IS INTERNATIONAL DIVERGENCE FROM WIDE STOCK OWNERSHIP DISPERSION AN OPTIMAL CORPORATE OUTCOME?

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Abstract: *We design a model of corporate ownership and control to assess Berle-Means convergence toward diffuse incumbent stock ownership. Berle-Means convergence occurs when legal institutions for investor protection outweigh in relative importance the firm-specific protection of shareholder rights. While these arrangements are complementary sources of investor protection, Berle-Means convergence draws the corporate outcome to the socially optimal quality of corporate governance. High ownership concentration creates perverse incentives for inside blockholders to steer major business decisions to the detriment of both minority shareholders and outside blockholders. Our analysis sheds skeptical light on high insider stock ownership with managerial entrenchment and rent protection.*
Keywords: *dynamic convergence of Berle-Means incumbent stock ownership dispersion; law and finance; corporate governance; investor protection; managerial entrenchment; rent protection.*

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Introduction

Adolf Berle and Gardiner Means's (1932) seminal work serves as the canonical qualitative basis for the separation of corporate ownership and control. Their primary thesis has set the mainstream foundation of corporate governance research for legal scholars, practitioners, and economists over 90 years. In line with this Berle-Means thesis, corporate control over physical assets responds to a centripetal force and concentrates in the hands of only a few incumbents, whereas, corporate ownership is centrifugal, splits into small units, and passes from one person to another (Berle and Means, 1932: 9). In the Berle-Means image of the modern corporation, executives and directors gain their income primarily from the effort that these incumbents put into business decisions, but not from

the return on their stock investment in the enterprise. To the extent that corporate structures evolve in response to competitive pressures in the capital markets, the Berle-Means thesis predicts gradual convergence toward diffuse equity ownership as the most efficient form.
In this paper, we design and develop a model of corporate ownership and control to assess the theoretical plausibility of Berle-Means convergence toward dispersed incumbent stock ownership. To the best of our knowledge, this study is the first mathematical analysis of whether Berle-Means convergence is optimal. Further, this analysis delves into whether Berle-Means convergence is desirable from the social planner's perspective. A subsequent analysis explores the equilibrium interplay between inside blockholders and minority shareholders.
The core analytical results suggest that Berle-Means convergence occurs when legal institutions for investor protection outweigh in relative importance firm-specific asset protection of investor rights. While legal and firm-specific asset arrangements are complementary sources of investor protection, Berle-Means convergence toward dispersed incumbent stock ownership draws the corporate outcome to the socially optimal quality of corporate governance. High incumbent stock ownership creates perverse incentives for inside blockholders to steer corporate decisions to the detriment of minority shareholders.
In the current study, we extend and generalize Yeh, Lim, and Vos's (2007) baseline model of Berle-Means convergence with the constant elasticity of substitution (CES) production function in comparison to the Cobb-Douglas special case. While the first proposition remains the same in this more general CES production function, several new analytical results include institutional complementarities, socially optimal incumbent equity ownership stakes, and persistent deviations from Berle-Means stock ownership dispersion in equilibrium. The latter result is an equilibrium subpar outcome in the corporate game with information asymmetries between inside blockholders and minority shareholders. These novel propositions serve as the theoretical basis for subsequent empirical analysis. The appendices provide the complete mathematical derivation.
Our analysis rests on the fundamental concept that corporate insiders can often steer key business decisions at the detriment of minority shareholders. The corporate governance literature is replete with examples of deliberate use of managerial power that leads to a deterioration in firm value. For instance, incumbents may engage in earnings management prior to major corporate events such as initial public offerings (Teoh, Welch, and Wong, 1998a), seasoned equity offerings (Teoh, Welch, and Wong, 1998b), stock-for-stock mergers (Erickson and Wang, 1999; Louis, 2004), and open-market repurchases (Gong, Louis, and Sun, 2008). Also, corporate managers tend to opportunistically time the stock market through equity issuance when the firm's market value is high relative to its book value or past market values (e.g. Jung, Kim, and Stulz, 1996; Pagano, Panetta, and Zingales, 1998; Baker and Wurgler, 2002; Huang and Ritter, 2009). In addition, abnormal stock returns tend to arise as a result of corporate events that are associated with asset expansion or contraction (e.g. Loughran and Ritter (1995), Ikenberry, Lakonishok, and Vermaelen (1995), Loughran and Vijh (1997), Titman, Wei, and Xie (2004), Anderson and Garcia- Feijoo (2006), Fama and French (2006), and Cooper, Gulen, and Schill (2008)). Incumbent blocks of stock further facilitate this managerial rent-protection mechanism that drives business decisions to benefit inside blockholders (e.g. Bebchuk, 1999; Bebchuk and Roe; 1999; Dyck and Zingales, 2004). In this context, the desire for retaining private benefits of control may induce incumbents to introduce corporate arrangements such as

poison pills and board classifications to insulate directors and executives from the influence of outside blockholders (Shleifer and Vishny, 1986; Bebchuk, Coates, and Subramanian, 2002; Bebchuk and Cohen, 2005; Bebchuk and Kamar, 2010; Bebchuk and Jackson, 2012; Bebchuk, 2013; Bebchuk, Brav, and Jiang, 2015). In summary, both managerial power and entrenchment are essential ingredients in our analysis of the equilibrium interplay between inside blockholders and minority shareholders. This interplay can shed light on whether the Berle-Means image of the modern corporation is sustainable near the social optimum.
This study provides a theoretical model of the dynamic evolution of corporate ownership and governance structures over time. This model is general enough to encapsulate both arguments for and against Berle-Means convergence as special cases. In the context of equilibrium interplay between inside blockholders and minority shareholders, the model predicts that the former obtain a positive rent from their large blocks of stock by having both corporate power and influence to steer business decisions while the latter maintain a neutral utility threshold. Insofar as incumbents seek and secure economic rent in the corporate game, this equilibrium interplay persists as a non- trivial deviation from the social optimum. Berle-Means convergence toward diffuse incumbent stock ownership hence may or may not materialize due to the unilateral tilt of both legal and firm- specific asset arrangements for investor protection. In summary, our mathematical analysis sheds skeptical light on high insider stock ownership with managerial entrenchment and rent protection.
The remainder of this paper follows the structure below. Section 2 offers a review of the literature on corporate ownership and control. This literature review details the ubiquitous arguments for and against Berle-Means convergence toward diffuse incumbent stock ownership. Section 3 offers a unified theory of Berle-Means convergence versus path dependence in corporate ownership and governance structures. Our model offers new insights into the conditions for Berle-Means convergence with respect to both legal and firm-specific arrangements for investor protection. This unified theory analyzes whether Berle-Means convergence contributes to the overall quality of corporate governance. Also, Section 3 extends the baseline model to evaluate the equilibrium interplay between inside blockholders and minority shareholders. Section 4 concludes and offers several key testable propositions for subsequent empirical research.

Literature review

In this section, we review the relevant literature on Berle-Means convergence toward dispersed incumbent stock ownership. The Berle-Means thesis suggests that the inexorable separation of corporate ownership and control leads to a conflict of interest between incumbents and shareholders (Berle and Means, 1932; Jensen and Meckling, 1976; Fama and Jensen, 1983, 1985). As businesses grow in size and complexity and shareholders increase in number, incumbent stock ownership becomes proportionally smaller. Both corporate executives and directors derive income largely from the returns on their effort as incumbents, not from their equity investment in the corporation. As a result, the gradual dilution of incumbent equity ownership suggests a unique form of Berle-Means convergence toward diffuse stock ownership.
The literature provides polemic and divergent views of Berle-Means convergence. On the one hand, the neoclassical convergence hypothesis suggests that Berle-Means convergence

arises as a natural result of competitive pressures in seeking to reduce agency costs and managerial slack. On the other hand, there are path-dependent forces that prohibit Berle-Means convergence. The reasons for this path-dependency include politics, managerial rent protection, asset specificity, and social norms of fairness and trust. For the practical purposes of this study, we attempt to encapsulate both sides of the debate in a simple model of corporate ownership concentration. This analysis motivates several testable hypotheses for subsequent empirical research and in turn has pivotal policy implications for corporate governance.

The neoclassical convergence hypothesis

The delegation of corporate power to directors as an efficient control mechanism

A prominent strand of literature suggests that most common-law countries outperform civil-law countries in promoting an amicable environment for financial markets to prosper in terms of market valuation (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998, 1999, 2002; Demirguc-Kunt and Maksimovic, 1998; Acemoglu and Johnson, 2005; La Porta, Lopez-de- Silanes, and Shleifer, 2006, 2008). Also, several studies find evidence in support of a positive relationship between stock market development and several broad measures of economic growth (Levine and Zervos, 1998; Bekaert, Harvey, and Lundblad, 2005; Brown, Martinsson, and Petersen, 2013). The U.S., the U.K., and most other OECD countries with Berle-Means corporations represent a lion's share of the value of the global stock market. In these economies, shareholders delegate the monitoring role to directors. Effective directorship imposes limits on self-interested managers' attempts to divert corporate resources in a way that erodes shareholder value. This mechanism allows investors to rely upon directors' judgment in monitoring management. In turn, the close alignment of shareholder and director interests helps reduce agency costs in pursuit of shareholder wealth maximization (Fama, 1980; Demsetz, 1983; Easterbrook and Fischel, 1991). This corporate control mechanism prevails in many OECD countries and includes examples such as independent directors, fiduciary duties of care and loyalty, takeovers, executive pay arrangements, shareholder rights against director deviance, and social norms of sound corporate conduct.

