly listed firm's survival (failure) probability up to a specific time. If the firm is geographically dispersed at the time of going public, we should expect that the survival (hazard) function curve is below (above) firms that are fully concentrated around the HQ location.

The Kaplan-Meier survival function is presented as:

$$\hat{S}(t_j) = \prod_{j(t_j \le t)} \left(\frac{n_j - d_j}{n_j} \right)$$

The Nelson-Aalen hazard function is presented as:

$$\hat{H}(t) = \sum_{j(t_j \le t)} \frac{d_j}{n_j}$$

where t_j indicates the time when an IPO firm's delisting occurs. n_j is the number of survived IPOs before the time t_j, d_j is the number of failed IPOs at time t_j. We use a log-rank test to examine whether the survival (hazard) function curves are significantly different between the two group of firms.

In the second stage, we implement parametric approaches which include Cox Proportional Hazard (CPH) Model. The CPH procedure combines the hazard model and maximum partial

likelihood estimation process (David (1972); Allison (2010)). The advantage of using CPH model is that the model does not need to pre-specify the hazard function and can take any function form (Allison, 2010). We estimate the Cox proportional hazard model as follow:

$$h(t) = h_0(t)\exp[\beta_1 Firm\ age + \beta_2 Proceeds + \beta_3 Sale + \beta_4 Venture\ capital + \beta_5 Underwriter + \beta_6 Auditor + \beta_7 Leverage + \beta_8 Profitability + \beta_9 Market - to - Book + Year\ dummies + Industry\ dummies] \quad (1)$$

Where $h_0(t)$ is the hazard function. The dependent variable is the hazard ratio indicating the risk of IPO failure. Thus, a positive (negative) coefficient implies that the IPO firm is more (less) likely to be delisted in the future. Likewise, the survival time is shorter (longer). For each of the control variable, the hazard ratio is calculated as the exponentiated coefficient. The ratio measures the increase of the failure risk for a unit increase in the independent variable (Jain and Kini, 2008). For binary variables, the hazard ratio is served as the ratio of estimated hazard for those with value one to the estimated hazard for those with value zero. For continues variables, the change of estimated hazard for a unit increase in the covariate is measured as 100*(hazard ratio-1) (Jain and Martin Jr (2005); Jain and Kini (2008); Allison (2010); Alhadab et al. (2015)).

The variable of interest is the measures of geographic dispersion. In addition, we incorporate control variables that are found to have an impact on IPO survivals in the analysis. Specifically, we include variables *Firm age*, *Proceeds* and *Sale* to proxy the size of IPO firms, as large firms (or firms with longer operating history) reduce information asymmetry and have less valuation uncertainty, therefore lower IPO failure risk (Hensler et al. (1997); Demers and Joos (2007)). In addition, some studies illustrate that the participation of financial intermediaries in firms improve post-IPO survival profile, such as venture capital (Jain and Kini, 2000), prestigious underwriters (Schultz, 1993), and top-ranked auditing firms (Jain and Martin Jr, 2005). We, therefore, add *Venture Capital*, *Underwriter*, and *Auditor* in the analysis. Furthermore, we follow Demers and Joos (2007), Jain and Kini (2008), Alhadab et al. (2015) to control for the effect of firm financial conditions on IPO survivals by including the variable *Leverage*, *Profitability* and *Market-to-book* ratio. The definitions of variables are provided in the Appendix.

We also use an Accelerated Failure Time (AFT) model in robustness checks. Unlike CPH model, the exponential of the coefficient of each independent variable in AFT model is the time ratio, known as an "acceleration factor" (Espenlaub et al., 2016). Therefore, the time ratio is greater (smaller) than one indicates that the variable factor increases (decreases) the survival time. Further, using AFT approach requires a specific distribution for the model. The Akaike Information Criterion (AIC) test is used to determine the appropriate distribution for non-nested models, such as the log-

logistic against lognormal distribution (e.g., Ahmad and Jelic (2014); Espenlaub et al. (2016)). Thus, we select the lognormal distributions as the AIC test shows the lowest value.

5. Empirical analysis of firm geographic dispersion on IPO survival

5.1 Hazard and survival curves

We first implement Kaplan-Meier survival function and Nelson-Aalen cumulative hazard function to access survival and hazard curves of dispersed and HQ-based firms. The outputs are displayed in Figure 2. Panel A shows the curves from survival function. As expected, the curve for geographically dispersed firms is below HQ-based firms, and the differences enlarge along with the time elapsed. Panel B witnesses that a hazard curve for HQ-based firms is below that of dispersed firms. While the gap between two curves widens over the whole analysis time. We perform a log-rank test, and the results are significant at 10% (p-value=0.0867), implying that the curves for the two groups of firms are statistically different. Overall, the results from survival and hazard functions suggest that firms with operations that are fully concentrated in the headquarter state at the time of going public have a better survival profile than firms have geographically dispersed business interests across different U.S. states.

[please insert Figure 2 here]

5.2 Survival analysis between geographically dispersed and HQ-based firms (CPH model)

In this section, we estimate variants of equation (1) to investigate the impact of an IPO firm being geographically dispersed on the survivorship, after controlling for various offering and firm characteristics that found to be related to the probability of IPO failure risks. We incorporate year and industry effects whose coefficients are suppressed. The results of the estimation of CPH model are tabulated in Table 4.

We first use a dummy variable taking one to indicate the firm is geographically dispersed, namely, the 10-k form that the firm filled reported for the IPO year mentions more than one state(including headquarter state), otherwise is zero. The coefficient on *Dispersion* is 0.462 and statistically significant at 1%, suggesting that firms with dispersed economic activities across different states at the time of going public are more likely to experience failures and shorter survival times compare to firms that only concentrate around headquarter locations. The hazard ratio of *Dispersion* suggests that geographically dispersed IPO firms make it 1.588 times more likely that these firms will fail relative to HQ-based firms.

Next, we follow Platikanova and Mattei (2016) to construct a state citation based HHI measure (*Concentration*) to indicate the degree of an IPO firm's geographical dispersion. The

variable ranges from zero to one, with zero indicates that the firm has business equally spread in the 50 U.S. states and one indicates that a firm's business fully concentrates in a unique state. In specification (2), the coefficient on the variable of interest is -0.468, with a significant level of 1%, which implies a negative relationship between the degree of an IPO firm's business concentration across the U.S. and post-offering failure risks. That is, a firm has more concentrated economic activities across less different states significantly reduce post-IPO failure risks and increase survival times.

Majority control variables display expected signs and significant at conventional levels. Specifically, we find that factors such as longer operating history, raise more proceeds, and higher sales make longer survival times for IPO firms, which is consistent with Hensler et al. (1997)'s finding. Moreover, the participation of financial intermediaries, including venture capitalists and reputable underwriters also contribute to the better survival profiles (e.g., Jain and Kini (2000); Jain and Martin Jr (2005)). Further, in line with Jain and Kini (2008), firms survive longer if they have high profitability and the market-to-book ratio at the time of going public. Lastly, IPO firms with higher leverage face higher delisting risks in the future.

Overall, the results are in line with findings from using nonparametric approaches. That is, geographical dispersion of an IPO firm increases the probability of failure and reduces survival times compared to the HQ-based firm, which is in support of our primary hypothesis.

[Please insert Table 4 about here]

5.3 Geographic dispersion, informational channel, and IPO survival

In this section, we investigate the information environment impact on the relationship between geographic dispersion and IPO firm survival. Petersen and Rajan (2002) argue that the increased distance between lenders and borrowers could be a result of the evolvement of innovations and technologies. Because large banks and firms can use advanced tools to communicate (e.g., e-mails) rather than face to face meetings. Such the information channel refers to hard information environment, which the information can be easily created impersonally (Petersen, 2004). On the contrary, in a soft information environment, the information cannot be transferred or verified through technologic means because of physical distances. Landier et al. (2007) document that managers tend to protect employees in soft information industries because of the limited communication with remote divisions. Similarly, Platikanova and Mattei (2016) show that earnings forecasts issued by financial analysts for geographically dispersed firms are less accurate, more

dispersed and more biased in a soft information environment, which attributes to high information asymmetry problem.

As we conjectured, information flow is important for managers to make strategic decisions in geographically dispersed firms. John et al. (2011) argue that the investment decisions made by managers belong to soft information, which is difficult to be observed or verified over long distances. As such, we predict the survivability issue among firms with dispersed economic activities across multiple states becomes more prominent in a soft information setting. To examine this conjecture, we collect National Survey of Small Business Finance data for the year 1987 and 2004. Following previous literature (e.g., Landier et al. (2007)), we define firms operate in a soft information environment if the industry-based (2-digit) average changes of the distance between borrowers and primary lenders is below the sample median, otherwise is a hard information environment. Due to multicollinearity issue in the subgroup regressions, we do not include industry fix effects. The results are displayed in Table 5.

[Please insert Table 5 about here]

As see from the specification (1), the coefficients on *Dispersion* (*Concentration*) are positive (negative) and significant at 1% (10%) level, suggesting that dispersed (more concentrated) firms operating in a soft information environment increase (decrease) probability of failure and decrease (increase) survival times. This is consistent with the expectation that information asymmetry problem is severer among dispersed firms in the soft information environment, which could affect managers to make effective decisions for firm performance. Specification (2) witnesses that both dispersion measures display negative signs, supporting the argument that firms take advantage of technological means in a hard information environment to acquire and process information and improve the survivability of dispersed firms, even though they are not statistically significant. The results provide evidence that information channel is an important mechanism for the performance of geographically dispersed firms.

