One Size Fits All? Costs and Benefits of Uniform Accounting Standards

Korok Ray
Texas A&M University

ABSTRACT: I build a model of neoclassical production to examine the capital market and welfare effects of a uniform accounting standard (like IFRS). Firms vary in their cost of compliance to the standard, and investors vary in their cost of learning diverse standards for capital allocation. A uniform accounting standard increases the quantity of capital in the economy and lowers the cost of capital. However, uniform standards force diverse firms onto the same standard, which reduces welfare. A regulator selects the optimal number and type of standards to balance these competing effects. Uniform accounting standards are better than diverse accounting standards when firm productivity and variation between investors is large, but worse when the cost of investment and variation between firms is large. I draw implications for IFRS/GAAP convergence and the incentives versus standards debate.

Keywords: international accounting; GAAP; IFRS; FASB; IASB.

I. INTRODUCTION

Over the last decade, the world has witnessed a slow, but steady, march toward convergence of international accounting standards. Dozens of countries around the globe have already shifted to the International Financial Reporting Standards (IFRS), and the Securities and Exchange Commission (SEC) has pledged to harmonize United States Generally Accepting Accounting Principles (U.S. GAAP) with IFRS. But are uniform accounting standards desirable? While the academic community has long articulated some skepticism of a single uniform accounting standard (e.g., Ball 2009; Dye and Sunder 2001; Sunder 2002), only recently has this skepticism turned into concrete hesitation by accounting regulators. I advance a simple theoretical framework for thinking about the costs and benefits of uniform accounting standards. I show exactly how uniform accounting standards lower the cost of capital and under what conditions society is better off under a single uniform accounting standard than under multiple diverse accounting standards. I show that uniform accounting standards are better when firm productivity and variation between investors is large, but diverse accounting standards are better when the cost of investment and variation between firms is large.

The measure of a "good" accounting standard stems from welfare economics, and the objective of this paper is to aim for economic efficiency. In particular, a government regulator selects accounting standards to maximize social welfare. The regulator acts as a single entity and, as such, the model abstracts away from strategic games and rent-seeking between different accounting standard-setting bodies. This is not to insinuate that different bodies, like the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB), agree completely on accounting standards. But the current movement to harmonize international accounting standards suggests that there is substantial coordination between international accounting standard setters. The model combines neoclassical production with Hotelling product choice. A continuum of investors supplies capital in a competitive marketplace to a continuum of firms, and supply and demand dictate the market clearing price and quantity of capital. A government regulator selects an accounting standard that firms must adhere to in order to attract capital. There is heterogeneity among both firms and investors with respect to these accounting standards. Firms vary in their cost of compliance to the accounting standards, and investors vary in their cost of interpreting and understanding diverse accounting standards. The regulator acts as a benevolent dictator and maximizes social welfare. The main tension in the model rests on the balance between the capital allocation benefit of a uniform accounting standard against the social cost of

forcing diverse firms to adhere to the same rigid standard. A uniform standard allows investors to compare investment opportunities across the economy more easily because all financial reports are expressed in the same "language." This draws investors into the marketplace, thereby increasing the supply of capital in the economy and lowering the cost of capital for all firms. However, a single standard is costly for firms because it fails to take advantage of the variation among firms. Firms prefer to choose among diverse standards because this lowers their cost of compliance. The regulator, knowing that the firms will choose the standard that best fits them, optimally selects the number and type of standards to minimize the social cost of compliance. The regulator balances the social cost of compliance against the liquidity benefit of greater supply of capital under a single standard.

This paper makes two main contributions. The first contribution is to adopt a neoclassical approach to understand the economic consequences of a uniform accounting standard. Policy makers have often discussed the greater transparency and investor confidence as benefits of a single international accounting standard (e.g., Cox 2008; Schapiro 2009), and the empirical accounting literature, reviewed below, often tracks the effects of IFRS adoption on measures of market liquidity and the cost of capital.

However, there has been a vacuum of theory precisely explaining the economic consequences of uniform standards. In particular, I show that the dominant intuition on harmonizing international accounting standards is correct: uniform standards do lower the cost of capital. My model argues not based on information asymmetry between investors and firms, but rather shows that accounting standards shift the market supply curve of capital.