Just as the founders of a corporation have incentives to employ state-of-the-art technology or efficient means of production, incumbents face incentives to build the ownership and governance structures that investors prefer. There can be an optimal nexus of contracts between incumbents and shareholders when directors and managers receive compensation in the form of stock-based pay (Jensen and Meckling, 1976; Jensen, 1986). This kind of executive compensation helps resolve the inherent conflict of interest between shareholders and incumbents. In this view, incumbents serve in the best interests of shareholders most of the time to receive better prices for corporate securities. Better investor protection encourages accurate stock price discovery, efficient corporate investment, and better access to external finance (McLean, Zhang, and Zhao, 2012). Competitive forces and market dynamics result in the natural selection of corporate arrangements in a Darwinian evolution. This dynamic characterization suggests that corporate ownership and governance structures should gravitate toward the most efficient form.

Since investors provide capital to corporations and delegate managerial power to incumbents, insofar as there are sound legal institutions that effectively protect shareholder

rights, the primary role of investors is to offer liquidity to corporations. By holding small equity stakes, investors and some incumbents inject capital into more corporations and as a result reap risk- sharing benefits (Fama and Jensen, 1983, 1985; Coffee, 1991, 2001). Because shareholders can discipline management via a variety of corporate control mechanisms, dispersed stock ownership for both investors and incumbents is likely to survive the test of time in the stock-market-oriented model.

The recent rise of fractional corporate ownership

The stock-market-oriented model creates a positive externality to investors and corporations. Investors spread their equity stakes across a portfolio of industries or corporations to reap diversification benefits. Corporations use equity and some other sources of funds to implement their valuable investment projects. Both parties are better off and experience a Pareto improvement. Further, there is an inevitable trade-off between liquidity and control (Coffee, 1991; Maug, 1998). Investors may voluntarily choose to forego their control over management and then retain the option to liquidate diffuse shares. Insofar as investors hold well-diversified stock portfolios, any specific loss can be offset by higher returns on other individual stocks for the median investor to perform well. Most investors' preference for liquid equity stakes in turn leaves the effective monitoring role to directors. This preference for liquidity results in the rise of diffuse stock ownership for incumbents and minority shareholders (Coffee, 2001). Berle-Means convergence to greater stock ownership dispersion can be viewed as a step toward the efficient ownership structure.

The global trend of systemic adaptation and emulation

The increasing globalization of financial markets is often viewed as another competitive force that drives convergence to the Berle-Means image of the modern corporation. Multinational corporations attempt to attain global scale to opt into high-quality regimes of securities regulation. The U.S. and U.K. landscapes are examples of regimes that enhance both transparency and fiduciary protection (Coffee, 1999, 2002). A key feature of the stock-market-oriented model is its adaptability to systemic changes. Deep and liquid stock markets that emphasize shareholder interests facilitate timely responses during a period of financial stress (Cunningham, 1999). These strong and responsive stock markets serve as an external monitor in the form of ubiquitous analyst forecasts or cross-border mergers and acquisitions (Gordon, 1999). Also, self-regulation can arise from a desire to emulate a set of best practices in corporate governance because many OECD countries with Berle-Means corporations have performed well in comparison to their East Asian and continental European counterparts, the latter of which deviate from the stock-market-oriented model (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1999; Claessens, Djankov, and Lang, 2000). In addition, the recent evidence suggests that many non-U.S. corporations choose to cross- list on the U.S. stock exchanges to subject management to stricter disclosure requirements and governance standards in a way that reduces private benefits of control (Reese and Weisbach, 2002). In summary, the global trend of systemic adaptation and emulation represents another route for Berle-Means convergence toward diffuse fractional stock ownership.

The path dependence story

The political theory of corporate finance

Politics can confine the terrain on which the large enterprise may evolve (Roe, 1991, 2000). This confinement subsequently shapes the efficient form of corporate ownership to which the large enterprise adapts. Also, this confinement gives rise to specific power-sharing arrangements. For instance, U.S. populism suggests that no institution should have significant financial power (Lipset and Schneider, 1987; Roe, 1991; Acemoglu, Johnson, and Robinson 2001; Johnson and Kwak, 2010). This pervasive belief can be the root cause of anti-bank sentiment in America (Johnson and Kwak, 2010; Admati and Hellwig, 2012). The mistrust of financial power may have contributed to the unequivocal case for laws that limit financial institutions' stock ownership (Black, 1990; Roe, 1991; Coffee, 1991, 1999, 2001, 2002). To satisfy the large corporation's capital needs, fractional shares arise as a solution. This fragmentation of equity stakes promotes a shift in corporate power from financial institutions to incumbents (Roe, 1993, 1994). In turn, politics shapes the prevalent ownership structure, and this ownership structure affects the internal power-sharing arrangements in the corporate context. The Berle-Means separation of ownership and control is thus a natural reality in American corporations (Roe, 1998: 217, 241).

In Japan and Germany, however, investors are much more tolerant of financial institutions' involvement in corporate affairs (Roe, 1993: 1936). Many of these financial institutions hold large blocks of stock to exert control and influence over management. Authority seems to be shared among incumbents and large shareholders in German and Japanese corporations (Roe, 1993: 1941-1946). The blockholder mechanism in Japan and Germany differs significantly from the

U.S. Berle-Means image of the modern corporation. In light of the structural differences, the political theory of corporate finance implies a schematic process. Politics sets the asymptotes of financial institutions' reach in stock ownership. These asymptotes impart the conditions for the separation of ownership and control. Thereby, political forces help shape corporate ownership and governance practices. To the extent that these forces appear to persist over time, complete Berle- Means convergence in corporate structures may not come to reality.

The rent-protection theory of corporate ownership and control

The size of private benefits of control plays a role in the determination of corporate ownership structure. Private benefits of control are those benefits that accrue to incumbents, who have effective control of the corporation, but not to minority shareholders (Reese and Weisbach, 2002). Examples include business connections, large office suites, corporate jets, executive retreats, and many other perquisites. Leaving corporate control up for grabs may attract attempts to acquire the company by rivals who seek to capture private benefits of control (Bebchuk, 1999). This phenomenon is more pronounced when private benefits of control are large. In these circumstances, incumbents may keep a lock on control by choosing to hold concentrated equity stakes (Bebchuk, 1999: 1-2; Dyck and Zingales, 2004). This concentrated ownership structure then serves as an antidote to potential takeover bids. In addition, the desire for keeping private benefits of corporate control may induce incumbents to introduce corporate arrangements such as poison pills and board classifications to insulate directors and executives from the direct influence of outside

blockholders (Shleifer and Vishny, 1986; Bebchuk, Coates, and Subramanian, 2002; Bebchuk and Cohen, 2005; Bebchuk and Kamar, 2010; Bebchuk and Jackson, 2012; Bebchuk, 2013; Bebchuk et al, 2015).

According to the rent-protection theory, concentrated ownership tends to prevail in corporate regimes where private benefits of control are large. Examples are Brazil, Russia, India, and China (BRIC), Mexico, Indonesia, Nigeria, and Turkey (MINT). Brazil, Russia, India, and China are widely known as the BRIC countries. Mexico, Indonesia, Nigeria, and Turkey are known as the MINT countries. Portugal, Italy, Greece, and Spain are commonly known as the PIGS countries. The less well-known countries that are expected to be the next generation of fast-growing countries with poor corporate governance, high political risk, and young and diverse population are Colombia, Indonesia, Vietnam, Egypt, Turkey, and South Africa (CIVETS). The genesis of these acronyms arises from a November 2001 paper on better global economic BRICs written by Goldman Sachs's former chairman and economist Jim O'Neill.

These regimes lack legal institutions that deter managerial rent protection. East Asian corporations provide another example of rent protection. More than two-thirds of East Asian corporations are under a single shareholder's direction, and this dominant shareholder is usually a family group (Claessens, Djankov, and Lang, 2000: 82-84, 94, 110). In contrast, concentrated stock ownership is likely to wane in countries that have robust legal rules and institutions in place to curtail private benefits of control (Bebchuk, 1999: 3-4, 37).

Private benefits of control are usually higher in corporations that do not cross-list their securities abroad (Doidge, 2004; Reese and Weisbach, 2002; Doidge, Karolyi, Lins, Miller, and Stulz, 2009). When private benefits of control are large, corporate insiders face incentives not to subject the corporation to stricter disclosure rules and other listing requirements. Incumbents would retain a lock on control if the probable gain in the present value of cross-listing abroad falls short of the likely loss in private benefits of control. To the extent that private benefits of control create perverse incentives for incumbents to keep a lock on control by holding large equity blocks, the rent-protection theory suggests that cross-country differences in corporate ownership and governance are likely to persist over time.

