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Too Much of a Good Thing? Board Independence and the Value of Initial Public Offerings

Fabio Bertoni,[1] Michele Meoli[2] and Silvio Vismara[3]

[1]SKEMA Business School – University Côte d'Azur, 5 Quai Marcel Dassault, 92150 Suresnes (France), Bergamo, Italy, [2]Michele Meoli, Department of Management, Information and Production Engineering, University of Bergamo, Bergamo, via Pasubio 7b, 24044, Dalmine (BG), Italy, and [3]Department of Management, University of Bergamo, via dei Caniana 2, Bergamo, 24127, Italy
Corresponding author email: silvio.vismara@unibg.it

Building on agency and resource dependence theories, we study the relationship between the value of initial public offerings and the extent of board independence, which we find to be an inverted U-shape: beyond a certain threshold, board independence becomes excessive. Consistent with agency theory, the inverted U-shaped relationship is more pronounced when ownership and control rights are separated. Consistent with resource dependence theory, the inverted U-shaped relationship is more pronounced in companies with higher industry diversification and less pronounced when the roles of the CEO and president of the board of directors are separated.

Introduction

In this study, we examine how board independence affects the value of initial public offerings (IPOs). We build on two complementary theories of the board of directors (BOD): agency theory and resource dependence theory. These two theories focus on two different roles played by the BOD: monitoring and advising (Huse, 2005). Agency theory considers the BOD mostly as a monitoring tool (Fama and Jensen, 1983; Hermalin and Weisbach, 2001; Jensen and Meckling, 1976). The BOD verifies whether the management of the company acts in the interest of the shareholders and exerts sufficient effort to maximize the value of the company without extracting private benefits from it. Resource dependence theory instead views the BOD as an integral component of the effective firm, which is used to gain access to scarce resources and information (Boyd, 1990). The contribution of BODs to the value of IPOs requires integrating these two theories: boards both monitor and provide resources, and both are related to firm performance (Hillman and Dalziel, 2003).

Both agency and resource dependence theories argue that board independence plays a key role in determining BOD functioning. Whereas agency theory contends that independent directors will be better monitors because of their independence, resource dependence theory argues that independent directors are those that are most effective in bringing competencies, skills and a network of contacts to the company that it would not otherwise possess. In summary, independent directors are a 'good thing' for both monitoring and advising, which should result, other things being equal, in a positive relationship between board independence and firm value.

The fact that regulators in many countries have started pushing companies to increase the number of independent directors on their boards (Faleye and Hoitash, 2011; Zattoni and Cuomo, 2010) has fuelled the interest in the literature about when board independence could actually become 'too

much of a good thing'. Both agency and resource dependence theories provide mechanisms for excess board independence. According to agency theory, monitoring can become excessive and cause short-termism and inertia, which will eventually reduce the value of the firm (Faleye and Hoitash and Hoitash, 2011). According to resource dependence theory, excess board independence results in a cacophony of advices, which dilutes the management's attention and reduces its decision-making abilities (Krause and Bruton, 2014).

The benefits and costs of monitoring and advising act as additive latent mechanisms (Haans, Pieters and He, 2016), resulting in an inverted U-shaped relationship between IPO value and board independence. The literature has mostly studied one important characteristic of this relationship: the turning point corresponding to where the marginal costs of board independence equal its marginal benefits, which is the optimal level of board independence. However, we argue that a better understanding of the costs and benefits of board independence can be obtained by more generally analysing the structural form of this relationship rather than by focusing only on its turning point. Following Haans, Pieters and He (2016), rather than just focusing on shifts of the turning point, we study whether the inverted U-shaped relationship between board independence and IPO value flattens or steepens according to what is predicted by agency and resource dependence theories.

Studying the shape of the relationship between IPO value and board independence allows us to understand not only how some factors may affect the optimal share of independent directors on the board, but also how a deviation from optimality may be more or less harmful depending on the circumstances, and what a firm can do to reduce this sensitivity. This contribution is particularly important because although boards are endogenously determined to maximize firm value (Hermalin and Weisbach, 2001), attrition may cause significant deviations from optimality. These deviations may be more or less detrimental, depending on the shape of the relationship between value and board independence.

This work directly contributes to the literature on corporate governance and IPO valuation, but it also indirectly adds to the much larger debate about the relationship between corporate governance and equity value and returns (e.g. Chhaochharia, and Grinstein, 2007). The focus on IPOs allows us to consider companies that because of their hybrid nature are extremely interesting from a corporate governance perspective. Although corporate governance does not follow a deterministic life-cycle (Wirtz, 2011), it tends to gain clarity as companies open up to external shareholders (Lang and Wirtz, 2022). IPOs tend to be at the fundamental strategic threshold between value creation and value protection (Filatotchev, Toms and Wright, 2006; Hülsbeck, Meoli and Vismara, 2019). In the value-creation phase, resource dependence theory is likely to dominate, and the board's objective will mostly be to advise managers. In the value-protection phase, the board's objective changes to monitoring, and agency theory applies. Hence, both theories will likely apply to companies at the threshold between these two strategic phases, such as in IPOs. This is a suitable setup for our study because we aim to analyse how factors considered under both these theories affect the relationship between a firm's value and board independence.

The remainder of this paper proceeds as follows. In the section 'Literature and hypotheses', we develop our hypotheses. We describe our sample and methodology in the section 'Data and methodology'. The analysis results are presented in the section 'Results'. Finally, in the section 'Discussion and conclusions', we discuss the results and conclude the paper.

Literature and hypotheses

Board independence in IPOs

IPOs are an interesting setting for this research. At the time of the IPO, the firm's corporate governance is clearer than at any other point in the firm's history (Bruton *et al*., 2010). In preparing for an IPO, various actors (such as founders, early-stage equity investors and underwriters) shape governance mechanisms. For the first time, the company opens its ownership structure to external public investors. Therefore, upon listing, the availability and reliability of company data increase substantially, allowing us to assess their governance and value.

The study of IPOs addresses the formation of governance mechanisms, specifically BOD independence, and the rationale for those mechanisms. Such mechanisms are intended to meet the needs

of the pre-IPO stakeholders as well as to make the firm more attractive to IPO investors.

Board independence in agency and resource dependence theories

BODs are one of the key elements in the complex corporate governance system of an IPO company (e.g. Wirtz, 2011). BODs perform various functions within a firm, which are explained by theories that were developed separately and were integrated only after the seminal paper by Hillman and Dalziel (2003). The foundation of agency theory is that shareholders delegate the management of the firm to self-interested managers and, to ensure that their interests are aligned, use a mix of bonding, monitoring, and incentives (Jensen and Meckling, 1976). The BOD is possibly the main mechanism through which monitoring is conducted (Hermalin and Weisbach, 1998). A characteristic of the BOD that determines its effectiveness as a monitoring device is its degree of independence. Theoretically, directors can be categorized as belonging to two groups: inside directors, who are involved in the day-to-day management of the company, and outside directors, who are not involved in the management of the company and are hence less influenced by its managers and CEO. Whereas outside directors can be less informed than inside directors about the firm, they have a degree of independence that is needed to monitor the management's decisions. Thus, a certain fraction of outside directors in the BOD is considered beneficial to ensure effective monitoring.

Monitoring by outside directors in the BOD benefits companies in several ways. Outside-dominated boards are more inclined to dismiss the CEO following a disappointing performance (Hermalin and Weisbach, 1998). A higher fraction of outside directors in the BOD translates into an increase in the use of high-powered incentives for managers (Ryan and Wiggins, 2004). When outside directors sit in the audit committee, the tendency of companies to report abnormal accruals reduces (Peasnell, Pope and Young, 2005). Outsiders on the board increase the expected shareholder return from hostile takeovers (Byrd and Hickman, 1992). Jain and Zaman (2020) demonstrated that firms with more independent BODs are better equipped to reduce irresponsible behaviours.

While the agency angle is predominant, BODs are the area of research in which resource dependence theory has had the greatest influence (Hillman and Dalziel, 2003; Hillman, Withers and Collins, 2009).[1] This theory proposes a complementary view of the determinants of BOD size (Sanders and Carpenter, 1998), experience (Kor and Misangyi, 2008), interlocks (Boyd, 1990) and, most importantly, composition (Daily and Schwenk, 1996). From this perspective, BODs are functional in providing the firm with additional resources, thus reducing its resource dependence (Pfeffer, 1972). They provide advice, legitimacy, channels of communication with the environment, and preferential access to elements outside the firm (Pfeffer and Salancik, 2003). A BOD links the firm to the external environment, and this function is mainly served by independent directors (Hillman, Cannella and Paetzold, 2000). Accordingly, the human and relational capital of the BOD, which determines its ability to provide such resources to the firm (Hillman, Cannella and Paetzold, 2000), is proportional to the extent to which the BOD employs independent directors.

Both theories argue that some board independence can be good, but they also suggest that after a certain level, board independence may become too much of a good thing. In their seminal model of agency, Jensen and Meckling (1976) introduce the possibility for principals to costly monitor the agent, which results in the existence of an optimal amount of monitoring that minimizes the total agency cost. This means that any monitoring beyond the optimal level will be counterproductive. Fama and Jensen (1983) note that this excessive monitoring could also be less effective because, without a minimum number of internal board members, some relevant information about the company will not reach the board. Along these lines, more recent works suggest that the costs of excess monitoring may result from less information shared by the CEO with the board (Adams and Ferreira, 2007; Holmlstrom, 2004). Consistent with this view, Faleye and Hoitash and Hoitash (2011) find that the intensity of monitoring is proportional to the fraction of independent directors;

[1]Works on young high-tech firms and threshold firms have used theoretical angles that overlap with, but are still distinct from, resource dependence theory. These include the resource-based view (e.g. Knockaert, Bjornali, and Erikson, 2015; Vandenbroucke *et al*., 2019), and the knowledge-based perspective (e.g. Zahra and Filatotchev, 2004).

however, beyond a certain threshold, the benefits of this monitoring outweigh its costs.

Although the underlying mechanism is different, resource dependence theory reaches a similar conclusion regarding the possibility of excess monitoring. Garg (2013) notes that an excess of board independence may result in an information overflow, which will distract venture executives and divert their attention away from their more substantive tasks (Sutton and Galunic, 1996). Not only will executives spend excessive time reporting data and justifying outcomes, but they will also be constantly confronted with the advisory role of independent directors (Krause and Bruton, 2014).

Using the terminology in Haans, Pieters and He (2016), both agency and resource dependence theories predict the existence of an 'additive' inverted U-shaped relationship between independence and firm performance, because, at some point, the marginal return from BOD independence (in the form of additional monitoring or advising) will be less than its cost (in the form of costs of monitoring and information overflow). In summary, according to both agency and resource dependence theory, some board independence is good, but after a certain threshold, it may become too much of a good thing, as we formally summarize in our first research hypothesis.

Hypothesis 1: There is an inverted U-shaped relationship between the value of IPOs and board independence.