This neoclassical approach focusing on supply and demand does not deny the existence of information problems in financial reporting, but does deliver novel results in a simple and tractable framework. To arrive at implications for the cost of capital, I build on the literature that connects stock returns to firm production functions.[1] This "*Q*-theory" of investment, initiated by Cochrane (1991), establishes a conceptual link between the stock returns and the firm's production function. I use this literature to show what implications the equilibrium prices and quantities from a neoclassical production problem have for the firm's cost of capital. In particular, under decreasing returns to scale, the cost of capital rises with the firm's price of capital. Thus, when a uniform standard increases the supply of capital, this lowers the equilibrium price of capital and, hence, the cost of capital.

The second contribution is to use the model to develop a number of comparative statics that can guide policy or future empirical work. I ask under what conditions a uniform accounting standard generates higher social welfare than under diverse accounting standards. For tractability, I assume that firms are distributed uniformly over their type space. There are four implications. First, when variation between firms is large, diverse standards are better. When firms are dispersed, the cost of complying with a single standard is high, and society is better off with multiple standards that provide better coverage of all types of firms. Second, when variation between investors is large, uniform standards are better. Dispersion between investors means that fewer investors are willing to bear the cost of transitioning to a new standard, thereby shrinking the investor pool. The main benefit of the uniform standard is that it draws capital into the marketplace and, therefore, it has a larger benefit to society precisely when investors are reluctant to enter the global capital marketplace. Third, when firm productivity is large, uniform standards are better. A high marginal product of capital generates the most returns when the capital level is high, and this occurs under a uniform standard, which increases the supply of capital in the economy. Fourth, when the cost of investment is large, diverse standards are better. Because investment overall is more expensive, this erodes the benefit of the uniform standard, making diverse standards more beneficial to society.

While the primary impetus and application for this paper is the current policy debate on convergence of the two major accounting standards, IFRS and U.S. GAAP, the theory applies more broadly. This can also apply to variation in accounting standards within a country, as well as between countries. In addition, the theory gives guidance on whether a single accounting standard should have multiple dimensions within a single overarching standard, like the separate rules for financial and nonfinancial firms within U.S. GAAP. I now review the debate over international accounting standards, the primary application of the theory.

Policy and Academic Debate on International Accounting Standards

The various policy bodies involved in international accounting standards have slowly shifted toward a single standard over several years. The former chair of the U.S. SEC, Christopher Cox, spoke primarily of the comparability benefit of a single

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[1] This literature initially sought to explain the optimal investment path of firms and to establish a relationship between Tobin's *Q* and marginal *Q*, which falls out of the first-order conditions of the firm's investment problem. Jorgenson (1963) posed the problem, Hayashi (1982) showed that marginal and average *Q* are equivalent under constant returns to scale, and Abel and Eberly (1994) showed that they are proportional under decreasing returns to scale. Cochrane (1991) first establishes a link between stock returns and investment returns using arbitrage arguments, while Restoy and Rockinger (1994) and, more recently, Liu, Whited, and Zhang (2009) show that the equivalence of Tobin's *Q* and marginal *Q* under constant returns to scale is identical to the equivalence between stock returns and investment returns. I build on Abel and Eberly (2011), who dispose of the controversial adjustment costs function, and consider firms with decreasing returns to scale.

standard, which would ultimately improve transparency of financial reporting and investor confidence.[2] The more recent SEC Chair, Mary Schapiro, has broadly supported convergence, although is skeptical, claiming that IFRS standards lack the detail of U.S. standards, leave much to interpretation, impose high transition costs, and rob the SEC of its oversight of accounting standards.[3] On top of all this, while the IASB and FASB still agree that harmonization is an eventual target, the process of convergence remains slow. This speaks not only to the complexity of actually implementing a uniform standard, but also to latent concerns, if not skepticism, on whether a single international standard is even desirable.

The literature on international accounting standards is large and growing. These papers examine the effects of international accounting standards on a wide variety of market measures. The papers most relevant for my model are those that address investment liquidity or cost of capital. The literature on IFRS adoption is split between voluntary and involuntary adoption. The evidence on the capital market effects (market liquidity, cost of capital) is mixed, although somewhat less so for voluntary adoption. Some find that the capital market effects (liquidity or cost of capital) are positive (e.g., Leuz and Verrecchia 2000; Daske, Hail, Leuz, and Verdi 2013; Platikanova 2007; Barth, Landsman, and Lang 2008; Hail and Leuz 2006), some find that they are neutral (e.g., Cuijpers and Buijink 2005; Leuz 2003), and some find that they are negative (e.g., Daske 2006; Barth, Clinch, and Shibano 1999). Mixed capital market effects provide an opportunity for theoretical guidance because the evidence establishes variation that can be explained with theory.