A nexus of firm-specific asset investments in comparison to a nexus of contracts

In contrast to the neoclassical hypothesis that a corporation is a nexus of contracts between shareholders and incumbents, the team production theory suggests that a corporation can be viewed as a nexus of firm-specific investments (Blair and Stout, 1999: 247, 275). This theory suggests that a corporation is normally structured to promote stakeholder value instead of shareholder wealth. Each team member devotes highly specialized and irrevocable effort to corporate affairs. Employees carry out day-to-day operational tasks and assignments. Executives organize and oversee employee performance. Creditors and stock owners inject capital to support the corporation's investment projects. As a hierarchical intermediary, the board of directors integrates all these endeavors to make the whole bigger than the sum of the parts (Rajan and Zingales, 1998). Each team member's expertise has little value outside the joint enterprise, and nobody leaves this enterprise and realizes the value of his or her investment in full.

The above observation suggests that the individual investments are all complementary in nature. In the corporate context, the status quo tends to be one of multiple optima. If large adjustment costs are required for a corporation to move to an alternative optimum, continuance is often efficient (Bebchuk and Roe, 1999: 139-142). Hence, the extant ownership and governance patterns are only second-best options. For instance, Russian investors may prefer government control of large corporations because few legal rules protect shareholder rights. In this case, government control is a second-best option and thus serves as an alternative form of investor protection in Russia (Frye and Shleifer, 1997; Shleifer and Treisman, 2005). If a structural shift toward first-best structures (such as less government control with better legal protection of shareholder rights) requires substantial adjustment costs and then leads to third-best outcomes, it may be better to maintain the status quo. This rationale suggests that complementary corporate ownership and governance structures are likely to persist over time.

Social norms of fairness and trust

Social norms of fairness and trust help shape the path of corporate ownership and governance structures (Blair and Stout, 2001; Coffee, 2001; Licht, 2001). In corporate governance, the rules of the game often depend on what is perceived to be fair. Stakeholders view a peculiar distribution of corporate wealth and power as unfair if this distribution departs substantially from the terms of a reference transaction, which is the transaction that defines the benchmark for corporate interactions (Jolls, Sunstein, and Thaler, 1998). Due to cultural differences, the reference transaction may vary from country to country. For instance, American culture typically resists hierarchy and centralized authority more than French culture (Bebchuk and Roe, 1999: 168-169). Codetermination reflects the need for a fair go for employees in Germany (Roe, 1993: 1942-1943). Political connections matter a great deal to Chinese CEOs in several major corporate decisions, whereas, these connections generally have a negative effect on corporate performance in terms of post-IPO earnings growth, sales growth, or profit margin (Fan, Wong, and Zhang, 2007). In East Asia, some large corporations often find it necessary to bribe senior bureaucrats to seek protection in the form of exclusive trade rights, commercial privileges, and preferential government contracts (Claessens, Djankov, and Lang, 2000). Also, several East Asian and Italian large corporations regard family involvement as an indispensable value driver (Claessens, Djankov, and Lang, 2000: 82-84; Licht, 2001). All of these social norms of fairness set the informal reference transactions or rules of the game. These informal rules create certainty for stakeholder interactions.

Firm-specific fairness norms help enhance the corporation's efficiency due to more cooperation and less opportunism among its stakeholders (Cooter and Eisenberg, 2000). The gradual internalization of fairness norms incentivizes stakeholders to trust one another in the nexus of firm-specific investments (Blair and Stout, 2001: 1807-1810). How willing stakeholders are to trust others shapes the initial ownership and governance arrangements in the corporate context (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997b). Nevertheless, trust per se does not necessarily facilitate Berle-Means convergence. Because there can be substantial heterogeneity in social norms of fairness and trust, what is viewed as fair in Japan may not be equally fair in Australia, and similarly, German codetermination may not be a suitable solution to the agency problem that New Zealand corporations face. To the extent that social norms of fairness and trust diverge from country

to country, this divergence suggests that corporate ownership and governance structures may continue to differ over time.

Synthesis and summary

The literature review has framed both sides of the debate on Berle-Means convergence. The neoclassical hypothesis and the path-dependence story both have their merits and thus need not be viewed as mutually exclusive. While the path dependence story suggests that the level of incumbent stock ownership concentration at any point in time depends on the initial condition, this static relation may not constitute the full picture. The neoclassical hypothesis may better describe the dynamic part of the picture that multinational corporations can adhere to higher standards of corporate governance by cross-listing their stocks abroad, by diversifying their portfolios via cross-border mergers and acquisitions, or by self-regulating corporate affairs in the presence of dispersed incumbent stock ownership. In light of this synthesis, we seek to develop a mathematical model to integrate both sides of the Berle-Means debate to depict a more holistic picture.

Theory

In the current study, we generalize Yeh, Lim, and Vos's (2007) baseline model of Berle-Means convergence with the constant elasticity of substitution (CES) production function in comparison to the Cobb-Douglas special case. While the first proposition remains the same in this more general CES production function, several new analytical results include institutional complementarities, socially optimal insider ownership stakes, and persistent deviations from Berle-Means corporate ownership dispersion in equilibrium. This latter result is an equilibrium sub-optimal outcome in the corporate game with information asymmetries between inside blockholders and minority shareholders. These novel propositions serve as the theoretical basis for subsequent empirical analysis. The appendices provide the complete mathematical derivation. We derive a mathematical model to characterize the relationship between incumbent stock ownership and legal and firm-specific arrangements that are designed to protect investor rights. Incumbents can commit to lower rates of value diversion by holding a substantial fraction of equity in the company (Himmelberg, Hubbard, and Palia, 1999: 357-358). In this case, stock ownership entails an inexorable trade-off between bonding incentives and risk-sharing benefits for incumbents. How these incumbents evaluate and balance this trade-off determines the severity of agency costs. Legal institutions that protect shareholder rights to corporate securities can well tilt this trade-off in favor of more dispersed stock ownership. This result is due to the fact that strong legal protection of shareholder rights enhances the value of equity in the corporation (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1999, 2002; La Porta, Lopez-de-Silanes, and Shleifer, 2006, 2008). Legal rules and institutions that enhance long-term access to stock market finance with better protection of shareholder rights help spur real investment growth in research and development (Brown, Martinsson, and Petersen, 2013). Also, better legal protection of shareholder rights encourages accurate stock price discovery, efficient capital investment, and better access to external finance (McLean, Zhang, and Zhao, 2012). Incumbents in particular, and outside investors in general, prefer to hold a well-diversified portfolio of stock investments across a myriad of

industries instead of concentrated blocks of stock in only a few companies. In accordance with this rationale, investor-friendly legal remedies can at least partly affect the equilibrium level of incumbent stock ownership dispersion.

Asset specificity also plays a role in setting the equilibrium level of insider stock ownership dispersion. Highly specific assets such as research labs, factories, plant, property, and equipment require large sums of finance and are thus hard to transfer from one entity to another. Each stakeholder's contribution to the corporate team production complements the use of assets that are specific to the corporation (Blair and Stout, 1999). Stakeholders that leave the corporation lose the value of the interplay between their human capital and specific asset use. In this light, specific assets provide a built-in degree of investor protection. To the contrary, less specific assets such as technical knowledge and practical experience are easily transferable when incumbents leave to start their own ventures at a low cost (Himmelberg, Hubbard, and Palia, 1999). Because most investments in research and development are intangible and offer little collateral value, the nature of these investments limits the firm's ability to use debt finance (Brown, Martinsson, and Petersen, 2013). The quality of firm-specific arrangements that protects private property rights can reflect the mix of tangible and intangible assets at least at the industry level (Claessens and Laeven, 2003). In essence, asset specificity complements legal rules and institutions in enhancing the overall quality of investor protection.

Several other firm-specific protective arrangements also contribute to better corporate governance. This firm-specific heterogeneity manifests in the resultant degree of asset protection of minority shareholder rights. Multiple examples of these firm-specific protective arrangements are board size and independence (Core, Holthausen, and Larcker, 1999; Adams, Hermalin, and Weisbach, 2010), CEO-chairman duality (Masulis, Wang, and Xie, 2007; Adams, Hermalin, and Weisbach, 2010), management quality in the form of prior industry-adjusted return on assets (Morck, Shleifer, and Vishny, 1990), executive pay (Bebchuk, Fried, and Walker, 2002; Bebchuk and Fried, 2003, 2004; Edmans, Gabaix, and Landier, 2009), costly debt usage (Lin, Ma, Malatesta, and Xuan, 2011; Rajan, 2012), independent audit assurance (Liao and Radhakrishnan, 2015; Aobdia, Lin, and Petacchi, 2015), financial disclosure and earnings management (Schrand and Zechman, 2012; Hribar and Yang, 2015), product market competition (Shleifer and Vishny, 1997), takeover defense in the form of anti-takeover provisions such as board classification and poison pill (Gompers, Ishii, and Metrick, 2003; Bebchuk, Cohen, and Ferrell, 2009), and institutional ownership (especially in the form of hedge fund activism) (Grinstein and Michaely, 2005; Brav, Jiang, Partnoy, and Thomas, 2008; Chung and Zhang, 2011; Bebchuk, Brav, and Jiang, 2015).