5.4 Geographic similarity and geographic correlation

Following Platikanova and Mattei (2016), we construct two indicators of geographic dispersion which are related to industry competitors and local economic shocks to further examine the effects of firm's economic activities across different states on IPO survival. First, we calculate to what extent an IPO firm's dispersion level is similar to the competitors in the same industry at the 3-digit level. The higher value of variable *GEOSIMILAR* implies that an IPO firm's business activities across the U.S. is similar to that of the rivals. Platikanova and Mattei (2016) document that

analyst's precision is increased in an environment where more firms share similar economic activities in the same industry because the cost of collecting information is reduced. Under this scenario, firms would face more competitiveness in the market because similar geographic dispersion between firms within the industry increases the chance for each other to gather business information. Managers can take advantage of this to make tactical plans to compete with rivals. In a similar vein, De Silva and McComb (2012) find that the greater concentration of high-tech firms within close proximity increases mortality rates. Thus, we should expect an IPO firm's geographic dispersion that is highly correlated with the rivals increases the likelihood of failures.

Next, we create the variable *GEOCORR* to capture to what extent a firm's dispersion is correlated to the local economic shocks. The high value means that the IPO firm either operates only in one state or its operations in multiple states that are closely correlated to the regional economic disturbance. Due to the integrity of firm's operating in different states with the local economy, we expect managers can collect and analyse information from divisions in a more straightforward and efficient way for those firm. Therefore, we conjecture that geographically dispersed IPO firms that are closely tied in local shocks are less likely to fail.

In specification (1) of Table 7, we find a positive relationship between the variable *GEOSIMILAR* and the probability of IPO failure risks, as the coefficient is 0.413 with a significant level of 10%. The result supports the conjecture that the market becomes more competitive along with the increased similarity of geographic dispersion of firms within the industry, which exposes firms to higher delisting risks in the market. In Colum (2), we observe that the variable *GEOCORR* is highly significant (at 1% level), with a hazard ratio of 0.61. This finding provides evidence that IPO firms are less likely to fail if their dispersed businesses in different states are jointly associated with local shocks.

[Please insert Table 7 about here]

5.5 Firm headquarter

Hau (2001) suggests that headquarter proximity to traders matters for the trading performance. Because traders cannot receive enough information about the firm stock. A firm's HQ takes responsibility to allocate resources to dispersed business units, including labours, R&D funds, or manufacturing equipment. Divisions, therefore, perform activities and tasks based on the orders received from headquarters. Further, a well-defined control system adopted by the HQ to monitor and screen divisions reduces agency costs (Eisenhardt, 1985). Therefore, the corporate headquarter is important for financial and operational performances, since it has decision making, coordinating

and value-adding functions within the organization (e.g., Chandler (1991); Collis et al. (2007)). We evaluate the importance of headquarters on post-IPO survival in this section.

Since the size of the headquarters matters for its fundamental roles (Hill et al., 1992), we take advantage of our state count-based data to construct a variable *HQ%* by using the citation of headquarter state over all states mentioned in the 10-K form to proxy the size of the HQ. The variable provides us with a clear picture of the degree of an IPO firm's operation concentration in the HQ location, regardless of how geographically dispersed of the firm is. Furthermore, John et al. (2011) argue that centrally located firms face more scrutiny from investors and enjoy better investment performance. Thus, the location of the firm headquarters is equally important for the performance. We, therefore, follow their study to locate whether IPO firm headquarters is in the ten largest metropolitan areas. The variable *Central location* equals one if the firm is located in one of the following cities in the US: New York City, Los Angeles, Chicago, Washington-Baltimore, San Francisco, Philadelphia Boston, Detroit, Dallas, and Houston, including their suburbs, otherwise is zero. The results are tabulated in Table 8.

[Please insert Table 8 about here]

First of all, the coefficient on the variable of interest *HQ%* is -0.333 and highly significant (at 1%), indicating that IPO firms with a higher percentage of business concentration around the headquarter locations are associated with lower probability of failure risks. This is consistent with the notion that the size of corporate headquarters plays a predominant role in firm performance. Moreover, the variable *Central location* also displays a negative sign (-0.159) with a significant level of 1%, suggesting that IPO firms that are headquartered in large metropolitan cities significantly prolong post-IPO survival times. This finding supports John et al. (2011)'s argument that remotely located firms are likely to aggravate agency conflicts between managers and shareholders and suffer from overinvestment, and therefore experience negative firm performance. The hazard ratio of 0.853 implies that the failure risk of firms located in large cities is 85.3% of the failure risks of firms located in remote areas. Overall, we address the importance of size and location of newly listed firm's headquarters in post-IPO survivals.

5.6 Endogeneity control

In this section, we first question whether the impact of IPO firm's geographic dispersion could be driven by other factors which are also related to corporate diversifications. Jain and Kini (2008) suggest that IPO firms operating in different industries significantly reduce failure risks because diversified commodity lines can lower adverse impacts from the product or financial

markets. More industry diversified firms also exhibit high tendency to expand the business to other areas (Gao et al., 2008). As such, managers have to compete with more rivals from various industries and states, which could impose a significant impact on the decision-making process. Moreover, international diversification could expose firms to additional risks, such as policies and regulations in foreign countries (Duru and Reeb, 2002). Further, Wan and Hoskisson (2003) argue that home country environment may play a decisive factor for firms to implement diversification strategies. Therefore, we collect a number of industries and geographic segments from Compustat Segment Data and include variables *IndustrySEG* and *Intl.SEG* in our main analysis. In Table 9, the coefficients on *Dispersion* and *Concentration* are consistent with previous findings and significant at 5%. The results suggest that highly geographically dispersed firms continue to experience greater IPO failure risks compared to HQ-based or less dispersed counterparts, even after controlling for additional diversification characteristics.

Moreover, the t-tests from Table 3 show that most of our control variables are significantly different between dispersed and HQ-based firms. Thus, the differences in IPO characteristics in the two groups of firms could be caused directly or indirectly by manager's decisions to expand businesses, or by unobserved heterogeneity between IPO issuers. Thus, we use propensity score matching (PSM) to control for such observable differences. Using a propensity score matching analysis, we can statistically compare the outcome of a treated observation (IPO firm) with an effect (geographically dispersed) to the same observation but not treated based on a number of covariates. We define our treatment observations as those IPOs from HQ-based firms and include rich sets of covariates from the baseline regression analysis to evaluate the effect of geographic dispersion of firms on the occurrence of IPO failure. The results are tabulated in Table 10. The ATET is 0.099 and statistically significant at 5% level, indicating that dispersed firms are more likely to experience failures than HQ-based firms. The finding is consistent with the results of the previous analysis.

[Please insert Table 9 about here]

5.7 Robustness checks

Various robustness checks are conducted in this section. We first replicate baseline regressions from Table 4 using an AFT model. The results are tabulated in Table 11. Consistent with our hypothesis, the coefficients on the variables of interest *Dispersion* and *Concentration* display expected signs, with a significant level of 1%. The time ratios are 0.681 and 1.511, respectively, suggesting that dispersed firms shorten survival times, while more geographically concentrated

firms extend survival times. The results of control variables are generally in line with baseline regressions.

[Please insert Table 10 about here]

Welbourne and Andrews (1996) document that firms suffer from stock price declines around acquisitions and the acquired firms may experience financial distress. In the main analysis, we classify failed firms as those that are delisted because of adverse reasons (e.g., bankruptcy). In the spirit of Welbourne and Andrews, we re-define failed firms by including those that are delisted due to M&As. Moreover, we also exclude acquired firms from the sample (e.g., Jain and Kini (2008)). In Table 12, the coefficients on *Dispersion* and *Concentration* remain unchanged as in Table 4 in terms of magnitude and significance. The results consistently support our primary hypothesis that geographically dispersed firms face higher post-IPO failure risks.

As for alternative measures of geographic dispersion, we first design a variable *Nstate* by simply counting how many different states that a firm has business interests at the time of IPO. Following Gao et al. (2008), we categorize how many U.S. geographical regions that an IPO firm has economic activities involved in. The variable *Region* is a count indicator ranging from one to nine in our sample. Moreover, Garcia and Norli (2012) document that local firms outperform dispersed firms in terms of stock returns. We follow their study and define the variable *Local* taking one if the geographical dispersion of IPO firms is in one or two, otherwise is zero. The results from specification (1) to specification (3) in Panel B of Table 12 continue to support our hypothesis.

Furthermore, geographically dispersed firms with operations in different states can have distinct financial performance due to the local economic conditions (e.g., Platikanova and Mattei (2016)). We use the gross domestic product (GDP) at the state level in the IPO year to construct a GPD-weighted HHI index of firm's geographic dispersion. The variable *Concentration(GDP)* is expected to capture the economic growth factor in the local state on the post-IPO performance of dispersed firms.

Another consideration is that firms operating in multiple states are likely to suffer from political risks such as corruption since they are characterised with dispersed businesses in different areas. Political corruption can reduce corporate investments and R&D expenditures, and negatively affect firm's managerial ability and productivity (e.g., Ades and Tella (1997); Athanasouli and Goujard (2015)). Smith (2016) finds that firms with more business concentration around the headquarter location hold less cash to avoid paying bribes requested from corrupt politicians. Following previous studies (e.g., Butler et al. (2009)), we obtain political conviction data from the Department of Justice (DOJ) in the US and measure the local corruption at the state level in the IPO

year as a number of convictions per million population. We, therefore, construct the variable *Concentration(corruption)*, which is a corruption-weighted HHI index by weighting the state citations as the importance of IPO firm's dispersion in each state. The variable is supposed to seize the negative impacts of political risks on multi-state operated firms across different areas. The results, through specification (4) to specification (5) in Panel B of Table 12, provide robust evidence that less geographically dispersed firms face much lower failure risks and enjoy longer survival times in post-IPO periods.