The moderating role of the separation between cash flow and control rights

Agency and resource dependence theories allow us to identify a series of factors that moderate the shape of the inverted U-shaped relationship between IPO valuation and board independence. We aim to focus on the factors that affect the shape of the relationship rather than just focusing on factors that shift its turning point. Thus, we aim to identify factors that will affect the costs and benefits of BOD independence in a way that will lead to a steepening or flattening of the inverted U-shaped curve describing the relationship between BOD independence and IPO value.

The first factor that we consider is the degree of separation between ownership and control, which is a central factor in the agency view of the BOD. The separation of cash-flow and voting rights is a major factor affecting a company's value (Faccio and Lang, 2002) and the valuation of IPOs (Brennan and Franks, 1997; Roosenboom and van der Goot, 2005; Roosenboom and van der Goot, 2006). A high level of cash-flow rights gives large shareholders an economic incentive to maximize a firm's value and reduce agency misconduct (Jensen and Meckling, 1976). When cash-flow and control rights are separated, the controlling shareholder may expropriate the minority shareholders. BODs are meant to reduce agency costs arising from the separation between ownership and control. Accordingly, the monitoring benefit of the BOD should be more important when cash-flow and control rights are separated.

However, a BOD that operates in circumstances in which monitoring is more important will also be monitored more intensely, which in turn increases the marginal costs of monitoring (Faleye and Hoitash and Hoitash, 2011). The potential costs of excess monitoring will also increase when cash-flow and control rights are separated. The simultaneous increase in the benefits and costs of monitoring when cash-flow and control rights are separated should translate into a more pronounced inverted U-shaped relationship between firm value and board independence, as formalized in our second hypothesis.

Hypothesis 2: The inverted U-shaped relationship between the value of IPOs and board independence is more pronounced when cash-flow and control rights are separated.

The moderating role of diversification

In the resource dependence view, complexity plays a similar role to the separation of ownership and cash-flow rights in the agency view of the BOD. Complexity makes the advisory role of the BOD more valuable, but, at the same time, it increases the cost of excess independence in the form of information overload. A form of complexity recognized as relevant by governance literature is diversification (Linck, Netter and Yang, 2008). Firms with disparate businesses will benefit more from outsiders with a wide range of expertise (Markarian and Parbonetti, 2007) because of their increased ability to secure valuable resources. Companies that extend their range of activities will therefore benefit from additional external competencies in their BOD (Boone *et al.*, 2007).

However, the costs of board independence increase with industry diversification (Linck, Netter and Yang, 2008). The wider the range of activities of the company, the more diverse the inputs from the external directors, thus increasing the costs of board independence because of information overflow and dispersion of monitoring activities (Krause and Bruton, 2014). Diversification increases information asymmetries, which, in turn, makes oversight from outsiders less effective. Information asymmetries and related difficulties in transferring specific information may limit the effectiveness of outsiders in BODs.

In summary, both the costs and benefits of board independence grow together with diversification. Therefore, resource dependence theory leads us to hypothesize that the inverted U-shaped relationship between firm value and board independence should be steeper in companies with a broader range of activities, as formalized in our third hypothesis.

Hypothesis 3: The inverted U-shaped relationship between the value of IPOs and board independence is more pronounced in firms with a broader range of activities.

The moderating role of board leadership on excessive board independence

Agency theory argues that duality increases the power the CEO has over the board, hindering the independence between the board and management (Fama and Jensen, 1983). A dual-board leadership structure is likely to have a negative impact because it attenuates the board's potential to monitor management effectively. Similarly, board independence can mitigate the costs of CEO duality, which improves the balance between strong leadership and superior board monitoring. The costs of excessive board independence can therefore be more easily borne when the chair of the board and CEO roles are separated.

According to resource dependence theory, the board represents an interface between the firm and the environment, through which several relevant resources flow. However, this flow of resources may become overflow in some circumstances and impair the activity of the firm's managers. The separation of the roles of the CEO and chair of the board can effectively protect the management from the risk of excess intrusion from board members. As Krause and Bruton (2014) note, the chairperson can integrate and consolidate the board's suggestions into a streamlined form and shield the CEO from answering the redundant questions of individual board members. The risk of information overflows will thus be lessened when the chair of the board and the CEO are separated, which leads to a less pronounced relationship between board independence and value, as formalized in the following hypothesis:

Hypothesis 4: The inverted U-shaped relationship between the value of IPOs and board independence will be less pronounced when the chair of the board and CEO roles are separated.

Data and methodology

Sampling and sample distribution

We perform our analysis on the population of 1818 firms that went public in Europe in the period 1995−2015. Our analysis refers to IPOs only, because at the time of the IPO, the corporate governance of a firm is opened up to external minority shareholders for the first time (Lang and Wirtz, 2022), and investors may evaluate the value-creation and value-protection (Filatotchev, Toms and Wright, 2006; Hülsbeck, Meoli and Vismara, 2019) content of the governance structure.

Our focus on Europe is motivated by the higher diversity in terms of institutional characteristics and ownership structures than would be the case in a single-country study. Corporate governance is influenced by institutional characteristics, such as investor protection. Institutional characteristics (Bell, Aguilera and Filatotchev, 2013) and corporate governance codes (Akyol *et al.*, 2014) also affect IPOs. Although institutional characteristics are not the focus of our study, having a variety of institutional settings in our sample greatly improves the generalizability of our results.

Moreover, given that our sample comprises IPOs in several countries, in both the main and second-tier markets, we can significantly reduce the contemporaneous effects of other unobservable market forces that affected IPO valuation during our sample period, allowing us to make stronger inferences about the effects of corporate governance features on IPO valuation. The listing markets are the Euronext (at that time, a consortium of the Belgian, Dutch, French

and Portuguese stock exchanges), Deutsche Börse (Germany), the London Stock Exchange (UK) and Nasdaq OMX (at that time, a consortium of the stock exchanges of Denmark, Estonia, Finland, Iceland, Latvia, Lithuania and Sweden), and the national stock exchanges of Austria, Cyprus, Czech Republic, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Poland, Slovakia, Slovenia and Spain. The list of IPOs is selected from the EURIPO database, which has been used in previous IPO studies (Chambers and Dimson, 2009; Judge *et al.*, 2015a, 2015b; Vismara, Paleari and Ritter, 2012).[2]

Extant literature has largely described the convergence of corporate governance codes in Europe (Cernat, 2004), though some specificities still exist. As far as the regulatory framework for the BOD is concerned, two models are generally identified in Europe, namely the Anglo-Saxon and the Continental European models, though in the latter model the German case is often identified as a separate approach (Ahmad and Omar, 2016). The Anglo-Saxon model is a market-centric, equity-based model, firstly aimed at addressing the principal–agent model between shareholders and managers. In this model, the BOD represents the shareholder, and safeguarding shareholders' interest remains their fiduciary duty. The BODs in the Anglo-Saxon model are usually single-tiered, primarily composed of non-executive directors who have been elected by shareholders. However, some single-tiered boards have both executive and non-executive directors. The Continental European model, in contrast, is based on the stakeholder theory presented by Freeman (2010). Although Continental European countries feature a variety of ownership structures and board compositions, overall they follow the stakeholders' perspective of corporate governance. Stakeholder theory takes a broader perspective and believes that managers' fiduciary duty is to safeguard the legitimate interests not only of shareholders but also of a broader group of internal and external stakeholders, such as employees, customers, suppliers, management itself, government, political and social groups, the environment, and society at large. Among these models, the German one is identified as a peculiar case because it incorporates two-tiered BODs, comprising an executive board (made up of executives) and a supervisory board (representing shareholders and employees), prohibiting the possibility of CEO duality. Akyol *et al.* (2014) show how most governance codes in Europe homogeneously adapt to external shocks, such as the reaction to the implementation of the Sarbanes-Oxley (SOX) in the USA, and highlight opportunities to pool data for better result generalization.

The sample distribution is shown in Table 1. Of the 1818 IPOs in our sample, 440 (24%) are listed in the UK, 423 (23%) are French, 432 (24%) are German, and 232 (13%) are Italian. In terms of age distribution at the time of listing, 474 (26%) IPOs in our sample are 1 year old or younger, 366 (20%) are between 1 and 5 years old, 362 (20%) are between 5 and 10 years of age, and 616 (34%) are older than 10 years. In terms of IPO years, 543 (30%) went public between 1995 and 2000, 177 (10%) between 2001 and 2005, 465 (26%) between 2006 and 2010, and 633 (35%) between 2011 and 2015. One interesting aspect of the sample distribution is that we have a sufficient number of companies in different countries, age groups, and IPO periods (e.g. before and after the dot.com bubble and the subprime crisis).

Methodology

To test our hypotheses on the relationship between board independence and firm value, we regress a variable (Tobin's Q) measuring IPO valuation against a variable measuring board independence, while controlling for other firm characteristics, country, industry and time dummies. Because we aim to assess whether such a relationship is an inverted U-shape, the squared value of board independence is included in all regressions.

By performing our analysis on different subsamples, we can identify the shape of the relationship between board independence and value, and how different factors moderate it. Specifically, according to hypotheses 2 and 3, a different shape of the relationship between board independence and firm value should exist for firms with higher industry diversification and higher agency costs. To test these hypotheses, we run our regressions on split samples identified according to the median value of two variables measuring agency costs (the ratio between the ultimate controlling shareholder's voting

[2]In line with previous studies, we exclude introductions (i.e. admissions with no initial offer), offers of existing shares by selling shareholders, re-admissions and cross-listings of companies already listed on other stock markets.

Table 1. Distribution of the sample

	Sample		UK		France		Germany		Italy		Others	
	N	%	N	%	N	%	N	%	N	%	N	%
Age at IPO (Years)												
Age ≤ 1	474	26%	216	49%	77	18%	94	22%	38	16%	49	17%
1 < Age ≤ 5	366	20%	92	21%	97	23%	85	20%	32	14%	60	21%
5 < Age ≤10	362	20%	52	12%	102	24%	105	24%	41	18%	62	21%
Age > 10	616	34%	80	18%	147	35%	148	34%	121	52%	120	41%
IPO Year												
1995–2000	543	30%	217	49%	98	23%	109	25%	65	28%	54	19%
2001–2005	177	10%	71	16%	32	8%	35	8%	21	9%	18	6%
2006–2010	465	26%	189	43%	106	25%	76	18%	58	25%	36	12%
2011–2015	633	35%	251	57%	114	27%	127	29%	76	33%	65	22%
Total	*1818*	100.0	440	24%	423	23%	432	24%	232	13%	291	16%

and cash-flow rights) and industry diversification (the number of industries in which the company operates). Lastly, to test Hypothesis 4, which predicts that board duality affects the relationship between board independence and firm value, we run our regressions on two subsamples split according to the value of the CEO Duality dummy variable. In the robustness tests section, we also report estimates using interaction dummies.