For instance, Masulis, Wang, and Xie (2007) empirically find that M&A announcements made by firms with more anti-takeover provisions yield significantly lower abnormal returns than M&A announcements made by firms with fewer anti-takeover provisions. Ceteris paribus, the differential bidder return is about 1% for the typical anti-takeover dictatorship and democracy firms with a mean spread of 10 anti-takeover provisions. The 1% spread is equivalent to a shareholder value loss of about $30 million. Also, firms that face more intense product market competition experience significantly greater abnormal bidder returns around the M&A announcement date, as do firms that separate the positions of the CEO and chairman of the board. In addition, firms with superior management quality in the form of higher prior industry-adjusted return on assets experience significantly

higher bidder returns around the M&A announcement date. In essence, these firm-specific protective arrangements such as sound board composition with CEO-chairman non-duality, better management quality, less takeover defense, and more intense product market competition promote a better corporate investment outcome in the form of higher abnormal bidder returns.

In addition to above, the design of executive pay contracts creates incentives for executive managers and directors to closely align their business vision with the best interests of shareholders in particular and all stakeholders in general (Bebchuk and Fried, 2004). Both debt covenants and independent audit reports help deter aggressive managerial overinvestments and other free cash flow problems (Jensen, 1986; Stulz, 1990; Lang, Stulz, and Walking, 1991; Harford, 1999; Titman, Wei, and Xie, 2004; Malmendier and Tate, 2005, 2008; Dittmar and Mahrt-Smith, 2007; Harford, Humphery-Jenner, and Powell, 2012; Liao and Radhakrishnan, 2015; Aobdia, Lin, and Petacchi, 2015). To the extent that debt usage better disciplines the senior executive team, less managerial overconfidence correlates with fewer and less likely instances of both financial fraud and earnings management (Schrand and Zechman, 2012; Hribar and Yang, 2015). Corporations with robust corporate governance often attract institutional investors such as pension funds and hedge funds to inject capital into these firms. Some recent evidence suggests that hedge fund activism is particularly effective in driving the target firms to improve their long-term stock return and operating performance (Brav, Jiang, Partnoy, and Thomas, 2008; Bebchuk, Brav, and Jiang, 2015). In this positive light, institutional investors play an important role in corporate governance (Chung and Zhang, 2011). In sum, all of the above mechanisms affect firm-specific intangible asset heterogeneity in the protection of shareholder rights. This asset heterogeneity complements both legal rules and institutions in promoting the overall quality of corporate governance.

The model relates to several studies that shine light on the nexus between corporate structures and firm-specific asset endowments. In particular, specific assets give rise to opportunities for the exploitation of private benefits of control. Incumbents who attempt to confiscate these private benefits of control lock in large blocks of stock. These cumulative attempts propagate information asymmetries, which arise from the fact that incumbents know more about the value of company assets than non-controlling shareholders. As a consequence, these information asymmetries lead the corporation to choose equity ownership and governance structures that provide a suboptimal degree of shareholder protection (Bebchuk, 2002). Some studies suggest that there are substantial differences in stock ownership and governance structures around the world (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998, 1999). While many scholars suggest that the forces of globalization put ineluctable pressures on corporate structures to converge toward the most efficient genre (e.g. Easterbrook and Fischel (1991: 212-213)), others suggest that incumbent rent-protection behaviors can result in the persistence of corporate ownership and governance structures (e.g. Bebchuk and Roe (1999)).

The subsequent model design builds on the above discussion. The level of incumbent stock ownership concentration at any point in time can be expressed as a function of (1) the initial level of insider stock ownership concentration, and (2) the degree of firm-specific asset protection of investor rights, and (3) the degree of legal protection that inhibits shareholder value diversion. Given the relative importance of firm-specific asset or legal protection of

investor rights, the model predicts whether corporate ownership patterns converge over time.

Legal protection, asset specificity, and Berle-Means convergence

The model builds on a schematic Cobb-Douglas production function that converts the normalized units of both legal and firm-specific asset arrangements for investor protection into a single output variable in the normalized units of the overall quality of corporate governance. The Cobb-Douglas production function is a standard concept that helps pave a microeconomic foundation for the current model of corporate ownership concentration. While this representation helps simplify the mathematical derivation, we present a more general form of the model with the constant elasticity of substitution (CES) production function in Appendix 1. Although the mathematical details are different, the qualitative propositions remain the same. The Cobb-Douglas production function follows the unique form below:

$$Q_{ot} = f_{ot}^{\alpha} x_{ot}^{\beta} \qquad \textbf{Eq(1)}$$

where Qot denotes the overall quality of corporate governance, fot is the degree of firm-specific asset protection of investor rights, xot is the degree of legal protection of investor rights, and α and β are the factor shares in the Cobb-Douglas production technology with a sum of unity. Taking the natural logarithm of Eq(1) yields a linear representation:

$$Q_t = \alpha f_t + \beta x_t$$

where Qt=lnQot>0, ft=lnfot>0, and xt=lnxot>0 are the respective logarithmic versions of (1) the quality of corporate governance, (2) the degree of firm-specific protection of investor rights, and
(3) the degree of legal protection of investor rights. In Eq(2), the factor shares, α and β, reflect the relative importance of the firm-specific and legal conditions under which the corporation operates. For instance, the U.S., the U.K., and other Anglo-Saxon countries tend to emphasize a unique set of legal rules and institutions in support of shareholder rights. In these corporate regimes, one observes the inequality α<β. In other words, these regimes assign a larger weight to legal protection than the weight to firm-specific asset protection. In comparison, the financial markets with poor corporate governance and high political risk, such as the BRIC and MINT regimes, largely rely on firm-specific asset protection of investor rights in the absence of robust shareholder-centric legal rules and institutions. In these corporate regimes, one observes the inequality α>β. Specifically, these regimes assign a larger weight to firm-specific asset protection than the weight to legal protection. While this characterization seems arbitrary and many corporate regimes may line up between these extreme tails, the simplification with different values of α and β facilitates the mathematical derivation. Insofar as there is a fair balance between model parsimony and complexity, this derivation yields useful and testable propositions that serve as a basis for subsequent empirical work.

In this mathematical formulation, ft encompasses a linear combination of firm characteristics and xt reflects a linear combination of external characteristics in support of investor protection. Firm-specific characteristics include size, book-to-market, Tobin's q, operating profitability, asset tangibility, dividend payout, share buyback, and so forth. External characteristics include the G- index or E-index for corporate governance, the index for anti-takeover provisions, and many other external legal arrangements in support of investor rights etc. Hence, ft and xt each include several characteristics in support of either firm-specific or legal arrangements for investor protection.

With equity stakes in the corporation, incumbents benefit from fractional stock ownership $0 \leq \varphi \leq 1$ where φ denotes the non-negative level of insider stock ownership. In order to gauge the full quality of corporate governance that arises from this stock ownership, one scales the term φ by Qt/ft, or (αft+βxt)/ft, so that the expression {φt·(αft+βxt)/ft} reflects the quality of corporate governance due to the legal and firm-specific asset arrangements for investor protection with 100% incumbent stock ownership. One can multiply this expression by dφt to derive the expression {φt·(αft+βxt)/ft}·dφt that captures the full benefits of both legal and firm-specific protective arrangements due to some change in incumbent stock ownership where dφt denotes a marginal change in incumbent stock ownership concentration.

Because diffuse stock ownership spreads the benefits of both legal and asset arrangements for investor protection to more owners, a corporation's dispersion of stock ownership creates a network externality. This logic suggests that the quality of corporate governance goes hand in hand proportionally with stock ownership concentration at the margin. The marginal change in the quality of corporate governance, dQ, can be expressed as a constant multiple of the marginal change in the full degree of investor protection that arises from both legal and firm-specific asset arrangements due to partial incumbent stock ownership. In this case dQt and dφt move in opposite directions due to the spread effect of stock ownership dispersion. This rationale suggests the differential equation below:

$$dQ_t = \left(-\frac{1}{k}\right)\phi_t(x_t)\left(\frac{\alpha f_t + \beta x_t}{f_t}\right)d\phi_t(x_t)$$

where k>0 is a proportionality scalar, and the negative sign on the right-hand side of Eq(3) keeps intact the logic that diffuse stock ownership permits the full benefits of investor protection to spread to more owners. The level of incumbent stock ownership concentration depends on the degree of legal protection at any given point in time. This characterization does not allow the protective effect of asset specificity to enter the determination of incumbent stock ownership concentration. One plausible explanation is that insider stock ownership concentration serves as a unilateral response to the legal rules and institutions in support of greater investor rights. The intrinsic value of corporate property rights is equal to the value of legal arrangements that enforce these property rights, not the face value of the hard assets. Firm-specific assets only represent corporate value if there are robust laws and institutions that protect the use of these assets. These legal arrangements in turn create incentives for investors to inject capital into corporations for reasonable streams of dividends and capital gains. Hence, the current level of insider stock ownership

concentration at any point in time is a function of legal protection but not firm-specific asset protection.