[Please insert Table 11 about here]

5.8 Other sensitivity checks

We conduct additional tests to access the sensitivity of the impact of geographic dispersion on IPO failures. Because many firms are incorporated in Delaware and Washington, those two states are likely to be outliers in our analysis. Thus, we re-run the main regressions with the exclusion of Delaware and Washington. In addition, instead of tracking IPO firm's status to the end of 2017, we consider a shorter tracking period, that is, five years after going public for each firm. With the re-defined IPO firm tracking period, we implement CPH model by including all covariates from Table 4. The results are consistent with our main findings. Moreover, the finding also suggests that the negative effects of IPO firms being highly geographically dispersed will even appear quicker (e.g., five years after offering). Tables are provided in the Internet Appendix.

6. Conclusion

In this study, we examine the impact of geographic dispersion on IPO firm's survivability. We argue that managers from firms that are with dispersed business activities across different U.S. states suffer from compromised information quality, and therefore cause various issues, such as agency conflicts. Therefore, managers are likely to make decisions to favour their own interests but against shareholder objectives. Ultimately, those decisions will be detrimental to corporate performance.

We differentiate geographically dispersed firms and HQ-based firms by counting different state names mentioned relative to the headquarter location in the 10-K report (e.g., Garcia and Norli (2012)). Based on the state citations, we also construct a normalized HHI index to represent the level of firm's dispersion. Implementing appropriate survival analysis, we document that geographic dispersion significantly increases firm's failure risks and shorten survival times in post-IPO periods. Consistent with our conjecture that geographic dispersion causes information asymmetry, our empirical evidence further reveals that failure risks of dispersed firms are more pronounced in a soft

information environment where the information cannot be made cheaply (e.g., via technological means). Additionally, we find that firms with the relatively high similarity of geographic dispersion compared to their industry rivals are more likely to fail, while firms with dispersed operations that are closely correlated with local shocks experience longer survival times. We also examine the importance of headquarters to firm survivals. Using a citation-based measure to proxy the HQ size, and define whether firm headquarters are situated in central locations in the US, we find both size and location of headquarters have a positive determinant power on IPO firm survival. Finally, our results are robust to various additional tests, including using another survival analysis methodology (e.g., AFT model), re-defined category of failed firms, and alternative geographic dispersion measures.

Our study contributes to the literature that investigates the association between geographic dispersion and firm performance. Particularly, it contributes to the IPO literature by revealing that geographically dispersed economic interests of firms serve as a significant determinant on IPO survivals.

References

ADDOUM, J. M., KUMAR, A. & LAW, K. 2013. Geographic diffusion of information and stock returns. Working Paper, University of Miami.

ADES, A. & TELLA, R. D. 1997. National Champions and Corruption: Some Unpleasant Interventionist Arithmetic*. *The Economic Journal,* 107**,** 1023-1042.

AHMAD, W. & JELIC, R. 2014. Lockup agreements and survival of UK IPOs. *Journal of Business Finance & Accounting,* 41**,** 717-742.

ALHADAB, M., CLACHER, I. & KEASEY, K. 2015. Real and accrual earnings management and IPO failure risk. *Accounting and Business Research,* 45**,** 55-92.

ALLISON, P. D. 2010. *Survival analysis using SAS: a practical guide*, Sas Institute.

ATHANASOULI, D. & GOUJARD, A. 2015. Corruption and management practices: Firm level evidence. *Journal of Comparative Economics,* 43**,** 1014-1034.

BERNILE, G., KUMAR, A. & SULAEMAN, J. 2015. Home away from home: Geography of information and local investors. *The Review of Financial Studies,* 28**,** 2009-2049.

BUSHMAN, R., CHEN, Q., ENGEL, E. & SMITH, A. 2004. Financial accounting information, organizational complexity and corporate governance systems. *Journal of Accounting and Economics,* 37**,** 167-201.

BUTLER, A. W., FAUVER, L. & MORTAL, S. 2009. Corruption, political connections, and municipal finance. *Review of Financial Studies***,** hhp010.

CHANDLER, A. D. 1991. The functions of the HQ unit in the multibusiness firm. *Strategic management journal,* 12**,** 31-50.

COLLIS, D., YOUNG, D. & GOOLD, M. 2007. The size, structure, and performance of corporate headquarters. *Strategic Management Journal,* 28**,** 383-405.

COVAL, J. D. & MOSKOWITZ, T. J. 1999. Home bias at home: Local equity preference in domestic portfolios. *The Journal of Finance,* 54**,** 2045-2073.

DAL BÓ, E. & ROSSI, M. A. 2007. Corruption and inefficiency: Theory and evidence from electric utilities. *Journal of Public Economics,* 91**,** 939-962.

DAVID, C. R. 1972. Regression models and life tables (with discussion). *Journal of the Royal Statistical Society,* 34**,** 187-220.

DE SILVA, D. G. & MCCOMB, R. P. 2012. Geographic concentration and high tech firm survival. *Regional Science and Urban Economics,* 42**,** 691-701.

DEMERS, E. & JOOS, P. 2007. IPO failure risk. *Journal of Accounting Research,* 45**,** 333-371.

DURU, A. & REEB, D. M. 2002. International diversification and analysts' forecast accuracy and bias. *The Accounting Review,* 77**,** 415-433.

EISENHARDT, K. M. 1985. Control: Organizational and economic approaches. *Management science,* 31**,** 134-149.

ESPENLAUB, S., KHURSHED, A. & MOHAMED, A. 2012. IPO survival in a reputational market. *Journal of Business Finance & Accounting,* 39**,** 427-463.

ESPENLAUB, S., KHURSHED, A., MOHAMED, A. & SAADOUNI, B. 2016. Committed anchor investment and IPO survival–The roles of cornerstone and strategic investors. *Journal of Corporate Finance,* 41**,** 139-155.

GAO, W., NG, L. & WANG, Q. 2008. Does geographic dispersion affect firm valuation? *Journal of Corporate Finance,* 14**,** 674-687.

GARCIA, D. & NORLI, Ø. 2012. Geographic dispersion and stock returns. *Journal of Financial Economics,* 106**,** 547-565.

GILL, A. & WALZ, U. 2016. Are VC-backed IPOs delayed trade sales? *Journal of Corporate Finance,* 37**,** 356-374.

GIROUD, X. 2013. Proximity and investment: Evidence from plant-level data. *The Quarterly Journal of Economics,* 128**,** 861-915.
GOUNOPOULOS, D., KALLIAS, A., KALLIAS, K. & TZEREMES, P. G. 2017. Political money contributions of US IPOs. *Journal of Corporate Finance,* 43**,** 19-38.
GOUNOPOULOS, D. & PHAM, H. 2017. Specialist CEOs and IPO survival.
HAU, H. 2001. Location matters: An examination of trading profits. *The Journal of Finance,* 56**,** 1959-1983.
HENSLER, D. A., RUTHERFORD, R. C. & SPRINGER, T. M. 1997. The survival of initial public offerings in the aftermarket. *Journal of Financial Research,* 20**,** 93-110.
HILL, C. W., HITT, M. A. & HOSKISSON, R. E. 1992. Cooperative versus competitive structures in related and unrelated diversified firms. *Organization Science,* 3**,** 501-521.
JAIN, B. A. & KINI, O. 2000. Does the presence of venture capitalists improve the survival profile of IPO firms? *Journal of Business Finance & Accounting,* 27**,** 1139-1183.
JAIN, B. A. & KINI, O. 2008. The Impact of Strategic Investment Choices on Post‐Issue Operating Performance and Survival of US IPO Firms. *Journal of business finance & accounting,* 35**,** 459-490.
JAIN, B. A. & MARTIN JR, C. L. 2005. The association between audit quality and post-IPO performance: A survival analysis approach. *Review of Accounting and Finance,* 4**,** 50-75.
JOHN, K., KNYAZEVA, A. & KNYAZEVA, D. 2011. Does geography matter? Firm location and corporate payout policy. *Journal of financial economics,* 101**,** 533-551.
KEASEY, K., MCGUINNESS, P. & SHORT, H. 1990. Multilogit approach to predicting corporate failure—further analysis and the issue of signal consistency. *Omega,* 18**,** 85-94.
LANDIER, A., NAIR, V. B. & WULF, J. 2007. Trade-offs in staying close: Corporate decision making and geographic dispersion. *The Review of Financial Studies,* 22**,** 1119-1148.
LANE, W. R., LOONEY, S. W. & WANSLEY, J. W. 1986. An application of the Cox proportional hazards model to bank failure. *Journal of Banking & Finance,* 10**,** 511-531.
PETERSEN, M. A. 2004. Information: Hard and soft.
PETERSEN, M. A. & RAJAN, R. G. 2002. Does distance still matter? The information revolution in small business lending. *The journal of Finance,* 57**,** 2533-2570.
PLATIKANOVA, P. & MATTEI, M. M. 2016. Firm geographic dispersion and financial analysts' forecasts. *Journal of Banking & Finance,* 64**,** 71-89.
RITTER, J. R. 2003. Differences between European and American IPO markets. *European financial management,* 9**,** 421-434.
RITTER, J. R. & WELCH, I. 2002. A review of IPO activity, pricing, and allocations. *The Journal of Finance,* 57**,** 1795-1828.
SCHULTZ, P. 1993. Unit initial public offerings: A form of staged financing. *Journal of Financial Economics,* 34**,** 199-229.
SHI, G., SUN, J. & LUO, R. 2015. Geographic dispersion and earnings management. *Journal of Accounting and Public Policy,* 34**,** 490-508.
SHI, G., SUN, J., ZHANG, L. & JIN, Y. 2017. Corporate social responsibility and geographic dispersion. *Journal of Accounting and Public Policy*.
SMITH, J. D. 2016. US political corruption and firm financial policies. *Journal of Financial Economics*.
SOMERS, M. J. 1996. Modelling employee withdrawal behaviour over time: A study of turnover using survival analysis. *Journal of Occupational and Organizational Psychology,* 69**,** 315-326.
WAN, W. P. & HOSKISSON, R. E. 2003. Home country environments, corporate diversification strategies, and firm performance. *Academy of Management journal,* 46**,** 27-45.