One major concern with the analysis of the cross-sectional determinants of valuation is the endogeneity between a firm's IPO value and corporate governance determinants. In practice, because the main focus of our analysis is on board independence, we are concerned about whether Tobin's Q and board independence can be jointly affected by the firm's unobserved characteristics, which may result in spurious correlations (Hermalin and Weisbach, 2001). We address this issue by employing an instrumental variable approach using two-stage least squares (2SLS) regression. In the first stage, board independence is instrumented using the Mimicking Behaviour variable (as in Bertoni, Meoli and Vismara, 2014; Cumming, Meoli and Vismara, 2019; Huang, Vismara and Wei, 2021; Minola, Donina and Meoli, 2016), which is defined as the ratio of non-executive members in the BODs of all firms belonging to the same industry (ICB code, first digit) and listed in the same stock exchange in the IPO year. Mimicking is a common behaviour for achieving social legitimacy (Deephouse, 1996; Deephouse and Carter, 2005), and it is particularly important for IPOs (Bell, Aguilera and Filatotchev, 2013).

Variables and descriptive statistics

Dependent variable. To investigate the determinants of the initial market valuation, we rely on Tobin's Q, a widely recognized indicator of a firm's future growth opportunities, as assessed by the investors' market. This variable is operationalized by computing the ratio of the market value of assets to the book value of assets. The market value is calculated as the sum of the book value of assets and the market value of common stocks minus the book value of common stocks. In our analysis, we compute the market value of common stocks based on IPO offer prices. Several previous contributions on IPO valuation have adopted this measure (Aktas *et al*., 2019; Bertoni, Meoli and Vismara, 2014; Bonardo, Paleari and Vismara, 2011; Daily, Certo and Dalton, 2005; Hülsbeck, Meoli and Vismara, 2019; McGuinness, 2020). In the robustness tests section, we replicate our analysis of different implementations of Tobin's Q (using, instead of the offer price, the preliminary offer price, or the first-day closing price), as well as different valuation ratios (such as market-to-book and enterprise value to sales). We also examine long-term stock performance using buy-and-hold abnormal returns (BHAR) for different holding periods (1, 2, 3 and 5 years). This long-run analysis, although performed in line with the finance literature (Ritter, 1991), cannot fully support how board independence will affect the long-term performance over the years because all the variables in our models are at the IPO year.

Board independence. Our main causal variable, board independence, is computed as the

proportion of non-executive members on the board, as reported in the IPO prospectus (Aktas *et al*., 2019; Chancharat, Krishnamurti and Tian, 2012; Gounopoulos *et al.*, 2020; Kang, Cheng and Gray, 2007).

Industry diversification. To capture industry diversification, we calculate the number of 2-digit SIC (Standard Industrial Classification of Economic Activities) code industries, as provided by Thomson One Banker, in which the company is active. Diversified firms are characterized, other things being equal, by a more complex business, typically requiring more effort for the independent directors monitoring their operations (Anderson *et al*., 2000). Industry diversification is used to split the sample into high (three or more different SIC codes) and low (one or two SIC codes) diversification.

Voting to cash-flow rights (V/C). Our measure for the level of potential agency cost is the ratio between the controlling shareholder's voting rights and his/her share of cash-flow rights. This measure accounts for both dual-class shares and pyramidal control structures. First, we compute cash-flow rights (C) by measuring the percentage ownership of the firm's profits and dividends held by the controlling shareholder (depending on the type of shares owned, if the firm has dual-class shares). If multiple chains of ownership exist, the cash-flow rights along each chain are the products of all ownership rights in the intermediate companies along that chain. The total cash-flow rights are then equal to the sum of all cash-flow rights from all ownership chains (Faccio and Lang, 2002). We measure the controlling shareholder voting rights (V) of the controlling shareholder (depending on the type of shares owned) following the procedure used by La La Porta *et al*. (1998). Following Faccio and Lang (2002), when multiple control chains exist, voting rights are the sum of the voting rights along each chain with the weakest link among all holding layers. The ratio of the controlling shareholder's voting to cash-flow rights (V/C) approximates the divergence from the one-share/one-vote ownership structure and is used to proxy the potential agency costs in a firm. To test Hypothesis 2, we split the sample into High (V/C>1) or Low (V/C = 1, which indicates no separation between ownership and cash-flow rights) levels of Agency Costs.

CEO duality. CEO duality is a binary variable equal to one when the CEO and the chairman of the BOD are the same person (Lin and Chuang, 2011). CEO duality may reduce principal–agent conflicts, but may also result in managerial entrenchment. It is important to point out that CEO duality is permitted in all countries in our sample except Germany, where the governance structure requires the CEO and chairman of the board to be separated.

Control variables. In our empirical analysis, we control for several variables used in the IPO literature. First, we consider the *Board Size*, measured as the number of directors on the board at the time of the IPO, including the chairperson (Chancharat, Krishnamurti and Tian, 2012). Larger boards are more likely than smaller boards to represent the interests of multiple stakeholders, including shareholders (Hillman, Cannella and Paetzold, 2000). In IPO firms, small boards have the advantage of being able to monitor management better and enact decisions more quickly (Fischer and Pollock, 2004). Board information, as well as accounting and ownership data, are from the EURIPO database, which collects information directly from official IPO prospectuses. Because owners and managers are legally accountable for the information disclosed in the prospectus, this document is considered reliable in finance and entrepreneurship research.

Second, we consider ownership levels in relation to the structure of the public offering. The decision of existing shareholders to show commitment and keep some 'skin in the game' for a certain period after new investors enter the firm is positively related to firm value (Leland and Pyle, 1977; Kotlar *et al*., 2018). Indeed, the decision of entrepreneurs to bear the risk associated with equity retention shows that they anticipate a profitable future for the company because only high-quality assets are worth retaining. For this reason, we include the share of the controlling shareholder's cash-flow rights (*C*) among the regressors. We also control for the size and structure of the offer to account for the effects of the nature of shares offered to the public. The size of the offer relative to the size of the firm (*Offer Size*) is expected to signal market confidence and, therefore, to be positively related to the firm's valuation. The structure of the offer (*Offer Structure*), measured as secondary shares sold by existing shareholders relative to the total

number of shares offered, accounts for the signal of a higher commitment by existing shareholders in offerings with a larger fraction of newly issued shares (Leland and Pyle, 1977; Kotlar *et al*., 2018).

In terms of firm characteristics, we define *Firm Size* as the logarithm of net sales for the year prior to the IPO date, adjusted for inflation. Smaller firms typically show higher Tobin's Q because of their better future growth opportunities (Colombo, Meoli and Vismara, 2019). We add *Firm Age* to our model, as the age of the IPO firm, in years since foundation. In the regression analysis, we use Log (1 + Age). We control for pre-IPO *Profitability* (return on assets) and *Leverage* (debt over total assets), as more profitable and less indebted IPO firms are expected to be worth more (Bonardo, Paleari and Vismara, 2011).

Affiliations with prestigious underwriters or venture capitalists (VCs) have been shown to be associated with better firm performance (Beatty and Ritter, 1986; Carter and Manaster, 1990). Accordingly, we control for the reputation of the underwriter and for firms supported by a VC at the time of the IPO. *Underwriter Reputation* is measured as in Colombo, Meoli and Vismara (2019) for each backed IPO *i* as the capital raised by the underwriter taking public companies in the sample before *i* went public, divided by the capital raised by all the IPOs in the sample, prior to the IPO of firm *i*.[3] The *VC Backing* dummy is equal to 1 for firms backed by VCs at the time of the IPO and 0 otherwise. VCs are identified as in Colombo, Meoli and Vismara (2019) among firms with institutional shareholders that focus on start-up financing. This information comes from a detailed examination of the directors' associations and the 'Other significant shareholders' sections of IPO prospectuses.

Finally, our models also control for market momentum, defined as the FTSE EuroMid percentage index return calculated over the 6 months before the offer date. As we rely on a cross-country sample, we also control for the listing market. Given that IPOs tend to cluster in time and industry (Ritter, 1984), we control for the IPO year and industry.

[3]Only lead and co-lead underwriters are considered. When more than one underwriter underwrites an issue, the proceeds (and number of IPOs) are equally split among all lead banks. Underwriters that have been acquired during the sampling period are treated as part of the new parent.

We report the descriptive statistics of our sample in Table 2. Firms in our sample have a mean Tobin's Q of 4.33 (median 3.32). On average, firms in our sample had a board independence of 53.16% (median 57.10%), which is slightly above the 50% recommended by some corporate governance codes of best practices (Zattoni and Cuomo, 2010). More importantly, for our analysis, board independence has a sufficiently broad range of variation in our sample, which results in a standard deviation of 18.30%. The first quartile of the distribution of board independence is 42%, the third quartile is 67%, and the 95th percentile is 80%. Companies in our sample are on average active in 2.98 industries (median 3.00) and have a ratio of voting to control rights of 1.15 (median 1.00). The average board size is 6.77 members (median 6.00), with a standard deviation of 3.27. Finally, it is important to highlight that Mimicking Behaviour is significantly correlated with board independence (0.563, p-value <1%), which confirms that mimicking is an important phenomenon in the choice of board independence.[4]

Results

Main results

Table 3 presents the results of our baseline model regarding the relationship between Tobin's Q and board independence. Column (1) of Table 3 reports the results of the OLS model, while column (2c) reports the results of the 2SLS model in which board independence is instrumented in the first step using Mimicking Behaviour. The control variables have the expected sign in both models, in accordance with the extant literature on IPO valuation in Europe (e.g. Ritter, Signori and Vismara, 2013; Bertoni, Meoli and Vismara, 2014). Tobin's Q is higher when the underwriter is reputed (p-value <1%) and lower when ownership and control are separated (p-value <1%), when the CEO is also the president of the board (p-value

[4]To identify VC firms, several sources were used: national associations such as the European Private Equity and Venture Capital Association (EVCA), the British Venture Capital Association (BVCA), the Association Francaise des Investisseurs en Capital (AFIC), the Bundesverband Deutscher Kapitalbeteiligungsgesellschaften (BVK), the Associazione Italiana del private equity e venture capital (AIFI) and the National Venture Capital Association (NVCA).