Rearranging Eq(3) with the substitution of $dQt/d\varphi t=(dQt/dxt)\cdot(dxt/d\varphi t)=\beta\cdot(dxt/d\varphi t)$ yields Eq(4):

$$\phi_t(x_t)d\phi_t(x_t) = -k\left(\frac{\beta f_t}{\alpha f_t + \beta x_t}\right)dx_t$$

The next step is to integrate each side of Eq(4) to solve for the prevailing level of incumbent stock ownership concentration at any particular point in time:

$$\phi_t(x_t) = \sqrt{c - 2kf_t \ln(\alpha f_t + \beta x_t)}$$

where c is an arbitrary constant that arises from the initial condition. When $\varphi(x)$ is non-trivial and positive, Eq(5) holds for logical values of k, α, and β at an interior optimum. We define the initial condition to be $\varphi(x0)=\varphi0$. This condition determines the constant $c=\varphi02+2kft\cdot\ln(\alpha ft+\beta x0)$ where one can observe the inequalities $\varphi0>0$ and $x0>0$. Substituting this result into Eq(5) yields Eq(6):

$$\phi_t(x_t) = \sqrt{\phi_0^2 + 2kf_t \ln\left(\frac{\alpha f_t + \beta x_0}{\alpha f_t + \beta x_t}\right)}$$

For better exposition, we define the Berle-Means convergence determinant as the second term in the square root on the right-hand side of Eq(6). The convergence determinant sets the condition for Berle-Means convergence to occur over time. If this determinant is substantially close to zero, the level of incumbent stock ownership concentration persists at a point in time. In comparison, if the determinant is consistently negative, the level of incumbent stock ownership concentration decreases from the initial condition. In essence, the relative magnitude of quantities that enter the convergence determinant shines fresh light on whether the Berle-Means image of stock ownership dispersion comes to reality.

$$\theta_t(x_t) = 2kf_t \ln\left(\frac{\alpha f_t + \beta x_0}{\alpha f_t + \beta x_t}\right)$$

Eq(6) suggests several key propositions. The first proposition suggests that there is a negative association between equilibrium insider stock ownership concentration and legal protection of investor rights (ceteris paribus). This result accords with the empirical law-and-finance thesis that ownership concentration can be a useful substitute for poor investor protection (La Porta, Lopez- de-Silanes, Shleifer, and Vishny, 1999: 473-474, 497). At any rate, Eq(6) suggests that the above negative association is non-linear. Also, Eq(6) does not

suggest the same sort of association between insider stock ownership concentration and asset protection. Alternatively, this analytical solution suggests that there is an ambiguous relationship between stock ownership concentration and firm-specific asset protection. Corporate assets often arise as a natural product of the geographic environment in the era of colonial settlement or extraction, thus it is reasonable to suggest that firm-specific asset arrangements are exogenous due to historical contingencies (Acemoglu, Johnson, and Robinson, 2001; Beck, Demirguc-Kunt, Levine, 2003). One the one hand, highly specific assets attract incumbents to increase their stock ownership in the corporation for better rent protection. On the other hand, this ownership concentration exposes incumbents to the risk of a substantial loss that may arise from the potential business failure or the confiscation of corporate property rights. In sum, the effect of asset protection on stock ownership concentration is not so clear-cut, whereas, the model points to a non-linear negative association between legal protection and stock ownership concentration.

Proposition 1

There is a non-linear negative association between incumbent stock ownership concentration and legal protection of investor rights. However, the relation between stock ownership dispersion and firm-specific asset protection is ambiguous.

The second proposition states the path dependence of ownership concentration. A country's pattern of corporate ownership and governance structures at any point in time depends partly on the patterns that this country had at earlier times (Bebchuk and Roe, 1999: 129). This prediction echoes the persistence of stock ownership concentration due to institutional complementarities and large adjustment costs that arise from the existence of multiple optima. In addition to these factors, political forces, managerial rent-protection behaviors, and social norms accentuate the persistence of ownership structures. The parties who intervene in corporate decisions under this structure may have both the incentive and the clout to hinder changes that would otherwise be socially efficient. The persistence of corporate structures can often be a natural subpar outcome due to incumbent interest groups' attempts to retain their private benefits of corporate control.

Proposition 2

The initial level of insider stock ownership concentration contributes to the determination of subsequent stock ownership concentration at a given point in time.

Eq(6) suggests the third proposition that the relative importance of legal and firm-specific arrangements for investor protection tilts the balance between the Berle-Means convergent and path-dependent forces. Ceteris paribus, if α approaches unity and β approaches zero (so that the social planner puts an exclusive emphasis on asset protection), the level of incumbent stock ownership concentration persists at the initial condition. In comparison, ceteris paribus, if α approaches zero and β approaches unity such that the social planner places an exclusive emphasis on legal protection, the level of subsequent insider stock ownership is less than the initial level by a full order of magnitude. Eq(8) and Eq(9) encapsulate these asymptotes:

$$\lim_{\beta \to 0} \phi_t(x_t) = \lim_{\alpha \to 1} \sqrt{\phi_0^2 + 2kf_t \ln\left(\frac{\alpha f_t}{\alpha f_t}\right)} = \phi_0$$

$$\lim_{\alpha \to 0} \phi_t(x_t) = \lim_{\beta \to 1} \sqrt{\phi_0^2 + 2kf_t \ln\left(\frac{\beta x_0}{\beta x_t}\right)} < \phi_0$$

where the former equality holds as the second term within the square root on the right-hand side of Eq(8) vanishes because the social planner assigns an absolute weight to the firm-specific asset arrangements for shareholder protection, and the latter inequality $\varphi t<\varphi 0$ in Eq(9) holds insofar as the corporate regime consistently improves the legal rules and institutions for investor protection,
i.e. $x0<xt$ or $\theta t(ft,xt)<0$, while this protection attracts an exclusive emphasis from the social planner. In sum, Berle-Means convergence arises from the plausible case where the balance between legal and firm-specific protective arrangements tilts toward consistent decreases in incumbent stock ownership concentration over time.
Proposition 3
The relative importance of legal and firm-specific asset arrangements for investor protection affects the balance between the Berle-Means convergent and path-dependent forces. Berle-Means incumbent stock ownership dispersion can arise as a natural result of the social planner's exclusive emphasis on the legal protective arrangements for investor rights.

Institutional complementarities

Our next step is to explore the presence or absence of core institutional complementarities. This exploration is important because complementarities help define the terrain on which corporate structures may or may not converge over time. The main motivation arises from the belief that investors derive the benefits of legal and firm-specific protective arrangements via their equity stakes in the company. On the one hand, investors hold more equity as a response to poor legal or firm-specific asset protection. On the other hand, blocks of stock exclude other investors from enjoying the beneficial protection of these arrangements. In turn, this exclusion suggests weak complementarities between legal institutions and asset endowments. Stock ownership poses an implicit link between legal protection and firm-specific asset protection, albeit this link is theoretically ambiguous.
It would be informative to know whether an increase in the effectiveness of legal protection induces an increase in the effectiveness of asset protection and vice versa. To this end, we derive the first-order derivatives $d\varphi t/d\alpha$ and $d\varphi t/d\beta$ and then use these quantities and the unit sum of α and β to assess whether both legal and firm-specific asset arrangements for investor protection reinforce each other. In microeconomic terms, we seek to derive the

(positive) elasticity of legal protection with respect to firm-specific protection (dxt/xt)/(dft/ft). Appendix 2 details the complete proof of this analytical result.
By the chain rule, we work out the first-order derivatives dφt/dα and dφt/dβ when we normalize
x0=0 without any loss of generality:

$$\frac{d\phi}{d\alpha}=\left(\frac{-kf_t^2}{(\alpha f_t+\beta x_t)\cdot\sqrt{\phi_0^2+2kf_t\ln\left(\frac{\alpha f_t+\beta x_0}{\alpha f_t+\beta x_t}\right)}}\right)$$

$$\frac{d\phi}{d\beta}=\left(\frac{\left(\frac{k\beta x_t^2}{\alpha}\right)}{(\alpha f_t+\beta x_t)\cdot\sqrt{\phi_0^2+2kf_t\ln\left(\frac{\alpha f_t+\beta x_0}{\alpha f_t+\beta x_t}\right)}}\right)$$

The unit sum of the factor shares α and β suggests the equality dα/dβ =(–1). The next step is to apply this result and Eq(10) and Eq(11) to solve for α and β:

$$\alpha=\left(\frac{x_t^2}{f_t^2+x_t^2}\right)$$

$$\beta=\left(\frac{f_t^2}{f_t^2+x_t^2}\right)$$

We work out the respective first-order derivatives dxt/dφt and dφt/dft:

$$\frac{dx}{d\phi} = -\left(\frac{(\alpha f_t + \beta x_t) \cdot \sqrt{\phi_0^2 + 2kf_t \ln\left(\frac{\alpha f_t + \beta x_0}{\alpha f_t + \beta x_t} \right)}}{\beta k f_t} \right)$$

$$\frac{d\phi}{df} = -\left(\frac{\alpha k f_t}{(\alpha f_t + \beta x_t) \cdot \sqrt{\phi_0^2 + 2kf_t \ln\left(\frac{\alpha f_t + \beta x_0}{\alpha f_t + \beta x_t} \right)}} \right)$$

The final step is to use Eq(14) and Eq(15) to find the derivative dxt/dft=(dxt/xt)(dft/ft) when we normalize x0=0 without any loss of generality. Appendix 2 provides the complete proof of this analytical result.

$$\frac{dx}{df} = \left(\frac{dx}{d\phi} \right) \cdot \left(\frac{d\phi}{df} \right) = \left(\frac{\alpha}{\beta} \right) = \left(\frac{x_t^2}{f_t^2} \right) > 0$$

According to Eq(16), legal and firm-specific protective arrangements are complementary mechanisms. Alternatively, one can derive the positive elasticity of legal protection with respect to asset protection: (dxt/xt)/(dft/ft)=(xt/ft)>0. This analytical result suggests that the effectiveness of legal protection is likely to increase by (xt/ft) percent in response to a unit percent increase in the effectiveness of asset protection. In turn, both legal protection and asset protection are complementary. This sequential logic supports the case for improving at least one of these protective arrangements to increase shareholder welfare for the corporate society as a whole.