WELBOURNE, T. M. & ANDREWS, A. O. 1996. Predicting the performance of initial public offerings: should human resource management be in the equation? *Academy of management journal,* 39**,** 891-919.

Table 1 IPO distribution

The table displays the distribution of IPO listing status in our sample. The sample includes newly listed firms in the US stock market from 1993 to 2012. Delisting status is tracked for five years after IPO by year (Panel B) and industry (Panel C), respectively. Survived firms are defined as those are continuing to trade at the end of our tracking period (CRSP delisting code is 100); acquire firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300).

Panel A Distribution of IPOs from 1993 to 2012

	From the IPO date to December 2017		From IPO date to five years after the offering	
	N	%	N	%
Failed	868	28.60	535	17.63
Acquired	1441	47.48	754	24.84
Survived	726	23.92	1746	57.53
Total	3035		3035	

Panel B: Distribution by IPO year

Year	All IPOs	Failed		Acquired		Survived	
	N	N	%	N	%	N	%
1993	13	0	0.00	5	38.46	8	61.54
1994	18	4	22.22	3	16.67	11	61.11
1995	320	42	13.13	88	27.50	190	59.38
1996	537	127	23.65	153	28.49	257	47.86
1997	350	84	24.00	106	30.29	160	45.71
1998	225	58	25.78	43	19.11	124	55.11
1999	350	87	24.86	99	28.29	164	46.86
2000	267	49	18.35	58	21.72	160	59.93
2001	53	6	11.32	8	15.09	39	73.58
2002	49	3	6.12	13	26.53	33	67.35
2003	49	5	10.20	15	30.61	29	59.18
2004	132	8	6.06	35	26.52	89	67.42
2005	127	13	10.24	21	16.54	93	73.23
2006	128	11	8.59	28	21.88	89	69.53
2007	134	19	14.18	26	19.40	89	66.42
2008	19	3	15.79	2	10.53	14	73.68
2009	31	1	3.23	7	22.58	23	74.19
2010	76	6	7.89	12	15.79	58	76.32
2011	72	4	5.56	11	15.28	57	79.17
2012	85	5	5.88	21	24.71	59	69.41
Total	3035	535		754		1746	

Panel B: Distribution by industry

	All IPOs	Failed		Acquired		Survived	
Industry	N	N	%	N	%	N	%
Oil and gas (13)	64	8	12.50	13	20.31	43	67.19
Food products (20)	31	4	12.90	9	29.03	18	58.06
Chemical products (28)	255	25	9.80	48	18.82	182	71.37
Manufacturing (30-34)	61	10	16.39	14	22.95	37	60.66
Computer equipment & services (35, 73)	946	170	17.97	271	28.65	505	53.38
Electronic equipment (36)	222	27	12.16	50	22.52	145	65.32
Scientific instruments (38)	194	22	11.34	57	29.38	115	59.28
Transportation & public utilities (41, 42, 44-49)	241	62	25.73	60	24.90	119	49.38
Wholesale & retail trade (50-59)	271	59	21.77	50	18.45	162	59.78
Entertainment services (70, 78, 79)	54	13	24.07	18	33.33	23	42.59
Health services (80)	79	21	26.58	21	26.58	37	46.84
All others (01, 12, 15, 17, 22-27, 29, 37, 39, 72, 75, 82, 87, 96)	617	114	18.48	143	23.18	360	58.35
Total	3035	535		754		1746	

Table 2 Kaplan-Meier survival rates of dispersion and HQ-based firms by year and industry

The table displays five years survival rates of geographically dispersed and HQ-based firms by year and industry using a Kaplan-Meier survival function. The sample includes newly listed firms in the US stock market from 1993 to 2012. We defined the HQ-based firms are those that are with only the headquarter state mentioned in the 10-K report at the time of IPO, and dispersed firms are those that are with more than one state mentioned (including the HQ). Survived firms are defined as those are continuing to trade at the end of our tracking period (CRSP delisting code is 100); acquire firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300).

Panel A

	All						Dispersed firms						HQ-based firms					
		Kaplan-Meier survival rates						Kaplan-Meier survival rates						Kaplan-Meier survival rates				
Year	N	1yr	2yrs	3yrs	4yrs	5yrs	N	1yr	2yrs	3yrs	4yrs	5yrs	N	1yr	2yrs	3yrs	4yrs	5yrs
1993	13	100	100	100	100	100	11	100	100	100	100	100	2	100	100	100	100	100
1994	18	100	100	100	87.50	74.04	18	100	100	100	87.5	74.04	0	-	-	-	-	-
1995	320	100	97.46	92.61	87.14	85.53	290	100	97.59	92.18	86.09	85.19	30	100	96.67	96.67	96.67	89.23
1996	537	100	95.68	87.02	80.27	72.37	493	100	95.5	86.92	80.01	72.23	44	100	97.67	88.15	83.11	73.87
1997	350	99.43	93.95	87.40	79.16	71.45	321	99.38	93.72	87.24	78.52	70.89	29	100	96.55	89.12	85.41	76.87
1998	225	100	95.11	88.35	77.44	70.94	196	100	94.9	87.68	75.75	68.92	29	100	96.55	92.84	88.8	84.57
1999	350	99.71	91.13	81.56	74.01	70.79	332	99.7	90.69	80.61	72.71	69.33	18	100	100	100	100	100
2000	267	99.63	92.83	85.97	82.89	80.01	248	99.6	92.28	84.84	81.97	79.88	19	100	100	100	94.44	82.64
2001	53	98.11	98.11	92.23	90.18	88.03	52	98.08	98.08	92.07	89.98	87.79	1	100	100	100	100	100
2002	49	100	100.00	97.83	95.55	92.97	46	100	100	97.67	97.67	97.67	3	100	100	100	66.67	33.33
2003	49	97.96	95.87	95.87	93.59	88.39	49	97.96	95.87	95.87	93.59	88.39	0	-	-	-	-	-
2004	132	100	98.48	98.48	96.74	92.98	128	100	99.22	99.22	97.43	93.57	4	100	75	75	75	75
2005	127	100	99.21	98.37	91.15	88.36	122	100	99.18	98.3	90.74	87.81	5	100	100	100	100	100
2006	128	100	97.66	92.81	91.10	91.10	126	100	97.62	92.7	90.95	90.95	2	100	100	100	100	100
2007	134	100	96.99	89.29	86.02	85.15	128	100	96.85	88.78	85.33	84.41	6	100	100	100	100	100
2008	19	100	94.74	84.21	84.21	84.21	19	100	94.74	84.21	84.21	84.21	0	-	-	-	-	-
2009	31	100	100	100	96.30	96.30	31	100	100	100	96.3	96.3	0	-	-	-	-	-
2010	76	100	100	97.3	94.44	91.29	76	100	100	97.3	94.44	91.29	0	-	-	-	-	-
2011	72	98.61	98.61	98.61	95.48	90.78	71	98.59	98.59	98.59	95.41	90.64	1	100	100	100	100	100
2012	85	100	100	98.77	93.35	93.35	85	100	100	98.77	93.35	93.35	0	-	-	-	-	-
1993-2012	3035	99.77	95.78	89.95	84.26	79.92	2842	99.75	95.67	89.7	83.85	79.7	193	100	97.37	93.54	90.05	83.1