Table 2. Descriptive statistics

	Variable	Mean	Median	Std dev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Tobin's Q	4.33	3.32	3.37																	
2	5-yr BHAR (%)	−30.49	−39.71	86.24	−0.12*	1.00															
3	Board Independence (%)	53.16	57.10	18.30	0.12*	0.09*	1.00														
4	Industry diversification	2.98	3.00	1.44	−0.05	0.09*	0.00	1.00													
5	V/C	1.15	1.00	0.77	−0.14*	0.06	−0.01	0.02	1.00												
6	CEO Duality (%)	29.05	0.00	45.41	−0.17*	0.06	−0.09*	−0.03	0.06												
7	Board Size	6.77	6.00	3.27	−0.09*	0.02	0.17*	0.08	0.09*	−0.30*	1.00										
8	C (%)	48.12	44.03	26.24	−0.03	0.06	0.04	0.05	−0.27*	−0.03	0.00	1.00									
9	Offer Size (%)	48.36	33.33	24.14	0.03	−0.10*	0.06	0.00	0.05	−0.09*	0.05	−0.24*	1.00								
10	Offer Structure (%)	47.41	52.00	49.67	0.20	−0.11*	0.07	−0.05	−0.05	−0.12*	0.00	−0.11*	0.25*	1.00							
11	Firm Size	369.98	203.12	431.32	−0.14*	0.05	−0.01	0.22*	0.00	0.02	0.21*	0.12*	−0.02	−0.05	1.00						
12	Firm Age	12.59	6.00	24.20	−0.26*	0.12*	0.01	0.14*	0.04	0.04	0.05	0.08	0.01	−0.09*	0.13*	1.00					
13	Profitability (%)	6.12	11.85	85.57	0.02	0.00	0.02	−0.03	0.00	0.04	−0.01	−0.02	0.11	−0.02	0.01	0.02	1.00				
14	Leverage (%)	28.07	19.24	27.06	0.05	−0.01	0.03	−0.03	−0.01	0.03	−0.01	−0.03	0.12*	−0.01	0.02	0.01	0.15*	1.00			
15	Underwriter Reputation	0.16	0.06	0.23	0.01	−0.03	0.10*	0.06	0.08	−0.04	0.24*	0.01	0.20*	0.03	0.15*	0.13*	0.03	0.06	1.00		
16	VC Backing (%)	38.26	0.00	48.61	0.16*	0.01	0.04	0.02	−0.07	−0.01	0.05	−0.17*	0.10*	0.10*	−0.07	−0.06	0.01	0.04	0.09	1.00	
17	Market Momentum (%)	1.54	0.86	30.97	0.00	−0.02	0.00	−0.02	0.01	−0.01	0.01	0.00	0.10*	0.03	0.04	−0.02	0.02	0.03	0.03	0.03	1.00
18	Mimicking Behaviour	54.97	56.59	9.93	0.13*	0.10*	0.56*	−0.11*	−0.03	−0.20*	0.14*	0.05	0.06	0.04	0.01	−0.02	0.17*	0.04	0.09*	−0.01	0.01

Note: This table presents the averages for the variables employed in the regression analyses on the whole sample, as well as the correlation between variables. Tobin's Q is the firm's Tobin's Q, calculated as the ratio of the market value of assets to the book value of assets. Board Independence is the percentage of non-executive directors on the board. Industry diversification is the number of SIC codes in which the listing company is active at the time of the IPO. V/C is the ratio between voting and control rights along the lines of (Faccio and Lang, 2002). Board Size is the number of board members, including the chairperson of the listing company. C is the cash-flow rights of controlling shareholders. Firm Size is net sales for the year prior to the IPO date (ln in regression analysis). Age is the age (in years) of the listing company at the time of the IPO (ln one plus age in regression analyses). Profitability is the return on assets in the pre-IPO year. Leverage is the debt over total assets in the pre-IPO year. Offer Size (%) is the fraction of post-IPO equity placed at the IPO. Offer Structure is the fraction of secondary to total shares sold at the IPO. Underwriter Reputation is defined as in Colombo, Meoli and Vismara (2019). Market Momentum is the FTSE Euromid percentage index return calculated over the 6 months before the offer date. VC Backing (%) is a dummy equal to one for sample companies backed by a venture capitalist at the time of the IPO. Mimicking Behaviour is the ratio of non-executive members in the BODs of all firms belonging to the same industry (ICB code, first digit) and listed in the same stock exchange in the IPO year. For correlation coefficients, a significance level below 1% is indicated by *.

Table 3. Effect of board independence on firm value

	(1) OLS Tobin's Q	(2a) 2SLS First stage Board Independence	(2b) 2SLS First stage (Board Independence)^2	(2c) 2SLS Second stage Tobin's Q
Board Independence	0.892**			1.142**
	(0.393)			(0.437)
(Board Independence)^2	−0.603**			−0.872**
	(0.228)			(0.338)
Industry Diversification	0.084	0.003	0.005	0.084
	(0.063)	(0.004)	(0.003)	(0.062)
V/C	−0.214***	0.011	−0.000	−0.213***
	(0.077)	(0.007)	(0.004)	(0.076)
CEO Duality	−0.852***	0.014	0.020**	−0.855***
	(0.173)	(0.010)	(0.010)	(0.170)
Board Size	−0.031	0.005***	0.005**	−0.030
	(0.025)	(0.002)	(0.002)	(0.025)
C	0.357	0.012	0.018	0.358
	(0.403)	(0.021)	(0.019)	(0.394)
Offer Size	0.619	−0.003	−0.007	0.623
	(0.493)	(0.025)	(0.022)	(0.482)
Offer Structure	0.273	0.007	0.006	0.274
	(0.366)	(0.007)	(0.009)	(0.360)
Firm Size	−0.736***	−0.002	−0.003	−0.736***
	(0.047)	(0.003)	(0.002)	(0.046)
Firm Age	−0.268***	0.001	−0.004	−0.267***
	(0.078)	(0.004)	(0.004)	(0.078)
Profitability	0.051	−0.004	−0.004	0.051
	(0.115)	(0.005)	(0.003)	(0.112)
Leverage	0.006	0.001	0.000	0.006
	(0.017)	(0.001)	(0.000)	(0.017)
Underwriter Reputation	0.957***	−0.012	−0.001	0.955***
	(0.214)	(0.012)	(0.010)	(0.209)
VC Backing	1.668	0.004	−0.011	1.664
	(2.060)	(0.009)	(0.009)	(2.017)
Market Momentum	0.209	0.094	0.058	0.212
	(0.171)	(0.111)	(0.104)	(0.168)
Mimicking Behaviour		1.077***	0.224	
		(0.114)	(0.194)	
(Mimicking Behaviour)^2		−0.085	0.466**	
		(0.118)	(0.188)	
Constant	7.546***	−0.089*	0.005	7.678***
	(1.322)	(0.052)	(0.061)	(1.261)
Observations	1818	1818	1818	1818
R-squared	0.424	0.462	0.359	0.411

Notes: OLS and 2SLS regressions on Tobin's Q, using the sample of 1818 European IPOs, as described in Table 1. Model (1) is an OLS estimate. Model (2) is a 2SLS, where Board Independence and its square value have been instrumented with Mimicking Behaviour and its square value (first stage in columns 2a-2b, second stage in column 2c). Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

<1%), and when the company is smaller (p-value <1%) and younger (p-value <1%).

In columns (2a) and (2b) and Table 3, we report the two separate first-stage regressions of the 2SLS, including the instrumental variable and its squared term (Haans, Pieters and He, 2016). The instrumental variable is significant (p-value <1%) in column 2a, and its squared term is significant

(p-value <5%) in column 2b, and the sign is as expected in both first-stage regressions.

The results for Board Independence are consistent across the two models (columns 1 and 2c): the linear term of Board Independence is positive and significant (p-value <5%), and the quadratic term of Board Independence is negative and significant (p-value <5%). These results confirm that, consistent with Hypothesis 1, the relationship between Tobin's Q and Board Independence is an inverted U-shape. The tipping point corresponds to somewhere between a Board Independence of 65.5% (2SLS) and a Board Independence of 74.0% (OLS), which is higher than the mean Board Independence of 53.16%, but well within the range of variation of Board Independence in sample IPOs. Our results satisfy the tests outlined by Haans, Pieters and He (2016) to validate the hypothesized inverted U-shaped relationship. First, the squared term for Board Independence is significant. Second, the partial derivative of Tobin's Q with respect to Board Independence is positive and significant, corresponding to the lowest theoretical value of the variable (Board Independence = 0, corresponding to which the partial derivative is 1.142, p-value <5%), and negative, corresponding to the highest theoretical value (Board Independence = 1, corresponding to which the partial derivative is 1.142–2*0.872 = −0.602, p-value <10%). Third, as mentioned earlier, the tipping point is between the lowest and highest values of Board Independence. Fourth, when added to the main regression, the third power of Board Independence is not significant.[5] Finally, as shown in the robustness section, an inverted U-shaped relationship is confirmed when estimating a spline model.

In Table 4, we study the extent to which the relationship between board independence and firm value is moderated by the separation of cash-flow and voting rights and industry diversification, as predicted by agency theory and resource dependence theories. The first two columns of Table 4 illustrate how the concavity of the relationship between Tobin's Q and board independence is significantly affected by the separation between cash-flow and voting rights. The quadratic term is not statistically significant in the 1329 companies in which such separation is low, and is negative and statistically significant (p-value <5%), for the 489 companies in which such separation is high. These findings support Hypothesis 2.

Panel B of Figure 1 illustrates the relationship between board independence and Tobin's Q for high and low separation of cash-flow and voting rights. The figure illustrates that the difference in the slope and concavity of the relationship is economically significant. In companies in which cash-flow and voting rights are separated, Tobin's Q is more sensitive to board independence; however, the tipping point for board independence is close to 100%, which means that even though both the benefits and the costs of board independence are amplified when V/C is high (which translates to a more concave relationship), the increase in the benefits of board independence is such that the point at which they are offset by costs is pushed to higher levels of board independence.

The results in the third and fourth columns in Table 4 show that the concavity of the relationship between Tobin's Q and board independence is significantly affected by diversification. In the 649 companies with low diversification, the relationship between board independence and Tobin's Q is linear, and the quadratic term of board independence is small in magnitude and not statistically different from zero. Conversely, the quadratic term is negative and significant (p-value <5%) in the 1169 companies with high diversification. These results are consistent with Hypothesis 3. The estimated tipping point for companies with high industry diversification corresponds to a board independence level of 62.7%. We illustrate the mediating role of diversification on the relationship between board independence and Tobin's Q in Panel A of Figure 1. Panel A of Figure 1 illustrates how the relationship between board independence and Tobin's Q is linear in firms with low industry diversification, indicating that the costs do not offset the benefits of board independence for reasonable values of board independence. In firms with high industry diversification, for levels of board independence greater than 62.7%, further increasing independence leads to a reduction in Tobin's Q, indicating that the costs offset the benefits and that board independence can be 'too much of a good thing' in more diversified companies.

In Table 5, we illustrate how board leadership affects the shape of the relationship between

[5] For instance, in Model (1) of Table 3, the variable (Board Independence)^3 has a coefficient of 0.15, statistically significant at more than 31%. Similar results are obtained when estimating a coefficient for the same variable in the other models.