Proposition 4

Legal and firm-specific asset arrangements for investor protection constitute complementary institutions. These arrangements complement each other in promoting better investor protection.

Does Berle-Means convergence represent a structural shift toward the social optimum?

Berle-Means convergence and path dependence can both be valid theoretical scenarios for the evolution of corporate ownership structure. The next question concerns the social desirability of Berle-Means convergence toward diffuse insider stock ownership. We first explore the condition under which this Berle-Means convergence closes the gap between the status quo and the social optimum. Then we assess whether this convergence toward dispersed incumbent stock ownership is socially desirable.
We rearrange Eq(6) to yield a function of legal protection of investor rights at each point in time:

$$x_t = \left(\frac{\alpha}{\beta}\right) f_t \left\{ \exp\left(\frac{\phi_0^2 - \phi_t^2}{2kf_t} \right) - 1 \right\} + x_0 \exp\left(\frac{\phi_0^2 - \phi_t^2}{2kf_t} \right)$$

Incumbent blockholders acquire some fraction of equity in the corporation φ* in response to the socially optimal degree of legal protection of investor rights x*=max(xt; t □□{1,2,3 T}). In mathematical terms, x* can be expressed as a function of φ*:

$$x_* = \left(\frac{\alpha}{\beta}\right) f_t \left\{ \exp\left(\frac{\phi_0^2 - \phi_*^2}{2kf_t} \right) - 1 \right\} + x_0 \exp\left(\frac{\phi_0^2 - \phi_*^2}{2kf_t} \right)$$

At this stage, we derive the respective expressions of the quality of corporate governance at any given point in time Qt as well as the socially desirable quality of corporate governance Qt*:

$$Q_t = \alpha f_t + \beta x_t = (\alpha f_t + \beta x_0) \cdot \exp\left(\frac{\phi_0^2 - \phi_t^2}{2kf_t} \right)$$

$$Q_t^* = \alpha f_* + \beta x_* = \alpha (f_* - f_t) + (\alpha f_t + \beta x_0) \cdot \exp\left(\frac{\phi_0^2 - \phi_*^2}{2kf_t} \right)$$

where f* denotes the socially optimal degree of asset protection of investor rights. For better and easier exposition, we define ξt as the distance between the socially desirable quality of corporate governance and the privately efficient counterpart at any point in time:

$$\begin{aligned} \xi_t = Q_t^* - Q_t \quad &= \alpha (f_* - f_t) \\ &+ \alpha f_t \left\{ \exp\left(\frac{\phi_0^2 - \phi_*^2}{2kf_t} \right) - \exp\left(\frac{\phi_0^2 - \phi_t^2}{2kf_t} \right) \right\} \\ &+ \beta x_0 \left\{ \exp\left(\frac{\phi_0^2 - \phi_*^2}{2kf_t} \right) - \exp\left(\frac{\phi_0^2 - \phi_t^2}{2kf_t} \right) \right\} \end{aligned}$$

The optimal outcome arises from the case where ξt hits its zero lower bound. The optimization problem is to differentiate ξt with respect to φt. Equating the first-order condition to nil yields a testable proposition:

$$\frac{d\xi_t}{d\phi_t} = \left(\frac{\alpha f_t + \beta x_0}{k f_t} \right) \cdot \exp\left(\frac{\phi_0^2 - \phi_t^2}{2k f_t} \right) \cdot \phi_t = 0$$

The above first-order condition is equal to zero when the strict equality φt=φt*=0 holds at the lower bound for the current level of incumbent equity ownership concentration at a given point in time. This analytical solution suggests that Berle-Means convergence toward diffuse incumbent stock ownership draws the corporate outcome closer to the social optimum. In turn, this convergence occurs at the zero lower bound and closes the gap between the initial condition and the socially desirable quality of corporate governance.
In order to affirm that this gap reaches its minimum, one evaluates the second derivative d2ξt/dφt2 at φt=0. This second derivative is strictly positive at φt=0, thereby the deviation from the social optimum vanishes when insiders hold little stock ownership in the corporation. Berle- Means convergence toward dispersed stock ownership precludes corporate insiders from steering business decisions at the expense of minority shareholders.

$$\frac{d^2\xi_t}{d\phi_t^2} = \left(\frac{\alpha f_t + \beta x_0}{k f_t} \right) \cdot \exp\left(\frac{\phi_0^2 - \phi_t^2}{2k f_t} \right) \cdot \left(1 - \frac{\phi_t^2}{k f_t} \right) = \left(\frac{\alpha f_t + \beta x_0}{k f_t} \right) \cdot \exp\left(\frac{\phi_0^2}{2k f_t} \right) > 0$$

Proposition 5
Berle-Means convergence toward dispersed insider equity ownership represents a structural shift toward the socially desirable quality of corporate governance.
In order to better appreciate the analytical results in Eq(6) and Eq(22), we use hypothetical values of the quantities {f0,ft,x0,xt,φ0,φt,k}={0.23,0.33,0.26,0.39,0.53,0.04,1.00} to plot the stereoscopic visualization of (1) the current level of insider stock ownership concentration, and (2) the first derivative of deviation from the optimal quality of corporate governance in Figure 1. In Figure 2, we plot the first derivative of deviation from the optimal level of corporate governance by assuming equal factor shares α=β=0.5 with different parameter values of proportionality factor and initial legal protection of investor right. In effect, this visualization better delineates the curvature of the relationship between the core variable under study and the legal protection of investor rights and the relative importance of this protection. This stereoscopic presentation integrates the testable conjectures that we summarize in Propositions 1 to 5 above.

Inside blockholder rent protection and minority shareholder expropriation

This section analyzes changes in the utility levels for both inside blockholders and minority shareholders. This analysis investigates the nexus between inside blockholder rent protection and minority shareholder expropriation. For the purposes of the current paper, we attempt to derive a testable proposition that reflects the equilibrium interplay between inside blockholders and minority shareholders. This intuitive analysis suggests that the former can use their large blocks of stock and thus corporate control rights to extract a

positive rent while the latter get fully expropriated with zero utility. As a consequence, the overall quality of corporate governance deviates from the social optimum. This economic rationale in turn suggests that corporate ownership and governance structures may depart substantially from the Berle-Means image of the modern corporation.

Figure 1: Stereoscopic visualization of the analytical results in Eq(6) and Eq(22)