Panel B

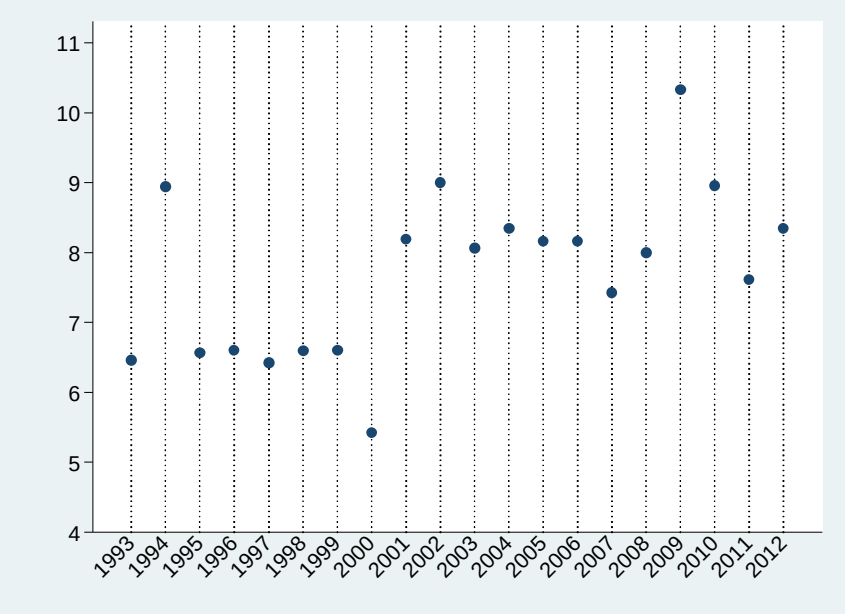
	All						Dispersed firms						HQ-based firms					
		Kaplan-Meier survival rates						Kaplan-Meier survival rates						Kaplan-Meier survival rates				
Industry	N	1yr	2yrs	3yrs	4yrs	5yrs	N	1yr	2yrs	3yrs	4yrs	5yrs	N	1yr	2yrs	3yrs	4yrs	5yrs
Oil and gas (13)	64	100	100	93.22	85.91	85.91	61	100	100	92.98	85.39	85.39	3	100	100	100	100	100
Food products (20)	31	100	90.32	86.98	86.98	86.98	31	100	90.32	86.98	86.98	86.98	0	-	-	-	-	-
Chemical products (28)	255	99.61	98.82	95.19	91.33	89.44	233	99.57	98.71	95.17	90.91	89.34	22	100	100	95.45	95.45	90.4
Manufacturing (30-34)	61	100	95.00	89.52	87.61	81.36	60	100	94.92	89.33	87.39	81.00	1	100	100	100	100	100
Computer equipment & services (35, 73)	946	99.79	94.45	89.48	84.23	79.10	883	99.77	94.29	89.1	83.6	78.69	63	100	96.67	94.91	93.05	84.96
Electronic equipment (36)	222	99.55	97.75	94.49	89.89	86.46	200	99.5	97.5	94.4	91.01	87.81	22	100	100	95.24	79.37	74.07
Scientific instruments (38)	194	99.48	97.42	93.53	90.37	86.78	169	99.41	98.22	94.37	90.72	86.59	25	100	92	87.82	87.82	87.82
Transportation & public utilities (41, 42, 44-49)	241	100	95.36	88.20	77.61	69.91	235	100	95.24	88.34	77.42	69.45	6	100	100	83.33	83.33	83.3
Wholesale & retail trade (50-59)	271	100	95.17	88.09	81.41	75.76	263	100	95.02	87.71	80.83	76.02	8	100	100	100	100	60.00
Entertainment services (70, 78, 79)	54	98.15	94.44	83.20	75.64	69.82	51	98.04	94.12	82.05	73.85	70.77	3	100	100	100	100	50.00
Health services (80)	79	100	96.15	85.62	72.69	69.15	76	100	96.00	86.4	72.85	69.11	3	100	100	66.67	66.67	66.67
All others(01, 12, 15, 17, 22-27, 29, 37, 39, 72, 75, 82, 87, 96)	617	99.84	95.74	88.11	82.6	79.19	580	99.83	95.64	87.68	82.2	78.99	37	100	97.3	94.52	88.61	82.50
Total	3035						2842						193					

Table 3 Descriptive statistics

The table displays the descriptive statistics for the sample. The sample includes newly listed firms in the US stock market from 1993 to 2012. Dispersion is a dummy variable taking 1 to indicate an IPO firm is geographically dispersed, otherwise is 0. Concentration is calculated using a normalized Herfindahl-Hirschman Index (HHI). HQ% is the ratio of a firm's HQ state counts over all state citations in the 10-K report, which measures the degree to what extent that an IPO firm operate its business around the headquarter location. Central location is a dummy variable indicating whether a firm's HQ location is from top big ten metropolitan areas and relevant suburbs, including New York City, Los Angeles, Chicago, Washington-Baltimore, San Francisco, Philadelphia, Boston, Detroit, Dallas, and Houston. Following Platikanova and Matter (2016), GEOSIMILAR measures the degree of a firm's geographic dispersion similarity in a specific industry; GEOCORR measures to what extent a firm's economic activities are correlated with local economic shocks. A t-test is conducted to compare differences in means between the two sub-group of IPOs with geographically dispersed firms and those with HQ-based firms. All variables are defined in Appendix A.

	All IPOs						Dispersed firms						HQ-based firms						
	N	Mean	p25	p50	p75	sd	N	Mean	p25	p50	p75	sd	N	Mean	p25	p50	p75	sd	P-value
Geographic dispersion																			
Dispersion	3035	0.94	1.00	1.00	1.00	0.24	2842	1.00	1.00	1.00	1.00	0.00	193	0.00	0.00	0.00	0.00	0.00	-
Concentration	3035	0.42	0.23	0.36	0.55	0.25	2842	0.38	0.22	0.34	0.51	0.21	193	1.00	1.00	1.00	1.00	1.00	0.00
HQ%	3035	0.47	0.23	0.46	0.70	0.29	2842	0.43	0.21	0.43	0.66	0.27	193	1.00	1.00	1.00	1.00	0.00	0.00
Central Location	3035	0.62	0.00	1.00	1.00	0.49	2842	0.62	0.00	1.00	1.00	0.48	193	0.55	0.00	1.00	1.00	0.50	0.03
GEOSIMILAR	3035	0.24	0.11	0.21	0.37	0.16	2842	-	-	-	-	-	193	-	-	-	-	-	-
GEOCORR	3035	0.20	0.05	0.11	0.24	0.25	2842	0.14	0.05	0.10	0.21	0.14	193	1.00	1.00	1.00	1.00	0.00	0.00
IPO and firm characteristics																			
Firm Age	3035	14.67	4.00	7.00	15.00	20.98	2842	14.96	4.00	7.00	15.00	21.39	193	10.43	4.00	7.00	11.00	12.94	0.00
Proceeds	3035	119.02	27.50	51.45	100.00	489.92	2842	123.99	28.88	54.00	102.95	505.74	193	45.89	16.80	32.50	56.00	50.74	0.02
Sales	3035	384.69	15.42	51.98	169.62	2958.02	2842	406.85	16.39	54.90	183.11	3055.32	193	58.26	6.61	23.02	62.07	154.39	0.06
Venture capital	3035	0.43	0.00	0.00	1.00	0.49	2842	0.42	0.00	0.00	1.00	0.49	193	0.47	0.00	0.00	1.00	0.50	0.12
Underwriter	3035	0.37	0.00	0.00	1.00	0.48	2842	0.38	0.00	0.00	1.00	0.49	193	0.26	0.00	0.00	1.00	0.44	0.00
Auditor	3035	0.68	0.00	1.00	1.00	0.47	2842	0.68	0.00	1.00	1.00	0.46	193	0.62	0.00	1.00	1.00	0.49	0.04
Leverage	3035	0.39	0.16	0.30	0.57	0.33	2842	0.39	0.16	0.31	0.58	0.33	193	0.33	0.12	0.24	0.43	0.28	0.00
Profitability	3035	-0.02	-0.12	0.05	0.14	0.31	2842	-0.02	-0.12	0.06	0.14	0.31	193	-0.02	-0.16	0.03	0.12	0.24	0.83
Market-to-Book	3035	5.55	2.04	3.40	5.89	21.82	2842	5.66	2.05	3.43	5.92	22.49	193	3.97	1.79	3.13	5.58	6.34	0.15
IndustrySEG	2900	1.73	1.00	2.00	2.00	0.86	2724	1.74	1.00	2.00	2.00	0.88	176	1.57	1.00	2.00	2.00	0.64	0.00
Intl.SEG	2486	1.73	1.00	1.00	2.00	1.57	2328	1.73	1.00	1.00	2.00	1.56	158	1.66	1.00	1.00	2.00	1.58	0.28

Panel A



Panel B

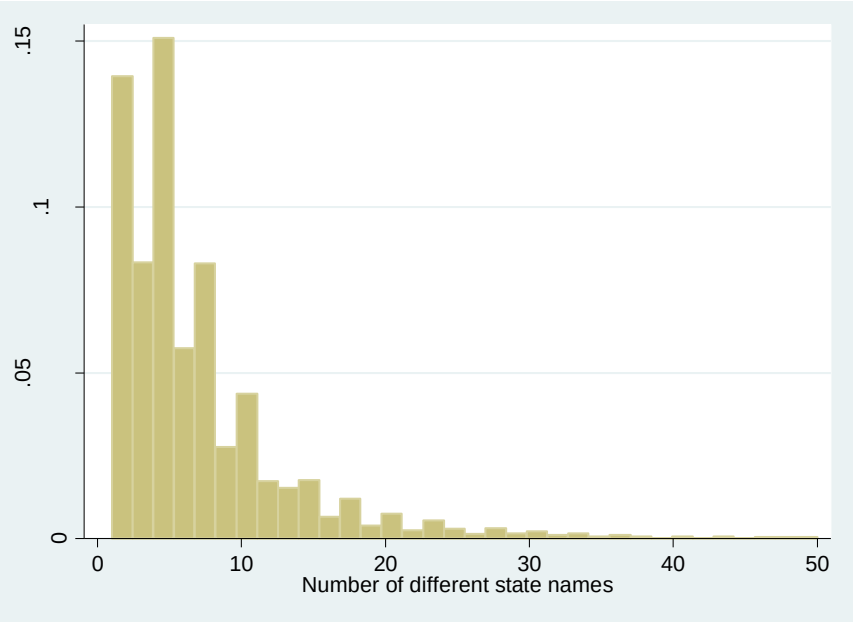
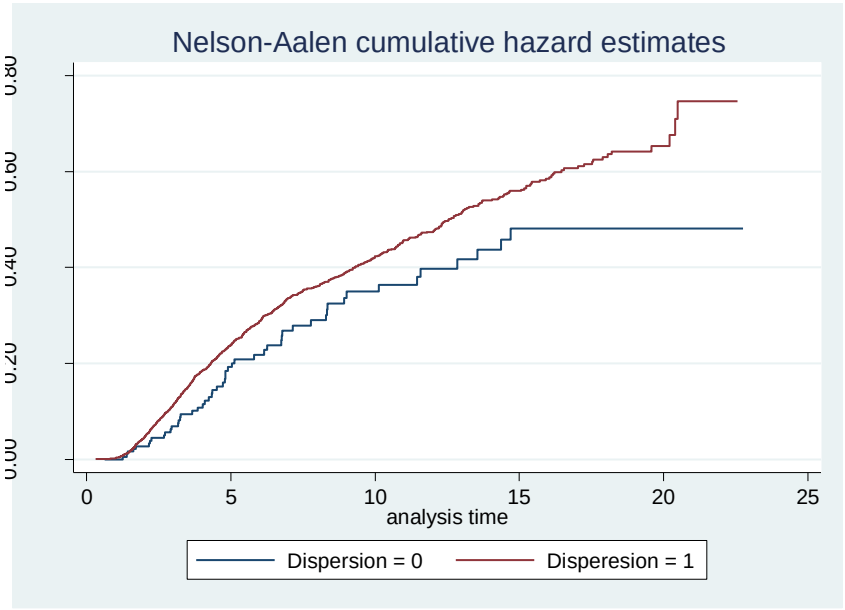


Fig.1. The level of IPO firm geographic dispersion
The level of a firm geographic dispersion is measure as how many different states that are mentioned in a 10-k report at the time of IPO. Penal A plots the average geographic dispersion by IPO years from 1993 to 2012; Panel B shows the histogram of geographic dispersion across 1993 to 2012.