Table 4. Effect of board independence on firm value: industry diversification and agency costs

	(1) Low agency costs	(2) High agency costs	(3) Low industry diversification	(4) High industry diversification
Board Independence	0.865**	2.105**	1.061**	1.535**
	(0.424)	(1.041)	(0.483)	(0.728)
(Board Independence)^2	−0.362	−1.720**	−0.545	−1.217**
	(0.267)	(0.802)	(0.324)	(0.518)
Industry Diversification	0.029	0.114	−0.404	0.133
	(0.083)	(0.089)	(0.310)	(0.091)
V/C		−0.199**	−0.373**	−0.140*
		(0.101)	(0.162)	(0.081)
CEO Duality	−0.797***	−0.595**	−0.307	−1.054***
	(0.240)	(0.235)	(0.286)	(0.219)
Board Size	−0.053	0.017	−0.056	−0.029
	(0.037)	(0.031)	(0.036)	(0.036)
C	0.718	−0.733	−0.387	0.869*
	(0.486)	(0.650)	(0.647)	(0.498)
Offer Size	−0.266	0.616	−0.020	0.497
	(0.615)	(0.703)	(0.826)	(0.608)
Offer Structure	0.044	1.003***	1.307***	0.088
	(0.270)	(0.372)	(0.443)	(0.287)
Firm Size	−0.753***	−0.700***	−0.635***	−0.758***
	(0.062)	(0.075)	(0.078)	(0.063)
Firm Age	−0.224**	−0.249**	−0.348**	−0.215**
	(0.097)	(0.125)	(0.137)	(0.098)
Profitability	0.025	0.385	−0.073	0.078
	(0.115)	(0.618)	(0.193)	(0.146)
Leverage	0.009	−2.899***	0.025	−0.045
	(0.017)	(0.614)	(0.029)	(0.155)
Underwriter Reputation	0.883***	0.616*	1.020***	0.961***
	(0.264)	(0.325)	(0.374)	(0.258)
VC Backing	0.352	0.038	0.090	0.248
	(0.218)	(0.248)	(0.285)	(0.209)
Market Momentum	0.139	1.238	−2.200	2.876
	(2.841)	(2.375)	(3.330)	(2.498)
Constant	5.048***	5.421***	7.393***	8.349***
	(1.503)	(2.371)	(1.870)	(1.509)
Observations	1329	489	649	1169
R-squared	0.432	0.519	0.430	0.475

Notes: 2SLS regressions on Tobin's Q, using a sample of 1818 European IPOs. Models (1–2) are estimated on subsamples of firms split according to the level of agency costs (Low: V/C = 1; High: V/C>1). Models (3–4) are estimated on subsamples of firms split according to industry diversification (Low: 1 or 2 SIC codes; High: 3 or more SIC codes). Each regression controls for time, industry and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance at less than 1%, 5% and 10%.

board independence and Tobin's Q. Consistent with Hypothesis 4, companies with CEO duality have a significant inverted U-shaped relationship, as shown by the negative and significant (p-value <5%) parameter corresponding to the squared term of board independence.[6] For companies in which the roles of chairman and CEO are separated, we cannot reject the null hypothesis that the relationship between board independence and Tobin's Q is linear. These differences are shown in Figure 2. The figure shows that Tobin's Q benefits substantially more by board independence

[6]Note that because CEO duality is not allowed in Germany, we report our results both on the full sample and on the subsample excluding Germany. Results are consistent.

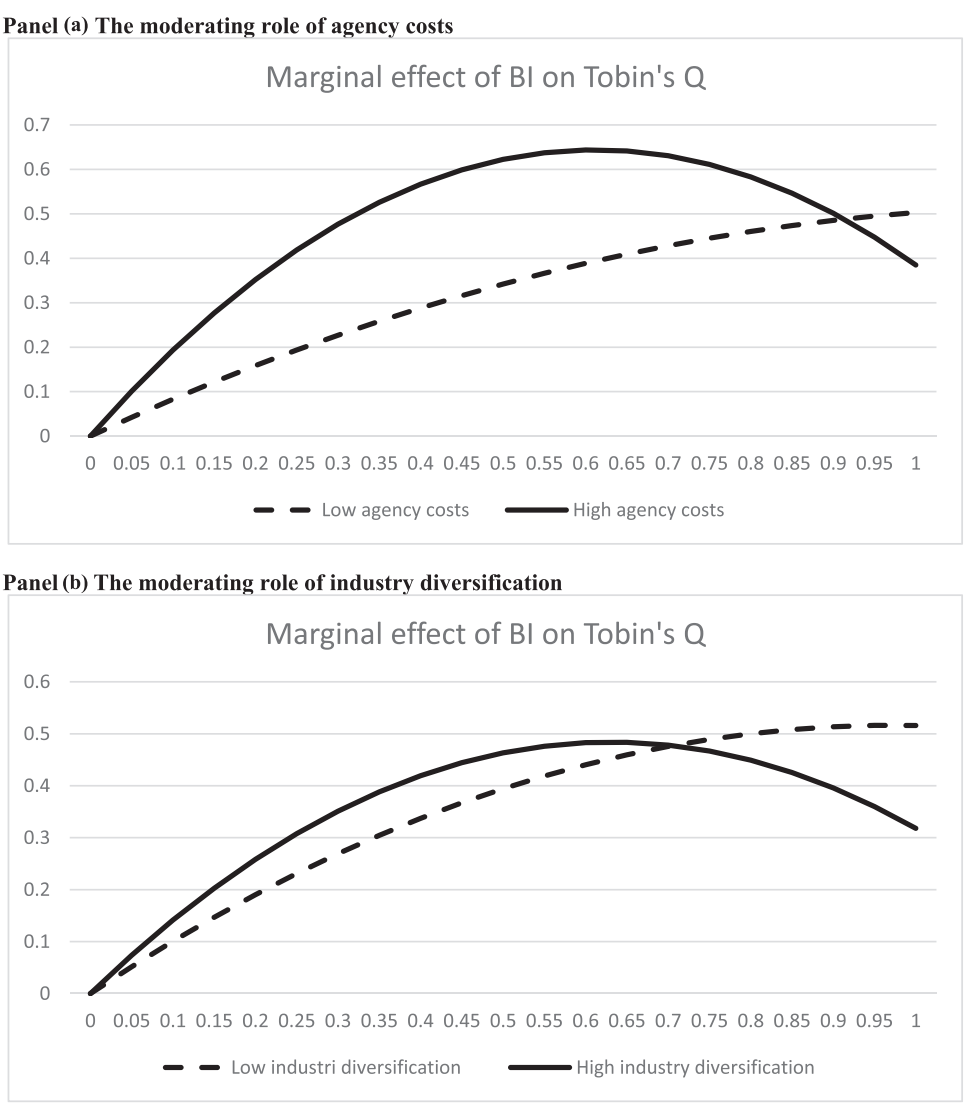

Figure 1. Effect of board independence on firm value. Panel A: the moderating role of agency costs; panel B: the moderating role of industry diversification

without CEO duality. Not only is the concavity of the curve statistically significant (as illustrated in Table 5), but the benefits of board independence seem to be considerably limited in the presence of CEO duality.

Long-term performance

We complement our analysis by examining long-term stock performance instead of valuation at the IPO. We calculate BHAR for 1-, 2-, 3- and 5-year holding periods for all 1818 IPOs in our sample, and regress them against the same control variables as used in the previous section. The results are presented in Table 6.

Our results support the idea that an inverted U-shaped relationship exists between stock returns after the IPO and board independence at the IPO, at least for long-term holding periods. For the 1-, 2- and 3-year holding periods, the linear term of Board Independence is positive and weakly significant (p-value <10%), and the squared term is negative but not significant (1- and 2-year holding periods) or weakly significant (3-year holding period,

Table 5. Effect of board independence and leadership on firm value

Sample	(1) CEO duality	(2a) No duality	(2b) No duality (excluding Germany)
Board Independence	2.112**	1.197**	1.245**
	(1.030)	(0.526)	(0.566)
(Board Independence)^2	−1.559**	−0.593	−0.647
	(0.710)	(0.515)	(0.620)
Industry Diversification	0.042	0.090	0.359
	(0.097)	(0.084)	(0.335)
V/C	−0.296**	−0.191**	−0.217**
	(0.139)	(0.080)	(0.104)
Board Size	−0.006	−0.049	0.022
	(0.044)	(0.031)	(0.050)
C	0.176	0.708	0.160
	(0.589)	(0.495)	(0.832)
Offer Size	1.193*	−0.088	−1.091
	(0.666)	(0.661)	(0.979)
Offer Structure	1.135***	0.129	0.573
	(0.371)	(0.302)	(0.489)
Firm Size	−0.749***	−0.764***	−0.577***
	(0.070)	(0.065)	(0.090)
Firm Age	−0.176	−0.312***	−0.416***
	(0.127)	(0.101)	(0.141)
Profitability	−0.073	0.824*	0.018
	(0.098)	(0.465)	(0.015)
Leverage	0.028*	0.022	0.015
	(0.015)	(0.016)	(0.018)
Underwriter Reputation	0.732**	1.097***	1.516***
	(0.321)	(0.272)	(0.443)
VC Backing	−0.127	0.555**	0.250
	(0.238)	(0.227)	(0.330)
Market Momentum	3.006	1.084	0.132
	(2.931)	(2.817)	(0.249)
Constant	5.863***	8.112***	6.806***
	(1.430)	(1.728)	(1.215)
Observations	527	1,291	859
R-squared	0.497	0.422	0.512

Notes: 2SLS regressions on Tobin's Q, using a sample of 1818 European IPOs. Model (1) is on the subsample of firms with CEO Duality, Model (2a) is on the subsample of firms with no CEO duality, and Model (2b) is on the subsample of firms with no CEO duality, after excluding German IPOs (for which COE Duality is not possible). Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance at less than 1%, 5% and 10%.

p-value <10%). For the 5-year holding period, all the conditions for a significant inverted U-shaped relationship between BHAR and board independence at the IPO are met: the coefficient of the linear term is significantly positive (p-value <5%), the coefficient of the squared term is significantly negative (p-value <5%), the slope is positive and significant for Board Independence = 0 (p-value <5%), and negative, although only weakly significant (p-value <10%), for Board Independence = 1, with the tipping point (87.0%) within the range of variation of Board Independence.

Robustness tests

In Table 7, we replicate our main analysis using different measures of IPO valuation as dependent variables. In the first two columns, we present two alternative ways to calculate Tobin's Q that use, instead of the offer price, the preliminary offer price (column 1), and the closing price of the first day of trading (column 2). In the last two columns, we replace Tobin's Q with the valuation ratio of market to book (column 3) and enterprise value to sales (column 4). Overall, the results are consistent with

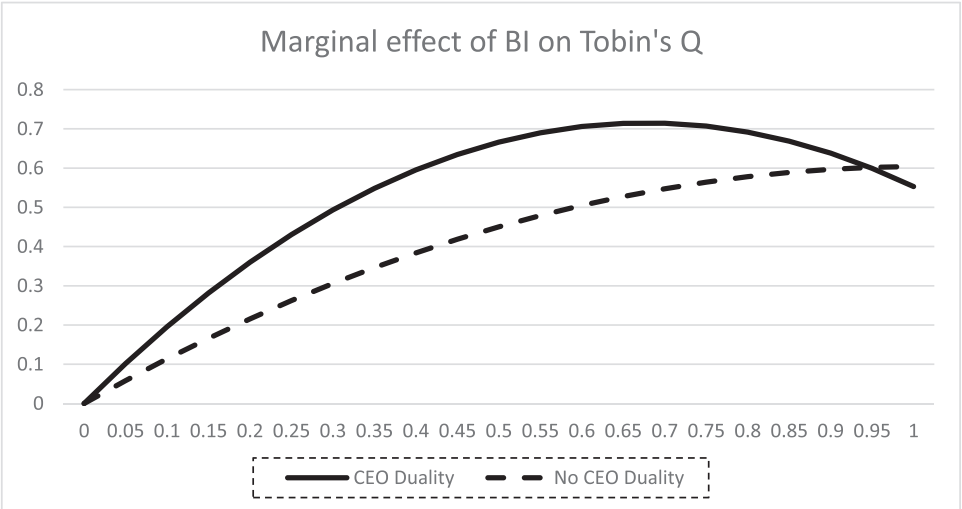

Figure 2. Effect of board independence on firm value: the moderating role of CEO duality

what is shown in Table 3, where there is an inverted U-shaped relationship between firm valuation and board independence.