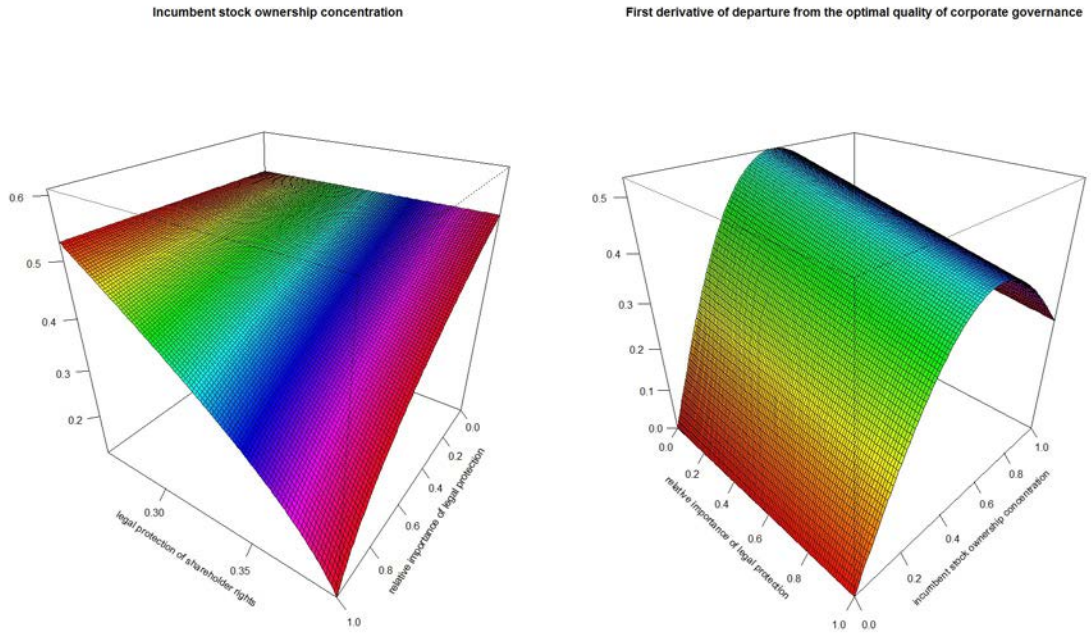
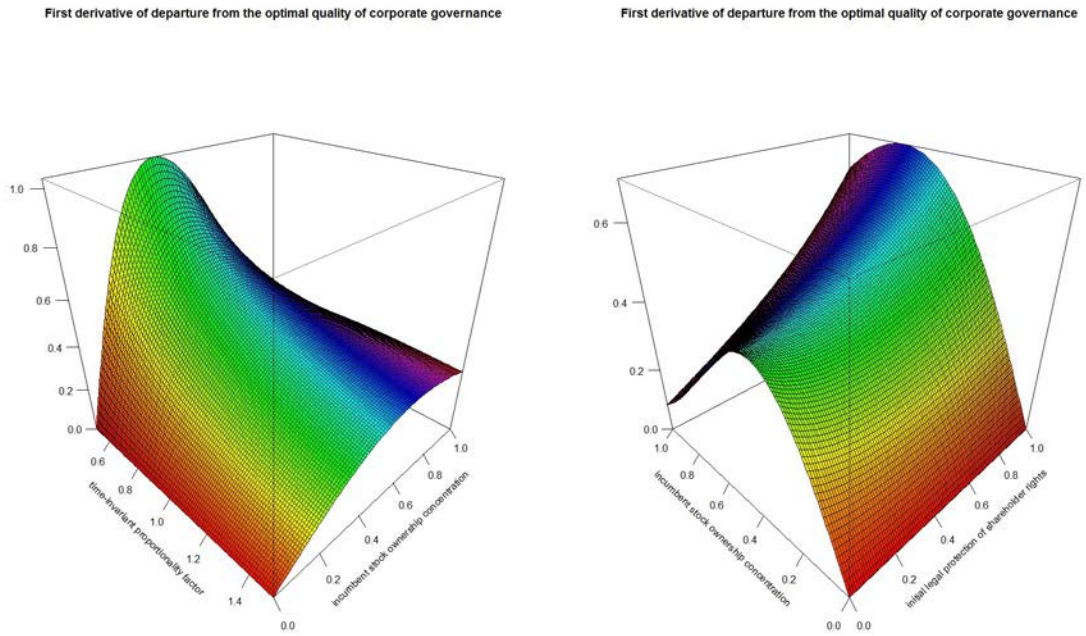


Figure 2: Stereoscopic visualization of the analytical solution in Eq(22) with equal factor shares and different parameter permutations



Our analysis rests on the fundamental concept that corporate insiders often steer key business decisions to the detriment of outside investors. The corporate governance literature is replete with examples of deliberate use of managerial power that leads to a deterioration in firm value. For instance, incumbents engage in earnings management prior to major corporate events such as initial public offerings (Teoh, Welch, and Wong, 1998a), seasoned equity offerings (Teoh, Welch, and Wong, 1998b), stock-for-stock mergers (Erickson and Wang, 1999; Louis, 2004), and open- market repurchases (Gong, Louis, and Sun, 2008). Also, corporate managers opportunistically time the stock market through equity issuance when the firm's market value is high relative to its book value or past market values (e.g. Jung, Kim, and Stulz, 1996; Pagano, Panetta, and Zingales, 1998; Baker and Wurgler, 2002; Huang and Ritter, 2009). In addition, abnormal stock returns arise as a result of corporate events that are associated with asset expansion or contraction (e.g. Loughran and Ritter (1995), Ikenberry, Lakonishok, and Vermaelen (1995), Loughran and Vijh (1997), Titman, Wei, and Xie (2004), Anderson and Garcia-Feijoo (2006), Fama and French (2006), and Cooper, Gulen, and Schill (2008)). Incumbent blocks of stock further facilitate this managerial rent-protection mechanism that drives core business decisions to benefit inside blockholders (e.g. Bebchuk, 1999; Bebchuk and Roe; 1999; Dyck and Zingales, 2004). In this context, the desire for retaining private benefits of control may induce incumbents to introduce corporate arrangements such as poison pills and board classifications to insulate directors and executives from the influence of outside blockholders (Shleifer and Vishny, 1986; Bebchuk, Coates, and Subramanian, 2002; Bebchuk and Cohen, 2005; Bebchuk and Kamar, 2010; Bebchuk and Jackson, 2012; Bebchuk, 2013; Bebchuk, Brav, and Jiang, 2015). In sum, both managerial power and

entrenchment are essential ingredients in our analysis of the game-theoretic equilibrium interplay between inside blockholders and minority shareholders. This interplay sheds light on whether Berle-Means convergence is sustainable near the social optimum.

For better exposition, we assume all minority shareholders to be outside shareholders who hold small equity stakes in the corporation. These outside investors are not able to cause any material changes in corporate decisions. In effect, these small minority shareholders differ from "controlling shareholders" who hold large equity stakes in the corporation such that the latter shareholders have the clout to directly influence managerial decisions in the corporate context. In this sense, we consider controlling shareholders part of the incumbent group since they tilt, share, and exercise power in the corporate game. The primary objective of this model setup is to derive a simple and intuitive analytical result that shines light on the comparison of utility changes for inside blockholders and minority shareholders in the corporate context.

We first consider a single period in which incumbents or inside blockholders derive utility from their efforts as well as private benefits of control. When incumbents choose self-employment, their base income co is presumably lower than their executive compensation ce=co+r that includes both their base income co and economic rent r. The former is the competitive equilibrium pay for incumbents, and the latter represents private benefits of control that incumbents extract by exercising their large blocks of stock to steer major corporate decisions in favor of inside blockholders. Over the period incumbents derive utility from the wedge between their executive pay ce and opportunity cost e, plus the present value of the same pay as the terminal utility:

$$u_e = c_e - e + \delta u_e \Rightarrow u_e = \left(\frac{c_e - e}{1 - \delta} \right)$$

where δ is the discount factor and ue is the amount of utility that incumbents can derive from their diligent involvement in corporate affairs as well as their private information about the firm's near- term investment, payout, and financing activities. The latter private information is unknown to minority shareholders. When private benefits of control are large, these information asymmetries create perverse incentives for incumbents to extract a material economic rent from their large blocks of stock. Then we derive the central condition under which large private benefits of control induce incumbents to engage in corporate affairs that lead to this value diversion.

When incumbents unilaterally deviate from the above diligent involvement in corporate decisions, their terminal utility becomes ud with probability p and co/(1–δ) with probability (1–p) where ud represents the amount of utility that incumbents derive from this unilateral deviation:

$$u_d = c_e + \delta \left\{ p u_d + (1-p) \left(\frac{c_o}{1-\delta} \right) \right\} \Rightarrow u_d = \left\{ \frac{(1-\delta)c_e + \delta(1-p)c_o}{(1-\delta p)(1-\delta)} \right\}$$

A comparison of Eq(24) and Eq(25) results in the condition, i.e. ue>ud, under which there is no unilateral profitable opportunity for incumbents to deviate from their diligent involvement in corporate decisions:

$$\left(\frac{c_e - e}{1-\delta}\right) > \left\{\frac{(1-\delta)c_e + \delta(1-p)c_o}{(1-\delta p)(1-\delta)}\right\}$$

$$c_e > c_o + \left(\frac{1-\delta p}{\delta(1-p)}\right)e \Rightarrow r > \left(\frac{1-\delta p}{\delta(1-p)}\right)e$$

This condition suggests that incumbents face perverse incentives in the form of large private benefits of control to steer major corporate decisions for shareholder value diversion. To the extent that a significant economic rent accrues to the use of large blocks of stock held by incumbents to influence major corporate decisions, the total amount of incumbent compensation exceeds self- employment pay plus a probabilistic time value of executive effort by a full order of magnitude.

The next logical step is to consider the disequilibrium scenario where incumbents deviate from the above strategy for one period and then switch back to this strategy thereafter. The resultant utility level becomes vd, and the condition for this deviation to be unprofitable is ue>vd:

$$v_d = c_e + \delta\left\{p\left(\frac{c_e - e}{1-\delta}\right) + (1-p)\left(\frac{c_o}{1-\delta}\right)\right\}$$

$$\left(\frac{c_e - e}{1-\delta}\right) > c_e + \delta\left\{p\left(\frac{c_e - e}{1-\delta}\right) + (1-p)\left(\frac{c_o}{1-\delta}\right)\right\}$$

$$c_e > c_o + \left(\frac{1-\delta p}{\delta(1-p)}\right)e \Rightarrow r > \left(\frac{1-\delta p}{\delta(1-p)}\right)e$$

The derivation of Eq(28)-Eq(30) affirms the theoretical validity of the condition under which incumbents should not deviate from their diligent engagement in business decisions in each period. Any unilateral deviation from the above equilibrium strategy cannot be profitable for incumbents. When incumbents face large private benefits of control, these corporate insiders have perverse incentives to use their clout to influence business decisions for value diversion. Incumbents would retain a lock on corporate control to entrench themselves for rent protection in future periods.