Panel A



Panel B

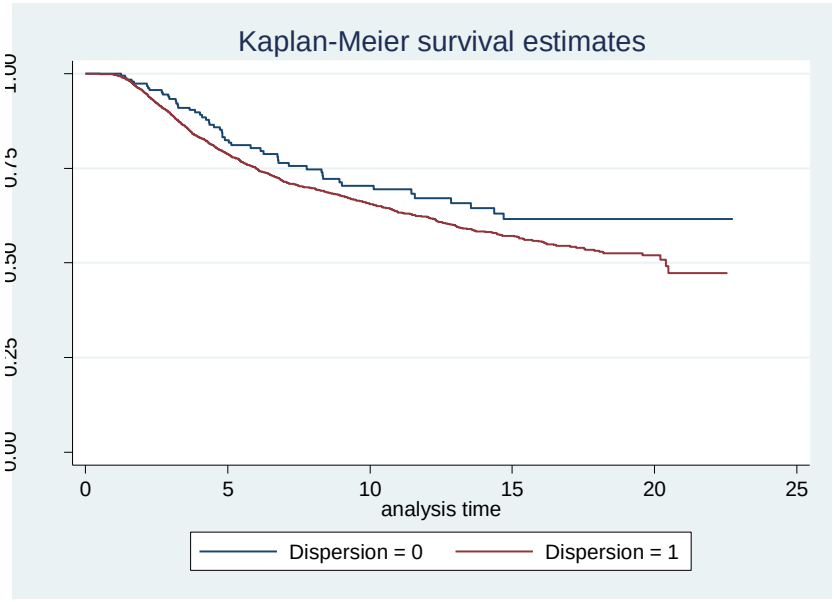


Fig.2. Kaplan-Meier Survival Function and Nelson-Aalen Cumulative Hazard Function Curves
The graphs report Kaplan-Meier Survival Function and Nelson-Aalen Cumulative Hazard Functions curves by HQ-based and Dispersed firms. We defined the HQ-based firms are those that are with only the headquarter state mentioned in the 10-K report issued immediately after IPO, and dispersed firms are those that are with more than one state mentioned (including the HQ). Survived firms are defined as those are continuing to trade at the end of our tracking period (CRSP delisting code is 100); acquire firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300).

Table 4 Geographic dispersion and probability of post-IPO failure (CPH model)

The table displays the results of using a COX Proportional Hazard (CPH) model to investigate the impact of firm's geographic dispersion at the time of going public on the probability of post-IPO failures. The sample includes newly listed firms in the US stock market from 1993 to 2012.Dispersion is a dummy variable taking 1 to indicate an IPO firm is geographically dispersed, otherwise is 0. Concentration is calculated using a normalized Herfindahl-Hirschman Index (HHI). Survived firms are defined as those are continuing to trade at the end of our tracking period (e.g., the end of 2017) (CRSP delisting code is 100); acquired firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300). All regressions are controlled for year and industry effects whose coefficients are supressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable on the right side. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Dispersion	0.462***	1.588		
	(3.12)			
Concentration			-0.468***	0.626
			(-3.14)	
Firm Age	-0.224***	0.799	-0.217***	0.805
	(-5.40)		(-5.23)	
Proceeds	-0.182***	0.834	-0.187***	0.829
	(-3.37)		(-3.47)	
Sale	-0.206***	0.814	-0.217***	0.805
	(-5.97)		(-6.22)	
Venture capital	-0.158*	0.854	-0.166*	0.847
	(-1.77)		(-1.85)	
Underwriter	-0.248***	0.780	-0.243***	0.784
	(-2.65)		(-2.60)	
Auditor	-0.061	0.941	-0.067	0.935
	(-0.78)		(-0.85)	
Leverage	0.424***	1.528	0.418***	1.519
	(3.67)		(3.60)	
Profitability	-0.479***	0.620	-0.497***	0.609
	(-3.72)		(-3.85)	
Market-to-Book	-0.002**	0.998	-0.002**	0.998
	(-2.15)		(-2.13)	
Year Control	Yes		Yes	
Industry Control	Yes		Yes	
Chi-square	723.29		728.72	
Chi-square test	0.00		0.00	
Obs	3035		3035	

Table 5 Geographic dispersion, information environment and probability of post-IPO failure (CPH model)

The table displays the results of using a COX Proportional Hazard (CPH) model to investigate the impact of geographic similarity and geographic correlation on the probability of post-IPO failures. The sample includes newly listed firms in the US stock market from 1993 to 2012. Following Landier et al. (2007), we define IPO firms operating in a soft (hard) information environment if the change of the distance of firm's primary lending institutions at 2-digit level is below (above) than the sample median. Survived firms are defined as those are continuing to trade at the end of our tracking period (e.g., the end of 2017) (CRSP delisting code is 100); acquired firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300). All regressions are controlled for year effects whose coefficients are supressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable on the right side. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

	Soft environment				Hard environment			
	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Dispersion	0.948***	2.580			-0.020	0.980		
	(3.50)				(-0.09)			
Concentration			-0.512**	0.599			-0.311	0.732
			(-2.43)				(-1.27)	
Firm Age	-0.109*	0.896	-0.106	0.899	-0.327***	0.721	-0.318***	0.728
	(-1.69)		(-1.64)		(-4.70)		(-4.57)	
Proceeds	-0.240***	0.787	-0.243***	0.785	-0.217***	0.805	-0.228***	0.796
	(-2.97)		(-3.02)		(-2.65)		(-2.80)	
Sale	-0.131***	0.877	-0.137***	0.872	-0.218***	0.804	-0.223***	0.800
	(-2.87)		(-2.93)		(-4.24)		(-4.34)	
Venture capital	-0.322***	0.724	-0.332***	0.718	-0.309**	0.734	-0.297**	0.743
	(-2.58)		(-2.65)		(-2.40)		(-2.32)	
Underwriter	-0.442***	0.642	-0.433***	0.648	-0.147	0.864	-0.150	0.861
	(-3.28)		(-3.20)		(-1.00)		(-1.02)	
Auditor	-0.089	0.914	-0.102	0.903	-0.028	0.972	-0.030	0.970
	(-0.78)		(-0.89)		(-0.23)		(-0.24)	
Leverage	0.833***	2.301	0.774***	2.168	1.393***	4.028	1.352***	3.866
	(3.66)		(3.29)		(6.25)		(5.96)	
Profitability	-0.552***	0.576	-0.605***	0.546	-0.466**	0.628	-0.459**	0.632
	(-3.26)		(-3.64)		(-2.40)		(-2.36)	
Market-to-Book	-0.004***	0.996	-0.003***	0.997	0.001	1.001	0.001	1.001
	(-3.06)		(-2.73)		(0.74)		(0.66)	
Year Control	Yes		Yes		Yes		Yes	
Industry Control	NO		NO		NO		NO	
Chi-square	225.35		3577.72		708.23		651.18	
Chi-square test	0.00		0.00		0.00		0.00	
Obs	1580		1580		1030		1030	

Table 6 Geographic similarity, geographic correlation and probability of post-IPO failure (CPH model)

The table displays the results of using a COX Proportional Hazard (CPH) model to investigate the impact of geographic similarity and geographic correlation on the probability of post-IPO failures. The sample includes newly listed firms in the US stock market from 1993 to 2012. Following Platikanova and Matter (2016), GEOSIMILAR measures the degree of a firm's geographic dispersion similarity in a specific industry; GEOCORR measures to what extent a firm's economic activities are correlated with local economic shocks. Survived firms are defined as those are continuing to trade at the end of our tracking period (e.g., the end of 2017) (CRSP delisting code is 100); acquired firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300). All regressions are controlled for year and industry effects whose coefficients are supressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable on the right side. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