In Table 8, we repeat our analysis separately for firms listed in the UK, France, Germany and Italy. Despite the differences in institutional settings, stock market regulations, and characteristics of IPO companies, our key result still holds: the relationship between IPO valuation and board independence is an inverted U-shape in each subsample.

We test alternative specifications for the sample splits used in our main analysis. In columns (1), (2) and (3), we introduce agency costs (V/C), industry diversification and CEO duality as moderators of the linear and squared terms of board independence. The difference in the convexity of the inverted U-shaped relationship is entirely captured by the interaction terms with the squared value of board independence (Haans, Pieters and He, 2016), which are all negative and significant (p-value <5%), lending additional support to hypotheses 2, 3 and 4.

Finally, in columns (4) and (5) of Table 9, we use a semi-parametric spline regression to substantiate the inverted U-shaped relationship between IPO valuation and board independence. In column (4), we calculate two separate parameters for board independence below and above its median, and in column (5), we use quartiles. Both splines show that, as expected, the slope is positive and significant (p-value <1% below median board independence in column (2), and p-value <5% for board independence in the second quartile in column (3)) in the first part of the curve, and negative and significant (p-value <1% above median board independence in column (2), and p-value <5% for board independence in the last quartile in column (3)) in the last part of the curve.

We conducted additional robustness tests, which we report in the Appendix for the sake of conciseness. In Table A1, we look at institutional differences between sample countries. Context includes control of corruption, government effectiveness, political stability, regulatory quality, rule of law, voice and accountability, contract enforcement, and minority investor protection (source: World Bank). Overall, the sign of these additional variables is as expected. Our sample includes both main and second-tier markets, which have different listing requirements and levels of regulation. In Table A2 of the Appendix, we document that the relationship is an inverted U-shape in both types of market. Similarly, regulation has become generally more stringent over our sample period, and, specifically, SOX-like regulations have been introduced, although at different times, in all European countries (Akyol *et al.*, 2014). In Table A3,A4 we split our sample between pre- and post-introduction of SOX-like regulations, and find that in both periods the relationship between board independence and IPO valuation is an inverted U-shape, and slightly more pronounced before the introduction of SOX-like regulations.

Table 6. Buy-and-hold abnormal returns (BHARs) analysis

	(1) 1-yr BHAR	(2) 2-yr BHAR	(3) 3-yr BHAR	(4) 5-yr BHAR
Board Independence	0.250*	0.606*	1.006*	1.681**
	(0.137)	(0.374)	(0.597)	(0.776)
(Board Independence)^2	−0.216	−1.169	−0.624*	−0.966**
	(0.173)	(0.631)	(0.318)	(0.424)
Industry Diversification	0.000	−0.002	0.038	0.127*
	(0.029)	(0.024)	(0.029)	(0.065)
V/C	0.023	0.050*	0.084**	0.081*
	(0.021)	(0.026)	(0.036)	(0.045)
CEO Duality	0.034	0.020	0.034	−0.024
	(0.077)	(0.081)	(0.091)	(0.076)
Board Size	−0.008	0.002	0.002	0.007
	(0.010)	(0.012)	(0.016)	(0.010)
C	−0.085	0.027	0.077	0.098
	(0.193)	(0.138)	(0.142)	(0.107)
Offer Size	−0.257	−0.327*	−0.587***	−0.301***
	(0.221)	(0.168)	(0.187)	(0.110)
Offer Structure	0.025	0.033	0.040	−0.011
	(0.047)	(0.045)	(0.061)	(0.048)
Firm Size	0.020	0.048***	0.063***	0.049**
	(0.019)	(0.017)	(0.022)	(0.021)
Firm Age	0.016	0.023	0.031	0.034*
	(0.032)	(0.026)	(0.026)	(0.018)
Profitability	0.050	0.067	0.045	−0.002
	(0.045)	(0.064)	(0.104)	(0.001)
Leverage	−0.006	−0.009	−0.006	0.001
	(0.006)	(0.009)	(0.015)	(0.001)
Underwriter Reputation	0.037	−0.119	−0.062	−0.088
	(0.111)	(0.091)	(0.106)	(0.119)
VC Backing	0.073	0.125	0.263**	0.196**
	(0.084)	(0.090)	(0.122)	(0.091)
Market Momentum	−1.462	−1.672*	−0.630	0.026
	(1.025)	(1.009)	(1.029)	(0.055)
Constant	0.438	−0.711	−0.665	−0.865**
	(0.450)	(0.449)	(0.406)	(0.344)
Observations	1818	1818	1818	1818
R-squared	0.276	0.375	0.352	0.368

Notes: 2SLS regressions on buy-and-hold abnormal returns (BHARs), using the sample of 1818 European IPOs described in Table 1. BHARs are calculated over 1, 2, 3 and 5 years in Models (1–4). Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

Discussion and conclusions

In the pursuit of appropriate board demography, BOD independence is a commonly recommended governance practice that dominates both governance academic literature and corporate governance codes. Many countries have mandated listed firms to maintain a minimum proportion of independent directors on the corporate board, aiming to provide better protection of shareholder value. Board independence is considered an important element of corporate governance, as independent directors are better positioned to curb managers' opportunistic behaviour, given their limited ties with them (Dalton *et al*., 2007; Hambrick, Misangyi and Park, 2015). The meta-analysis by Neville *et al*. (2019) confirms that independent directors are negatively associated with corporate misconduct. However, empirical evidence linking board independence and firm performance and valuation has yielded mixed results (Boivie *et al*., 2016). Increased board independence does not

Table 7. Alternative measures of firm value

	(1) P-o-p Tobin's Q	(2) 1st-day price Tobin's Q	(3) M/B ratio	(4) EV/Sales
Board Independence	1.450**	1.504**	0.997**	5.453**
	(0.626)	(0.773)	(0.454)	(2.601)
(Board Independence)^2	−0.829**	−0.924**	−0.761*	−3.276*
	(0.355)	(0.417)	(0.389)	(1.848)
Industry Diversification	0.106	0.076	−0.013	0.703***
	(0.066)	(0.070)	(0.061)	(0.139)
V/C	−0.144*	−0.106	−0.133	−0.190
	(0.075)	(0.093)	(0.135)	(0.227)
CEO Duality	−0.724***	−0.853***	−0.414**	−1.095***
	(0.182)	(0.194)	(0.170)	(0.381)
Board Size	−0.017	−0.021	−0.007	0.155**
	(0.026)	(0.028)	(0.028)	(0.061)
C	0.637	0.576	0.653*	−1.046
	(0.423)	(0.434)	(0.378)	(0.825)
Offer Size	−0.278	0.582	1.035**	1.000
	(0.497)	(0.539)	(0.502)	(1.074)
Offer Structure	−0.080	0.254	0.117	1.664**
	(0.251)	(0.380)	(0.379)	(0.686)
Firm Size	−0.727***	−0.729***	−0.491***	−2.312***
	(0.047)	(0.049)	(0.052)	(0.117)
Firm Age	−0.299***	−0.382***	−0.201**	−0.627***
	(0.085)	(0.088)	(0.080)	(0.183)
Profitability	−0.063	0.049	0.067	−1.283**
	(0.094)	(0.109)	(0.120)	(0.535)
Leverage	0.028*	0.008	−0.022	0.232***
	(0.014)	(0.016)	(0.019)	(0.079)
Underwriter Reputation	1.070***	0.916***	0.279	4.019***
	(0.230)	(0.234)	(0.199)	(0.491)
VC Backing	0.433**	0.356*	−0.090	1.068***
	(0.185)	(0.190)	(0.160)	(0.387)
Market Momentum	0.204	2.621	−1.471	4.675
	(2.234)	(2.328)	(2.100)	(4.678)
Constant	5.675***	5.990***	6.610***	10.618***
	(1.271)	(1.121)	(1.927)	(3.039)
Observations	1818	1818	1818	1818
R-squared	0.388	0.393	0.324	0.522

Notes: 2SLS regressions on measures of firm value alternative to Tobin's Q, using the sample of 1818 European IPOs, as described in Table 1. Firm value is measured using Tobin's Q calculated using the preliminary offer price in Model (1), Tobin's Q calculated by using the first-day closing price in Model (2), the market-to-book ratio in Model (3), and the enterprise value to sales ratio in Model (4). Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses. ***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

automatically lead to more effective boards. While independent directors might prevent managerial wrongdoings, their independence increases monitoring costs and risks creating an information overload for managers. Hence, the relationship between BOD and firm performance is not linear and does not apply to every firm.

The emerging view in governance studies underlines that to create well-functioning boards, it is not sufficient to add more independent directors, as the codes of good governance recommend (Zattoni and Cuomo, 2010). However, appropriate board composition is important to make the board effective and investors confident. The role of BODs is to protect suppliers of finance from managerial misbehaviour (i.e. a monitoring role) and to give the company a competitive advantage by providing reputation, a network of contacts,

Table 8. Country analyses

	(1) France	(2) Germany	(3) Italy	(4) UK
Board Independence	2.662**	3.504**	4.280*	1.738*
	(1.257)	(1.531)	(2.336)	(0.960)
(Board Independence)^2	−0.871**	−1.268**	−2.861**	−1.292***
	(0.346)	(0.569)	(1.823)	(0.373)
Industry Diversification	1.164**	0.805	−0.898*	0.705
	(0.522)	(0.551)	(0.470)	(0.451)
V/C	−0.258*	−0.660	−0.295**	−0.132***
	(0.135)	(0.604)	(0.133)	(0.043)
CEO Duality	−0.050	–	0.466	−2.281**
	(0.236)		(0.295)	(1.105)
Board Size	−0.033	−0.001	0.018	0.078
	(0.033)	(0.045)	(0.053)	(0.192)
C	0.212	0.224	0.776	−3.323***
	(0.611)	(0.565)	(0.830)	(0.650)
Offer Size	0.391	−1.142	−0.492	1.321
	(0.658)	(0.814)	(0.706)	(0.950)
Offer Structure	1.017***	−0.188*	−0.101	−1.068*
	(0.352)	(0.097)	(0.452)	(0.571)
Firm Size	−0.670***	−0.830***	−0.571***	−0.376***
	(0.071)	(0.082)	(0.130)	(0.058)
Firm Age	−0.340**	−0.145	−0.207	−0.050
	(0.145)	(0.117)	(0.134)	(0.177)
Profitability	−0.008	−0.002	0.074***	0.013
	(0.005)	(0.023)	(0.026)	(0.456)
Leverage	0.021	0.013***	0.143	0.125***
	(0.018)	(0.004)	(0.654)	(0.045)
Underwriter Reputation	1.077**	0.963**	1.683***	−0.055
	(0.437)	(0.402)	(0.458)	(0.173)
VC Backing	−0.556**	0.598**	−0.176	−0.156
	(0.220)	(0.287)	(0.406)	(0.436)
Market Momentum	−4.767*	−0.169	−0.024	−0.139
	(2.436)	(0.291)	(0.173)	(0.161)
Constant	5.915**	8.005***	8.766***	11.287***
	(2.380)	(2.484)	(2.038)	(2.842)
Observations	423	432	232	440
R-squared	0.502	0.435	0.550	0.485

Notes: 2SLS regressions on measures of firm value alternative to Tobin's Q, using subsamples of 1818 European IPOs, as described in Table 1. Model (1) is estimated on the sample of firms listed in French markets, Model (2) on the sample of firms listed in German markets, Model (3) on the sample of firms listed in Italian markets, and Model (4) on the sample of firms listed in UK markets. Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses. ***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

and strategic advice (i.e. an advisory role). The first dimension lies in agency theory, which sees the BOD as a value-protection device. The second dimension lies in resource dependence, which views the BOD as a value-creation device (Bertoni, Meoli and Vismara, 2014).