We define the kth investor's utility function as ($\varphi_k Q_k - c_k$) where φ_k represents the investor's stock ownership in the corporation (i.e. $\varphi_B > \varphi_M$), Qk is the quality of corporate governance from the investor's perspective, and ck denotes the investor's opportunity cost of executive effort. Incumbents possess private information about the firm's investment, payout, and financing activities, thus these information asymmetries permit incumbents to receive better investor protection than small minority shareholders who have no clout to influence major business decisions. In this case, one observes the inequality $Q_M < Q_B$ where QM represents the level of investor protection for small minority shareholders while QB represents the level of investor protection for insider blockholders. Further, inside blockholders and minority shareholders face different opportunity costs of executive effort.

The former devote much time and energy to key corporate decisions while the latter have quite minimal corporate engagement. In this light, one observes the inequality cM<cB.
A convenient assumption expresses the disutility that arises from executive effort e(Qk) as a function of the overall quality of corporate governance. For technical convenience, one assumes this function to be twice-differentiable and convex with the first derivatives e'(0)=0 and e'(∞)=∞. Each investor derives a utility gain from his or her interplay with the other investors in the corporate context. This utility gain is thus cM–e(QM) for small minority shareholders or cB–e(QB) for inside blockholders.
With the above model setup, the corporate planner's main objective is to maximize the sum of gains for all investors:

$$\max_{Q_M, Q_B, c_M, c_B} \left(\frac{M}{M+B}\right)(c_M - e(Q_M)) + \left(\frac{B}{M+B}\right)(c_B - e(Q_B))$$

$$\phi_M Q_M - c_M \geq \phi_M Q_B - c_B$$

$$\phi_B Q_B - c_B \geq \phi_B Q_M - c_M$$

$$\phi_M Q_M - c_M \geq 0$$

$$\phi_B Q_B - c_B \geq 0$$

where M is the number of small minority shareholders and B is the number of inside blockholders. This optimization entails key constraints around incentive compatibility and investor rationality. Both Eq(32) and Eq(33) are incentive compatibility constraints. The former states that minority shareholders prefer to hold small equity stakes with lower investor protection. In this way, small minority shareholders voluntarily give up corporate control in exchange for portfolio liquidity to reap better risk-return trade-offs; otherwise, these investors would hold large equity stakes in the firm to entrench themselves as either controlling shareholders or inside blockholders. The latter incentive compatibility constraint requires that inside blockholders prefer the higher quality of corporate governance. This better investor protection in effect entrenches and insulates incumbents from the direct influence of other shareholders such as outside blockholders. Also, this latter constraint suggests that inside blockholders can choose to sell their large blocks of stock at a reasonable premium as compensation for this voluntary equity dilution. In essence, investors would self-select to reveal their preferences when these investors have to choose from a menu of stock ownership and governance structures that satisfy these incentive compatibility constraints. Eq(34) and Eq(35) are investor rationality constraints. The former states that small minority shareholders prefer small equity stakes with lower investor protection to zero participation in the corporate game. The latter suggests that inside blockholders prefer large equity stakes with better investor protection to zero participation in the corporate game. With the above constraints Eq(32)- Eq(35), one can transform the optimization problem to characterize the equilibrium interplay between inside blockholders and small minority shareholders. Appendix 3 provides the complete

proof of this mathematical transformation.
This mathematical transformation results in a set of equivalent constraints and Kuhn-Tucker first-order conditions:

$$c_M = \phi_M Q_M$$

$$c_B = \phi_B Q_B - (\phi_B - \phi_M) Q_M$$

$$\max_{Q_M, Q_B} \left(\phi_M Q_M - e(Q_M) - \left(\frac{B}{M}\right)(\phi_B - \phi_M) Q_M \right) + \left(\left(\frac{B}{M}\right)(\phi_B Q_B - e(Q_B)) \right)$$

$$e'(Q_M) = \phi_M - \left(\frac{B}{M}\right)(\phi_B - \phi_M) < e'(Q_M^*) = \phi_M$$

$$e'(Q_B) = \phi_B$$

The above derivation suggests several key insights. Eq(39) indicates that the opportunity cost of executive effort for small minority shareholders is lower than the opportunity cost of executive effort at the socially efficient ownership level: e'(QM)< e'(Q *)=φ . As a result of Eq(36) and Eq(39), minority shareholders receive zero utility uM=φMQM–cM=0. This complete expropriation arises from the existence of information asymmetries that favor inside blockholders at the detriment of small minority shareholders. Nevertheless, these minority shareholders are not necessarily worse off because they may be able to reap better diversification benefits with respect to their extant stock investment portfolios.
Further, Eq(40) indicates that the opportunity cost of executive effort for inside blockholders is equal to the opportunity cost of executive effort at the socially efficient ownership level: e'(QB)=e'(QB*)=φB. As a result of Eq(37) and Eq(40), inside blockholders can extract a positive rent from their equilibrium interplay with small minority shareholders uB=φBQB–cB=(φB–φM)QM>0. This positive rent arises from the presence of information asymmetries that allow incumbents to exercise their large blocks of stock to steer major corporate decision at the expense of minority shareholders. In the equilibrium interplay between minority shareholders and inside blockholders, the former are indifferent while the latter are better off in light of both substantive information asymmetries and stock ownership spreads for these investor groups.

Proposition 6
The equilibrium interplay between inside blockholders and small minority shareholders suggests that the former extract a positive rent from their large blocks of stock in the corporation while the latter get fully expropriated with zero utility. The resultant quality of corporate governance thus deviates from the social optimum. In equilibrium, the corporate ownership and governance structures may depart from the Berle-Means image of the modern corporation.
The above equilibrium interplay between inside blockholders and small minority shareholders suggests corporate rent protection in favor of incumbents who hold large blocks of stock in the firm. This interplay tends to cause a deviation from the social optimum that can arise from Berle- Means convergence toward diffuse incumbent stock

ownership. In fact, higher incumbent stock ownership concentration exacerbates this deviation when inside blockholders hold excess control rights in comparison to their cash flow rights. For instance, the cost of debt is significantly higher for firms with a wider divergence between the largest ultimate owner's control rights and cash flow rights due to potential tunneling and self-dealing behaviors or other moral hazard activities by inside blockholders (Lin, Ma, Malatesta, and Xuan, 2011). Also, the shadow price of external finance is significantly higher for firms that experience a wider insider control-ownership divergence, so corporations whose incumbents have larger excess control rights face more severe financial constraints (Lin et al, 2011). These negative outcomes arise from high insider stock ownership concentration and thus call for attention from corporate governance policymakers.

Conclusion

In the current study, we design and develop a model of corporate ownership and control to better assess the theoretical plausibility of Berle-Means convergence toward diffuse incumbent stock ownership. To the best of our knowledge, this mathematical analysis is the first study of the key conditions for Berle-Means convergence, its social desirability, and the equilibrium interplay between inside blockholders and minority shareholders.

We generalize Yeh, Lim, and Vos's (2007) baseline model of Berle-Means convergence with the constant elasticity of substitution (CES) production function in comparison to the Cobb- Douglas special case. While the first proposition remains the same in this more general CES production function, several new analytical results include institutional complementarities, socially optimal insider ownership stakes, and persistent deviations from Berle-Means corporate ownership dispersion in equilibrium. This latter result is an equilibrium sub-optimal outcome in the corporate game with information asymmetries between inside blockholders and minority shareholders. These novel propositions serve as the theoretical basis for subsequent empirical analysis. The appendices provide the complete mathematical derivation.

The analytical results suggest that Berle-Means convergence occurs when the legal rules and institutions for investor protection outweigh in relative importance the firm-specific asset protection of shareholder rights. While both the legal and firm-specific arrangements constitute complementary sources of investor protection, Berle-Means convergence toward dispersed incumbent equity ownership draws the corporate outcome closer toward the social optimum. High insider stock ownership creates perverse incentives for inside blockholders to influence corporate decisions in a way that is detrimental to minority shareholders. These analytical results serve as testable propositions for empirical research.

This study offers a mathematical model of the dynamic evolution of corporate ownership and governance structures over time. This model is general enough to encapsulate both arguments for and against Berle-Means convergence as special cases. In the context of equilibrium interplay between inside blockholders and minority shareholders, the model predicts that the former obtain a positive rent from their large blocks of stock by steering major corporate decisions while the latter maintain a neutral utility threshold. Insofar as incumbents seek and secure economic rent in the corporate game, this equilibrium interplay persists as a deviation from the social optimum. Berle-Means convergence toward diffuse incumbent stock ownership may or may not materialize due to the unilateral tilt of both

legal and firm-specific asset arrangements for investor protection.

These analytical results contradict Leland and Pyle's (1977) central thesis that incumbent stock ownership sends a positive signal of firm-specific investment project quality as a natural response to information asymmetries between corporate insiders and minority shareholders. To the extent that both firm value and incumbent ownership vary together endogenously, this simultaneity leads to an ambiguous empirical nexus after one adequately controls for a unique array of exogenous productivity parameters (Coles, Lemmon, and Meschke, 2012). This ambiguous nexus between firm value and incumbent stock ownership reflects the balance between incentive alignment and incumbent entrenchment. At any rate, our study models the evolution of corporate governance and ownership patterns over time. Whether Berle-Means convergence can close a wedge between the status quo and the social optimum for better stakeholder value maximization remains an empirical puzzle. Our analysis has major implications for public policy and future empirical research in search of best practices in corporate governance.

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