	Coefficient	Hazard ratio	Coefficient	Hazard ratio
GEOSIMILAR	0.413*	1.512		
	(1.76)			
GEOCORR			-0.495***	0.610
			(-3.39)	
Firm Age	-0.218***	0.804	-0.222***	0.801
	(-5.20)		(-5.34)	
Proceeds	-0.180***	0.835	-0.186***	0.831
	(-3.32)		(-3.45)	
Sale	-0.205***	0.814	-0.214***	0.808
	(-5.91)		(-6.15)	
Venture capital	-0.185**	0.831	-0.158*	0.854
	(-2.06)		(-1.77)	
Underwriter	-0.252***	0.777	-0.246***	0.782
	(-2.71)		(-2.63)	
Auditor	-0.071	0.932	-0.064	0.938
	(-0.90)		(-0.81)	
Leverage	0.413***	1.511	0.416***	1.516
	(3.57)		(3.58)	
Profitability	-0.502***	0.606	-0.482***	0.617
	(-3.87)		(-3.76)	
Market-to-Book	-0.002**	0.998	-0.002**	0.998
	(-2.19)		(-2.23)	
Year Control	Yes		Yes	
Industry Control	Yes		Yes	
Chi-square	707.87		722.54	
Chi-square test	0.00		0.00	
Obs	3035		3035	

Table 7 Firm headquarter and probability of post-IPO failure (CPH model)

The table displays the results of using a COX Proportional Hazard (CPH) model to investigate the impact of the level of business concentration around the firm headquarter and its location on the probability of post-IPO failures. HQ% is the ratio of a firm's HQ state counts over all state citations in the 10-K report, which measures the degree to what extent that an IPO firm operate its business around the headquarter location. Central location is a dummy variable indicating whether a firm's HQ location is from ten largest metropolitan areas and relevant suburbs, including New York City, Los Angeles, Chicago, Washington-Baltimore, San Francisco, Philadelphia, Boston, Detroit, Dallas, and Houston. Survived firms are defined as those are continuing to trade at the end of our tracking period (e.g., the end of 2017) (CRSP delisting code is 100); acquired firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300). All regressions are control for year and industry effects whose coefficients are supressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable on the right side. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

	Coefficient	Hazard ratio	Coefficient	Hazard ratio
HQ%	-0.333***	0.716		
	(-2.73)			
Central Location			-0.159**	0.853
			(-2.21)	
Firm Age	-0.218***	0.804	-0.228***	0.796
	(-5.24)		(-5.47)	
Proceeds	-0.187***	0.829	-0.170***	0.844
	(-3.46)		(-3.15)	
Sale	-0.210***	0.810	-0.203***	0.816
	(-6.10)		(-5.90)	
Venture capital	-0.160*	0.852	-0.163*	0.850
	(-1.79)		(-1.82)	
Underwriter	-0.245***	0.782	-0.237**	0.789
	(-2.63)		(-2.54)	
Auditor	-0.060	0.942	-0.062	0.940
	(-0.76)		(-0.79)	
Leverage	0.419***	1.520	0.405***	1.499
	(3.62)		(3.52)	
Profitability	-0.497***	0.608	-0.517***	0.596
	(-3.87)		(-4.08)	
Market-to-Book	-0.002**	0.998	-0.002**	0.998
	(-2.13)		(-2.19)	
Year Control	Yes		Yes	
Industry Control	Yes		Yes	
Chi-square	730.46		733.04	
Chi-square test	0.00		0.00	
Obs	3035		3035	

Table 8 Geographic dispersion and probability of post-IPO failure controlling for diversification factors (CPH model)

The table displays the results using a COX Proportional Hazard (CPH) model to investigate the impact of firm's geographic dispersion at time of going public on the probability of post-IPO failures. The sample includes newly listed firms in the US stock market from 1993 to 2012.Dispersion is a dummy variable taking 1 to indicate an IPO firm is geographically dispersed, otherwise is 0. Concentration is calculated using a normalized Herfindahl-Hirschman Index (HHI). IndustrySEG is number of industries that a firm involves in. Intl.SEG is number of a firm's geographic segments. Survived firms are defined as those are continuing to trade at the end of our tracking period (e.g., the end of 2017) (CRSP delisting code is 100); acquired firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300). All regressions are controlled for year and industry effects whose coefficients are supressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable on the right side. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Dispersion	0.347**	1.414		
	(2.15)			
Concentration			-0.330**	0.719
			(-2.05)	
Firm Age	-0.201***	0.818	-0.196***	0.822
	(-4.32)		(-4.21)	
Proceeds	-0.209***	0.811	-0.211***	0.810
	(-3.51)		(-3.54)	
Sale	-0.231***	0.794	-0.240***	0.786
	(-6.07)		(-6.23)	
Venture capital	-0.276***	0.759	-0.283***	0.754
	(-2.92)		(-3.00)	
Underwriter	-0.217**	0.805	-0.209**	0.812
	(-2.10)		(-2.03)	
Auditor	-0.030	0.970	-0.027	0.974
	(-0.35)		(-0.32)	
Leverage	1.052***	2.862	1.042***	2.835
	(6.56)		(6.42)	
Profitability	-0.416***	0.660	-0.432***	0.649
	(-3.04)		(-3.16)	
Market-to-Book	-0.002*	0.998	-0.002*	0.998
	(-1.79)		(-1.80)	
IndustrySEG	-0.027	0.973	-0.026	0.974
	(-0.53)		(-0.51)	
Intl.SEG	0.003	1.003	0.005	1.005
	(0.09)		(0.13)	
Year Control	Yes		Yes	
Industry Control	Yes		Yes	
Chi-square	407.95		406.68	
Chi-square test	0.00		0.00	
Obs	2463		2463	

Table 9 Endogeneity control - Propensity score matching

The table display the results of using a propensity score matching to investigate the impact of geographic dispersion of firms on the probability of post-IPO failure. The variables used for matching process include: Firm age, Proceeds, Sales, Venture capital, Underwriter, Auditor, Leverage, Profitability, and Market-to-book. Survived firms are defined as those are continuing to trade at the end of our tracking period (CRSP delisting code is 100); acquire firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300). Z-statistics are presented in parentheses below coefficients. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

ATET	Failed
Dispersion	0.099**
(1 vs 0)	(2.23)
Obs	3035

Table 10 Geographic dispersion and probability of post-IPO failure (AFT model)

The table display the results of using an Accelerated Failure Time (AFT) model to investigate the impact of firm's geographic dispersion at time of going public on the probability of post-IPO failures. The sample includes newly listed firms in the US stock market from 1993 to 2012.Dispersion is a dummy variable taking 1 to indicate an IPO firm is geographically dispersed, otherwise is 0. Concentration is calculated using a normalized Herfindahl-Hirschman Index (HHI). Survived firms are defined as those are continuing to trade at the end of our tracking period (e.g., the end of 2017) (CRSP delisting code is 100); acquired firms are those that are delisted due to reasons such as M&A (CRSP delisting code between 200 and 299); failed firm are those that are delisted due to negative reasons, such as bankruptcy and liquidation (CRSP delisting code equal or above 300). All regressions are control for year and industry effects whose coefficients are supressed for brevity. Z-statistics are presented in parentheses below coefficients and a time ratio is reported for each variable on the right side. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

	Coefficient	Time ratio	Coefficient	Time ratio
Dispersion	-0.384***	0.681		
	(-3.22)			
Concentration			0.413***	1.511
			(3.41)	
Firm Age	0.200***	1.222	0.197***	1.218
	(5.92)		(5.83)	
Proceeds	0.127***	1.136	0.134***	1.143
	(3.01)		(3.13)	
Sale	0.155***	1.168	0.161***	1.175
	(5.72)		(5.89)	
Venture capital	0.140**	1.150	0.138**	1.149
	(1.99)		(1.98)	
Underwriter	0.193***	1.213	0.188***	1.207
	(2.70)		(2.63)	
Auditor	0.074	1.077	0.079	1.082
	(1.19)		(1.28)	
Leverage	-0.297*	0.743	-0.291*	0.747
	(-1.81)		(-1.77)	
Profitability	0.461***	1.586	0.478***	1.612
	(3.71)		(3.81)	
Market-to-Book	0.002	1.002	0.002	1.002
	(1.57)		(1.63)	
Intercept	1.310**		0.782	
	(2.44)		(1.46)	
Year Control	Yes		Yes	
Industry Control	Yes		Yes	
Chi-square	629.20		638.32	
Chi-square test	0.00		0.00	
Obs	3035		3035	

Table 11 Robustness checks (CPH model)

The table displays the results of using a COX Proportional Hazard (CPH) model to investigate the impact of firm's geographic dispersion on the probability of post-IPO failures. The sample includes newly listed firms in the US stock market from 1993 to 2012.In Panel A, (1) failed firms are re-defined as those firms that are delisted due to M&As (with CRSP delisting code between 200 and 299; and equal or above 300); (2) M&As are excluded from the sample. Survived firms are defined as those are continuing to trade at the end of our tracking period (e.g., the end of 2017) (CRSP delisting code is 100). Dispersion is a dummy variable taking 1 to indicate an IPO firm is geographically dispersed, otherwise is 0. Concentration is calculated using a normalized Herfindahl-Hirschman Index (HHI). In Panel B, NState is number of different states mentioned in the 10-report for an IPO firm. Region is a count variable indicating how many different regions that the firm has business. Local is defined as firms that are with one or two different states mentioned in the 10-K form. Concentration(GDP) and Concentration(corruption) is GPD and corruption weighted normalized Herfindahl-Hirschman Index (HHI). All regressions are controlled for year and industry effects whose coefficients are supressed for brevity. Z-statistics are presented in parentheses below coefficients and a hazard ratio is reported for each variable on the right side. One, two and three asterisks denote statistical significance at the 10%, 5% and 1%, respectively. All variables are defined in Appendix A.