In this study, we combine agency theory and resource dependence theory to argue that the level of board independence is inherently contextual. Specific aspects of a firm's organizational setting, such as the level of separation between ownership and control and the degree of industry diversification, are critical drivers of how board independence relates to firm valuation at the IPO.

Analysing firm valuation at the time of IPO, namely when investors assess how the governance structure generates value creation and value protection (Filatotchev, Toms and Wright, 2006; Hülsbeck, Meoli and Vismara, 2019), we find an inverted U-shaped relationship between the value

Table 9. Alternative specifications

	(1) Agency Costs	(2) Industry Diversification	(3) CEO Duality	(4) 2-spline reg.	(5) 4-spline reg.
Board Independence	0.952*	1.743**	0.725**		
	(.533)	(0.828)	(0.312)		
(Board Independence)^2	−0.994	−0.991	−0.670		
	(0.846)	(0.916)	(0.584)		
BI × V/C	0.651*				
	(0.448)				
BI^2 × V/C	−1.216**				
	(0.588)				
BI × Industry Diversification		1.199*			
		(0.609)			
BI^2 × Industry Diversification		−0.998**			
		(0.496)			
BI × CEO Duality			2.087**		
			(1.036)		
BI^2 × CEO Duality			−1.833**		
			(0.819)		
BI below median				1.890***	
				(0.725)	
BI above median				−1.453**	
				(0.660)	
BI ≤ 1st Quartile					0.427
					(0.403)
1st Quartiles ≤ BI < Median					1.042**
					(0.481)
Median ≤ BI < 3rd Quartile					1.018
					(0.821)
BI above 3rd Quartile					−1.337**
					(0.563)
Industry Diversification	−0.561	0.545	−0.266	−0.128	−0.089
	(0.524)	(0.608)	(0.396)	(0.370)	(0.381)
V/C	4.274	−0.280***	−0.186**	−0.222***	−0.225***
	(2.609)	(0.097)	(0.079)	(0.075)	(0.076)
CEO Duality	−0.610***	−0.758***	−1.937	−0.754***	−0.713***
	(0.195)	(0.174)	(1.428)	(0.171)	(0.172)
Board Size	−0.037	−0.030	−0.036	−0.010	−0.006
	(0.029)	(0.026)	(0.027)	(0.026)	(0.026)
C	0.556	0.120	0.127	0.236	0.256
	(0.462)	(0.388)	(0.385)	(0.385)	(0.384)
Offer Size	−0.325	−0.106	−0.194	−0.014	−0.005
	(0.494)	(0.461)	(0.457)	(0.450)	(0.449)
Offer Structure	0.341	0.250	0.274	0.287	0.289
	(0.325)	(0.288)	(0.288)	(0.309)	(0.309)
Firm Size	−0.725***	−0.696***	−0.672***	−0.680***	−0.683***
	(0.055)	(0.050)	(0.049)	(0.046)	(0.046)
Firm Age	−0.279***	−0.243***	−0.267***	−0.266***	−0.266***
	(0.077)	(0.076)	(0.078)	(0.074)	(0.073)
Profitability	−0.010***	−0.010***	−0.009***	−0.007**	−0.007**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Leverage	0.015***	0.016***	0.018***	0.017***	0.018***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Underwriter Reputation	1.329***	1.204***	1.126***	1.129***	1.114***
	(0.312)	(0.275)	(0.278)	(0.266)	(0.265)
VC Backing	0.209	0.226	0.124	0.198	0.192
	(0.182)	(0.175)	(0.177)	(0.169)	(0.169)

Table 9. (Continued)

	(1) Agency Costs	(2) Industry Diversification	(3) CEO Duality	(4) 2-spline reg.	(5) 4-spline reg.
Market Momentum	−0.279*	−0.266	−0.199	−0.190	−0.170
	(0.144)	(0.164)	(0.140)	(0.158)	(0.143)
Constant	6.672**	8.847**	6.030***	7.084***	7.323***
	(2.743)	(3.691)	(2.268)	(1.790)	(1.904)
Observations	1818	1818	1818	1818	1818
R-squared	0.313	0.388	0.375	0.446	0.448

Notes: 2SLS regressions on measures of firm value alternative to Tobin's Q on the sample of 1818 European IPOs, as described in Table 1. In Model (1), Board Independence (BI) and its square value are moderated by the level of Agency Costs (V/C). In Model (2), BI and its square value are moderated by the level of Industry Diversification. In Model (3), BI and its square value are moderated by CEO duality. Models (4–5) are spline regressions, where BI is split into two or four linear splines. In Model (4), two splines are identified above and below the median value. In Model (5), four splines are identified using the 1st quartile, median value and 3rd quartile as separating points. Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

of IPOs and board independence, which is more pronounced in firms with a broader range of activities and when cash flow and control rights are separated. We therefore show how, consistent with agency theory, the separation between ownership and control exacerbate the relationship between value and board independence, and how, consistent with resource dependence theory, industry diversification exacerbate the relationship between value and board independence. Instead, consistent with both theories, the inverted U-shaped relationship between the value of IPOs and board independence is less pronounced when the chair of the board and the CEO roles are separated.

This work has limitations that offer interesting avenues for future research. The choice of the empirical setting is one of them. While the focus on European IPOs offers a privileged setting for integrating agency and resource dependence theories, a limitation relates to the generalizability of our results. Our sampling is limited in terms of geography and transaction type. Our analysis is performed at the continental and national levels. Still, firms in European markets, as compared with North American markets, are also more closely held, especially in terms of family ownership (Wu and Li, 2022). Hence, our analysis is not immediately generalizable to the USA, which has more diffuse ownership. A replication of this study in other contexts, such as the USA, would allow investigation of whether our results are influenced by these different institutional characteristics (Guedhami *et al.*, 2022). Our second boundary condition is the study of IPO firms. The focus on IPOs is shared with many studies interested in corporate governance (Giudici and Vismara, 2022), especially in its relation to valuation. The IPO is a privileged setting to explore the role of BODs, as this is the time in the life-cycle of a firm when its ownership structure is opened to outside public investors. However, some studies find that the relationship between the independence of directors and performance is ambiguous and not valid for all firms going public. Our study contributes to this research field. Additional insights might be obtained by jointly investigating how corporate governance and firm valuations evolve over the years after the listing, as well as by observing valuations in other types of deals, such as venture capital investments or mergers and acquisitions. Thirdly, other characteristics of the BOD could moderate the relationship between independence and valuation. The literature shows that board diversity can play a role in IPOs (e.g. Filatotchev and Bishop, 2002), and can significantly affect firms' irresponsibility and misconduct (e.g. Casu *et al.*, 2022; Jain and Zaman, 2020). An interesting research question we could not explore in this work is the extent to which diversity affects the costs and benefits of independence (and hence the shape of the relationship between independence and value). Board size could also moderate the relationship between independence and firm value. The literature predicts for board size an inverted

U-shaped relationship similar to that for board independence (e.g. Eisenberg, Sundgren and Wells, 1998; Hermalin and Weisbach, 2001; Yermack, 1996), and board size has been used as a measure of board strength alongside board independence in several empirical studies (e.g. Mollah, Skully and Liljeblom, 2021). However, the extent to which the two inverted U-shaped relationships jointly affect firm value has not yet been fully studied.

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Appendix

Table A1. Institutional characteristics

	(1) Enterprise-country dummies	(2) Control of Corruption	(3) Government Effectiveness	(4) Political Stability	(5) Regulatory Quality	(6) Rule of Law	(7) Voice and Accountability	(8) Enforcing Contracts	(9) Minority Investors
Board Independence	1.065**	1.071**	1.029**	1.090**	1.106**	1.075**	1.005**	1.051**	1.044**
	(0.507)	(0.514)	(0.498)	(0.525)	(0.526)	(0.508)	(0.480)	(0.490)	(0.510)
(Board Independence)^2	−0.845**	−0.842**	−0.823**	−0.831**	−0.853**	−0.802**	−0.846**	−0.860**	−0.806**
	(0.406)	(0.398)	(0.385)	(0.398)	(0.421)	(0.374)	(0.413)	(0.421)	(0.376)
Industry diversification	0.174	0.154	0.180	0.123	0.186	0.124	0.132	0.274	0.354
	(0.286)	(0.222)	(0.264)	(0.252)	(0.289)	(0.209)	(0.261)	(0.486)	(0.422)
V/C	−0.139**	−0.184*	−0.227**	−0.217**	−0.178*	−0.196*	−0.226**	−0.247**	−0.281*
	(0.069)	(0.108)	(0.108)	(0.104)	(0.106)	(0.108)	(0.106)	(0.122)	(0.163)
CEO Duality	−0.400**	−0.492**	−0.600***	−0.415**	−0.375**	−0.542***	−0.555***	−0.624**	−0.624**
	(0.170)	(0.194)	(0.195)	(0.191)	(0.142)	(0.195)	(0.194)	(0.254)	(0.292)
Board Size	−0.001	−0.003	−0.011	−0.002	−0.002	−0.006	−0.005	−0.056*	−0.030
	(0.025)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.033)	(0.047)
C	0.200	0.232	0.125	0.121	0.238	0.201	0.216	0.020	0.231
	(0.377)	(0.468)	(0.470)	(0.466)	(0.471)	(0.469)	(0.471)	(0.608)	(0.670)
Offer Size	−0.738*	−0.326	−0.271	−0.487	−0.497	−0.284	−0.323	−0.354	−0.920
	(0.29)	(0.492)	(0.499)	(0.499)	(0.491)	(0.494)	(0.493)	(0.611)	(0.682)
Offer Structure	0.175	0.499*	0.537*	0.378	0.439	0.517*	0.553*	−0.610	−0.675
	(0.229)	(0.300)	(0.302)	(0.304)	(0.299)	(0.301)	(0.300)	(0.430)	(0.504)
Firm Size	−0.708***	−0.636***	−0.628***	−0.654***	−0.644***	−0.632***	−0.634***	−0.597***	−0.562***
	(0.046)	(0.052)	(0.053)	(0.053)	(0.052)	(0.052)	(0.052)	(0.061)	(0.081)
Firm Age	−0.231***	−0.212**	−0.234***	−0.231***	−0.214**	−0.214**	−0.222***	−0.134	−0.143
	(0.074)	(0.087)	(0.086)	(0.085)	(0.086)	(0.086)	(0.086)	(0.108)	(0.125)
Profitability	0.013*	0.049	0.048	0.051	0.049	0.051	0.044	0.059	0.081
	(0.007)	(0.085)	(0.0125)	(0.078)	(0.084)	(0.085)	(0.088)	(0.090)	(0.099)
Leverage	0.021	0.017	0.017	0.018	0.016	0.018	0.018	0.018	0.023
	(0.023)	(0.012)	(0.012)	(0.022)	(0.012)	(0.012)	(0.018)	(0.016)	(0.019)
Underwriter Reputation	1.142***	1.319***	1.332***	1.248***	1.298***	1.327***	1.277***	1.431***	1.121**
	(0.248)	(0.309)	(0.310)	(0.307)	(0.309)	(0.311)	(0.311)	(0.424)	(0.475)