Panel A: M&As as left censored

	M&As as left censored				Excl. M&As from sample			
	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Dispersion	0.247***	1.281			0.432***	1.541		
	(2.86)				(2.92)			
Concentration			-0.403***	0.669			-0.448***	0.639
			(-4.37)				(-2.95)	
Firm Age	-0.094***	0.910	-0.090***	0.914	-0.207***	0.813	-0.197***	0.822
	(-3.62)		(-3.43)		(-4.76)		(-4.54)	
Proceeds	-0.057*	0.944	-0.063**	0.939	-0.125**	0.883	-0.130**	0.878
	(-1.81)		(-2.01)		(-2.31)		(-2.40)	
Sale	-0.052**	0.949	-0.062***	0.939	-0.171***	0.843	-0.180***	0.835
	(-2.36)		(-2.80)		(-4.89)		(-5.09)	
Venture capital	0.052	1.054	0.053	1.054	0.021	1.021	0.010	1.010
	(1.01)		(1.01)		(0.23)		(0.11)	
Underwriter	-0.069	0.933	-0.063	0.939	-0.173*	0.841	-0.172*	0.842
	(-1.33)		(-1.21)		(-1.81)		(-1.80)	
Auditor	0.011	1.011	0.006	1.006	-0.047	0.954	-0.058	0.944
	(0.22)		(0.12)		(-0.60)		(-0.74)	
Leverage	0.287***	1.332	0.289***	1.335	0.480***	1.616	0.475***	1.607
	(3.98)		(3.99)		(4.22)		(4.15)	
Profitability	-0.345***	0.708	-0.354***	0.702	-0.316**	0.729	-0.334**	0.716
	(-3.54)		(-3.66)		(-2.30)		(-2.42)	
Market-to-Book	-0.002**	0.998	-0.002**	0.998	-0.005	0.995	-0.004	0.996
	(-2.40)		(-2.50)		(-1.59)		(-1.49)	
Year Control	Yes		Yes		Yes		Yes	
Industry Control	Yes		Yes		Yes		Yes	
Chi-square	433.73		445.03		600.71		620.47	
Chi-square test	0.00		0.00		0.00		0.00	
Obs	3035		3035		1594		1594	

Panel B Alternative measures of geographic dispersion

	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio	Coefficient	Hazard ratio
Nstate	0.023***	1.023								
	(3.87)									
Region			0.063***	1.065						
			(3.37)							
Local					-0.162*	0.850				
					(-1.83)					
Concentration (GDP)							-0.416*	0.660		
							(-1.70)			
Concentration (Corruption)									-0.311**	0.732
									(-2.48)	
Firm Age	-0.217***	0.805	-0.219***	0.804	-0.224***	0.799	-0.227***	0.797	-0.222***	0.801
	(-5.22)		(-5.28)		(-5.40)		(-5.45)		(-5.35)	
Proceeds	-0.196***	0.822	-0.192***	0.826	-0.177***	0.838	-0.179***	0.836	-0.183***	0.833
	(-3.61)		(-3.53)		(-3.27)		(-3.30)		(-3.38)	
Sale	-0.217***	0.805	-0.218***	0.804	-0.211***	0.810	-0.203***	0.816	-0.210***	0.811
	(-6.22)		(-6.25)		(-6.03)		(-5.89)		(-6.06)	
Venture capital	-0.172*	0.842	-0.170*	0.843	-0.165*	0.848	-0.155*	0.856	-0.164*	0.849
	(-1.93)		(-1.91)		(-1.84)		(-1.73)		(-1.83)	
Underwriter	-0.232**	0.793	-0.238**	0.788	-0.241**	0.786	-0.237**	0.789	-0.241***	0.786
	(-2.48)		(-2.55)		(-2.57)		(-2.53)		(-2.58)	
Auditor	-0.063	0.939	-0.065	0.937	-0.063	0.939	-0.054	0.947	-0.065	0.937
	(-0.81)		(-0.83)		(-0.80)		(-0.69)		(-0.83)	
Leverage	0.387***	1.472	0.400***	1.492	0.413***	1.512	0.403***	1.496	0.409***	1.505
	(3.27)		(3.41)		(3.54)		(3.48)		(3.53)	
Profitability	-0.515***	0.597	-0.502***	0.605	-0.492***	0.611	-0.504***	0.604	-0.492***	0.611
	(-4.03)		(-3.93)		(-3.80)		(-3.88)		(-3.84)	
Market-to-Book	-0.002**	0.998	-0.002**	0.998	-0.002**	0.998	-0.002**	0.998	-0.002**	0.998
	(-2.29)		(-2.28)		(-2.32)		(-2.08)		(-2.21)	
Year Control	Yes		Yes		Yes		Yes		Yes	
Industry Control	Yes		Yes		Yes		Yes		Yes	
Chi-square	702.39		705.86		712.08		726.09		720.85	
Chi-square test	0.00		0.00		0.00		0.00		0.00	
Obs	3035		3035		3035		3035		3035	

Appendix A: Variable definitions

Panel A: Geographic dispersion	
Dispersion	A dummy variable taking 1 to indicate an IPO firm is geographically dispersed, otherwise is 0
Concentration	Following Platikanoova and Mattei (2016), we measure the degree of a firm's geographic dispersion using a normalized Herfindahl-Hirschman Index (HHI): $SS_{i,t} = \left(\frac{\#Alabama_{i,t}}{\#Total_{US}state_{i,t}}\right) + \cdots + \left(\frac{\#New\ York_{i,t}}{\#Total\_US\ States_{i,t}}\right) + \cdots + \left(\frac{\#Wyoming_{i,t}}{\#Total\_US\ States_{i,t}}\right)$; where $SS_{i,t}$ is the sum of the squared relative state counts for firm i around the IPO. We then calculate the normalized concentration as follows: $Concentration(HHI) = \frac{SS_{i,t}-1/50}{1-1/50}$. The variable ranges from 0 to 1, where the lower values indicate the higher level of a firm's geographic dispersion across different states.
GEOSIMILAR	The value takes 1 if the firm has concentrated business only in the headquarter location.
GEOCORR	Following Platikanova and Matter (2016), the variable measures the degree of a firm's geographic dispersion similarity in a specific industry
HQ%	Following Platikanova and Matter (2016), the variable measures to what extent a firm's economic activities are correlated with local economic shocks.
Central location	The ratio of a firm's HQ state counts over all state citations in the 10-K report, which measures the degree to what extent that an IPO firm operate its business around the headquarter location.
Count	A dummy variable indicating whether a firm's HQ location is from top big ten metropolitan areas and relevant suburbs, including New York City, Los Angeles, Chicago, Washington-Baltimore, San Francisco, Philadelphia, Boston, Detroit, Dallas, and Houston.
IndustrySEG	Number of different state names mentioned in 10-K report in the first fiscal year after IPO.
Intl.SEG	Number of industries that a firm involves in.
Nstate	Number of a firm's geographic segments.
Region	Number of different states mentioned in the 10-report for an IPO firm.
Local	A count variable indicating how many different regions that the firm has businesses.
Concentration (GDP)	A dummy variable taking 1 if a firm has two or less states mentioned in the 10-K report, otherwise is 0.
Concentration(corruption)	GDP weighted normalized Herfindahl-Hirschman Index (HHI).
	Political corruption weighted normalized Herfindahl-Hirschman Index (HHI). The corrupt environment is measured as corruption related convictions per million population in each state in the IPO year for a firm.
Panel B: Firm and offering characteristics	
Firm age	Nature logarithm of one plus IPO firm age. The firm age is measured as number of years between firm's founding year and IPO year.
Proceeds	Nature logarithm of total proceeds that a firm raised at the time of IPO.
Sale	Nature logarithm of sales in the IPO year.
Venture capital	A dummy variable indicating whether the IPO firm is venture backed.
Underwriter	A dummy variable indicating whether the IPO is supported by underwriters with rank above 8. The underwriter's rank is from Jay Ritter's website.
Auditor	A dummy variable indicating whether the IPO firm uses top 6 auditing firms.
Leverage	Ratio of total debts to total assets in the IPO year.
Profitability	Ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets in the IPO year.
Market-to-book	Ratio of a firm's market value to book value in the IPO year.

Appendix B Distribution of state citations for sample firms

The table displays the frequency of each state mentioned in 10-K report for our sample.

State	Frequency	Percentage
California	1787	8.41%
Delaware	1667	7.85%
New York	1295	6.10%
Texas	1147	5.40%
Washington	1063	5.01%
Illinois	787	3.71%
Florida	777	3.66%
Massachusetts	719	3.39%
Georgia	625	2.94%
New Jersey	611	2.88%
Pennsylvania	595	2.80%
Virginia	593	2.79%
Colorado	574	2.70%
Ohio	471	2.22%
Maryland	465	2.19%
Michigan	457	2.15%
Arizona	442	2.08%
North Carolina	421	1.98%
Tennessee	356	1.68%
Connecticut	355	1.67%
Indiana	354	1.67%
Minnesota	340	1.60%
Oregon	332	1.56%
Kansas	315	1.48%
Missouri	314	1.48%
Nevada	308	1.45%
Louisiana	296	1.39%
Maine	290	1.37%
Oklahoma	282	1.33%
Wisconsin	277	1.30%
Alabama	247	1.16%
Kentucky	246	1.16%
South Carolina	236	1.11%
Utah	231	1.09%
Mississippi	216	1.02%
New Mexico	198	0.93%
Iowa	189	0.89%
Arkansas	180	0.85%
Idaho	136	0.64%
Nebraska	133	0.63%
New Hampshire	131	0.62%
West Virginia	109	0.51%
Hawaii	104	0.49%
Montana	95	0.45%
Wyoming	95	0.45%
Rhode Island	94	0.44%
Alaska	81	0.38%
Vermont	75	0.35%
South Dakota	66	0.31%
North Dakota	61	0.29%