Table A1. (Continued)

	(1) Enterprise-country dummies	(2) Control of Corruption	(3) Government Effectiveness	(4) Political Stability	(5) Regulatory Quality	(6) Rule of Law	(7) Voice and Accountability	(8) Enforcing Contracts	(9) Minority Investors
VC Backing	0.038	0.008	0.054	0.128	0.012	0.020	0.033	0.023	0.076
	(0.163)	(0.205)	(0.207)	(0.200)	(0.202)	(0.206)	(0.203)	(0.298)	(0.349)
Market Momentum	−0.228	−0.206	−0.239	−0.191	−0.209	−0.212	−0.233	−0.175	−0.240
	(0.217)	(0.221)	(0.187)	(0.179)	(0.216)	(0.215)	(0.205)	(0.176)	(0.162)
Enterprise-country dummies	YES	NO	NO	NO	NO	NO	NO	NO	NO
Control of Corruption		0.835***							
		(0.193)							
Government Effectiveness			0.537***						
			(0.205)						
Political Stability				1.437***					
				(0.376)					
Regulatory Quality					1.811***				
					(0.394)				
Rule of Law						0.921***			
						(0.236)			
Voice and Accountability							2.551***		
							(0.587)		
Enforcing Contracts								0.022***	
								(0.007)	
Minority Investors									0.061*
									(0.032)
Constant	8.121***	7.273***	7.373***	9.046***	6.451***	7.364***	5.282***	4.489***	6.069***
	(1.491)	(1.858)	(1.656)	(1.986)	(1.752)	(1.821)	(1.692)	(0.764)	(1.087)
Observations	1818	1818	1818	1818	1818	1818	1818	1197	1197
R-squared	0.497	0.433	0.425	0.435	0.435	0.430	0.431	0.403	0.388

Table A1. (Continued)

Notes: 2SLS regressions on Tobin's Q on the sample of 1818 European IPOs, as described in Table 1. All models replicate Model 2c in Table 3, when adding: enterprise-country dummies in Model (1); Control of Corruption (World Bank's measure, capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests) in Model (2); Government Effectiveness (World Bank's measure, capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies: estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately −2.5 to 2.5) in Model (3); Political Stability (World Bank's measure of perceptions on the likelihood of political instability and/or politically motivated violence, including terrorism: estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately −2.5 to 2.5) in Model (4); Regulatory Quality (World Bank's measure, capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development: estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately −2.5 to 2.5) in Model (5); Rule of Law (World Bank's measure, capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence: estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately −2.5 to 2.5) in Model (6); Voice and Accountability (World Bank's measure, capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media: estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately −2.5 to 2.5) in Model (7); Enforcing Contracts (World Bank's score, as the simple average of the scores for each of the component indicators: the procedures, time and cost for resolving a commercial dispute through a local first-instance court. The score is computed based on the methodology in the DB04-15 studies) in Model (8); and Minority Investors (the score for protecting minority investors benchmarks economies with respect to the regulatory best practice on the indicator set: the score is indicated on a scale from 0 to 100, where 0 represents the worst regulatory performance and 100 the best regulatory performance, and is computed based on the methodology in the DB06-14 studies) in Model (9). UK values are used when indicators for British territories were missing. Enforcing Contracts and Minority Investors are available only starting from 2004. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, that is, ranging from approximately −2.5 to 2.5. Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

Table A2. Main vs Second markets

	(1) Main markets	(2) Second markets
Board Independence	0.976**	1.406**
	(0.433)	(0.622)
(Board Independence)^2	−0.711*	−0.954**
	(0.377)	(0.431)
Industry Diversification	0.815	0.819
	(0.374)	(0.444)
V/C	−0.329**	−0.231**
	(0.131)	(0.114)
CEO Duality	−0.593**	−0.816***
	(0.252)	(0.213)
Board Size	0.007	−0.042
	(0.041)	(0.032)
C	0.841	0.655
	(0.618)	(0.465)
Offer Size	−1.202*	0.554
	(0.647)	(0.601)
Offer Structure	0.264	0.319
	(0.409)	(0.383)
Firm Size	−0.655***	−0.791***
	(0.084)	(0.063)
Firm Age	−0.338***	−0.219**
	(0.105)	(0.103)
Profitability	0.006	0.010***
	(0.013)	(0.003)
Leverage	0.019	−0.067
	(0.013)	(0.115)
Underwriter Reputation	0.946**	1.135***
	(0.441)	(0.270)
VC Backing	0.172	0.152
	(0.211)	(0.170)
Market Momentum	−0.194	−0.234
	(0.173)	(0.147)
Constant	8.971***	7.259***
	(1.556)	(2.817)
Observations	472	1,346
R-squared	0.380	0.417

Note: 2SLS regressions on Tobin's Q on the sample of 1818 European IPOs, as described in Table 1. Model (1) is estimated on the sample of IPO firms that were listed on main markets. Model (2) is estimated on the sample of IPO firms that were listed on second markets. Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses. ***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

Table A3. The effect of SOX-like regulations

	(1) Pre-SOX-like regulations	(2) Post-SOX-like regulations
Board Independence	1.157**	0.930**
	(0.525)	(0.409)
(Board Independence)^2	−0.940**	−0.715**
	(0.410)	(0.344)
Industry Diversification	0.115	0.353
	(0.126)	(0.496)
V/C	−0.123**	−0.230***
	(0.049)	(0.082)
CEO Duality	−0.498**	−0.680***
	(0.158)	(0.173)
Board Size	−0.085*	−0.026
	(0.048)	(0.026)
C	−1.153	0.142
	(0.952)	(0.376)
Offer Size	0.498	−0.028
	(0.579)	(0.443)
Offer Structure	−0.526	0.255
	(0.346)	(0.287)
Firm Size	−0.371***	−0.676***
	(0.056)	(0.047)
Firm Age	−0.152*	−0.280***
	(0.082)	(0.075)
Profitability	0.024	0.006*
	(0.230)	(0.004)
Leverage	0.183**	0.016***
	(0.086)	(0.002)
Underwriter Reputation	1.329***	1.204***
	(0.312)	(0.275)
VC Backing	0.209	0.226
	(0.182)	(0.175)
Market Momentum	−0.279*	−0.266
	(0.144)	(0.164)
Constant	6.672**	8.847**
	(2.743)	(3.691)
Observations	568	1,250
R-squared	0.313	0.340

Note: 2SLS regressions on Tobin's Q on the sample of 1818 European IPOs, as described in Table 1. Model (1) is estimated for the sample of firms that were listed in a European country before a SOX-like provision was implemented, or in a country where a SOX-like provision was not implemented at all. Model (2) is estimated for the sample of firms that were listed in a European country after a SOX-like provision was implemented. Dates of implementations are provided in Akyol *et al.* (2014). Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

Table A4. Alternative specifications

	(1) Main vs. second markets	(2) Pre- vs. post-SOX-like regulations
Board Independence	0.920**	1.392**
	(0.428)	(0.642)
(Board Independence)^2	−0.698*	−0.922**
	(0.376)	(0.409)
BI × Second markets	0.547	
	(0.391)	
BI^2 × Second markets	−0.257	
	(0.283)	
BI × Post-SOX-like reg.		−0.452
		(0.661)
BI^2 × Post-SOX-like reg.		−0.227
		(0.360)
Industry Diversification	1.206	0.845
	(0.721)	(0.806)
V/C	−0.209***	−0.192**
	(0.080)	(0.075)
CEO Duality	−0.774***	−0.748***
	(0.166)	(0.156)
Board Size	−0.014	−0.039*
	(0.026)	(0.022)
C	0.265	0.443
	(0.387)	(0.301)
Offer Size	−0.136	0.026
	(0.469)	(0.361)
Offer Structure	0.289	0.068
	(0.321)	(0.180)
Firm Size	−0.713***	−0.529***
	(0.050)	(0.058)
Firm Age	−0.280***	−0.164**
	(0.075)	(0.064)
Profitability	−0.007**	−0.006*
	(0.003)	(0.003)
Leverage	0.017***	0.019***
	(0.002)	(0.003)
Underwriter Reputation	1.027***	0.153
	(0.268)	(0.132)
VC Backing	0.230	0.220
	(0.169)	(0.173)
Market Momentum	−0.188	−0.157
	(0.165)	(0.134)
Constant	6.128**	7.540
	(2.316)	(6.671)
Observations	1818	1818
R-squared	0.449	0.423

Note: 2SLS regressions on measures of firm value alternative to Tobin's Q on the sample of 1818 European IPOs, as described in Table 1. In Model (1), Board Independence (BI) and its square value are moderated by Second markets. In Model (2), BI and its square value are moderated by Post-SOX-like regulations. Each regression controls for time, industry, and market effects. Heteroscedasticity-robust standard errors are reported in parentheses.
***, ** and * represent, respectively, significance levels below 1%, 5% and 10%.

Fabio Bertoni is a full professor of finance and member of the FAIRR research center at SKEMA Business School, France. His research interest is in corporate finance, with a particular focus on entrepreneurial finance and alternative financial instruments. His work has been published in leading scientific journals such as *Entrepreneurship Theory & Practice*, *Journal of Corporate Finance*, and *Research Policy and Strategic Entrepreneurship Journal*.

Michele Meoli is an associate professor in the Department of Management, Information and Production Engineering, University of Bergamo, where he teaches Finance and Business Organization. He is also Director of the CISAlpino Institute for Comparative Studies in Europe (CCSE), University of Bergamo and University of Augsburg, and an advisor for the Italian Ministry of University and Research on Higher Education and Right to Education. His research interests include corporate governance, corporate finance, academic entrepreneurship, higher education, and science policy.

Silvio Vismara is Vice-Chancellor for Research and Professor of Corporate Finance at the University of Bergamo. He is Editor of *Small Business Economics*, co-founder and Executive Editor of the *Review of Corporate Finance*, and Associate Editor of the *Journal of Technology Transfer*. His has published in leading journals such as the *Academy of Management Journal*, *Journal of Business Venturing*, *Entrepreneurship Theory & Practice*, *Journal of Corporate Finance*, and *Research Policy and Strategic Entrepreneurship Journal*.