Despite the mixed empirical verdict on the capital market effects of an international accounting standard, the broader evidence on lowering barriers to investment is more conclusive (e.g., Aggarwal, Klapper, and Wysocki 2005; Gordon, Loeb, and Zhu 2012). And improving the ability for foreign investment to a country improves liquidity, lowers the cost of capital, and increases the pool of investor capital (e.g., Stulz 1981; Cooper and Kaplanis 1986), predictions that are all consistent with my model. Bradshaw, Bushee, and Miller (2004), in fact, find direct evidence of the comparability benefits of a uniform standard, showing that investors in the U.S. prefer companies that use accounting standards similar to U.S. GAAP because they are better able to interpret and process data. This matches Christopher Cox's (2008) rhetoric on the value of comparable financial reports and fits the steering assumption of my model.

A competing hypothesis in the academic debate on international accounting is the importance of reporting incentives. This argument claims that accounting standards are less important than the incentives firms face to make high-quality financial reports, which are determined by a wide variety of institutional and legal factors (e.g., Ball 2009; Christensen, Lee, and Walker 2009; Ball, Kothari, and Robin 2000; Fan and Wong 2002; Leuz, Nanda, and Wysocki 2003; Bradshaw et al. 2004; Burgstahler, Hail, and Leuz 2006). These studies show that even when firms adhere to the same standards, there is significant variation in reporting practices across countries (e.g., Ball, Robin, and Wu 2003; Ball and Shivakumar 2005; Burgstahler et al. 2006; Lang, Raedy, and Wilson 2006). While my model is one of accounting standards and does not contain an explicit incentive problem for the firm, it does produce results that speak to this empirical literature. In particular, the cost of investment in my model references all of the institutional and legal constraints on investment, such as weak enforcement of financial reporting, poor protection of property and shareholder rights, and weak financial regulatory institutions—any feature of the environment that raises the cost of investment. My theory predicts that when this cost is small, a uniform standard is better than diverse standards. In this sense, a uniform standard and the institutional environment (captured by a low cost of investment) are complements and reinforce one another. This follows the theory and is consistent with the literature on reporting incentives in international accounting.

The existing theoretical literature on international accounting standards is thin and does not directly address whether a single standard is socially optimal. The closest is Barth et al. (1999), who examine the effects of harmonizing domestic with foreign accounting standards. Like my model, they assume that investors must bear a cost to learning a new (domestic) accounting standard, and they make predictions on trading volume and the cost of capital. Unlike my paper, they consider the precision of GAAP as a key component to determining when harmonization leads to lower cost of capital. Although their model differs in many of the details, they do arrive at a similar conclusion, that harmonization is not necessarily the best option.[4]

Other work examines the issue of uniformity versus flexibility within a single accounting standard (e.g., Friedman and Heinle 2016; Dye and Verrecchia 1995; Dye and Sridhar 2008). Some address the wide claim that IFRS allows more discretion and flexibility than U.S. GAAP. While this is an important issue, I focus on whether a uniform standard is socially optimal,

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[2] In his address to IOSCO, Schapiro (2009) remarks that "An international language of disclosure and transparency would significantly improve investor confidence in global capital markets. Investors could more easily compare issuers' disclosures, regardless of what country or jurisdiction they came from. They could more easily weigh investment opportunities in their own country against competing opportunities in other markets."

[3] Testimony before the Senate Committee on Banking, Housing, and Urban Affairs (January 15, 2009).

[4] There is an unambiguous benefit from a uniform standard, namely, that it lowers cost of capital and increases liquidity. The question remains on whether the costs of a uniform standard outweigh this unambiguous benefit. Barth et al. (1999) do not find that harmonization necessarily produces the benefit of lower cost of capital and higher liquidity. In that sense, their paper takes more of a skeptical view on uniform standards than this one does.

rather than the optimal structure of a single accounting standard. Finally, Lambert, Leuz, and Verrecchia (2007) model the effects of accounting information on the cost of capital, finding that an increase in the quality of a firm's disclosure about its own future cash flows has a direct effect on the assessed covariance with other firms' cash flows, thereby establishing that accounting disclosure can reduce the cost of capital. While their paper certainly differs from mine in both setup and focus, it shares the goal of mapping the relationship between the accounting system and the measure of cost of capital. They argue that accounting disclosure reduces information asymmetry between firms and investors, lowering the cost of capital. I take a neoclassical approach, arguing that accounting standards shift the market supply of capital, which lowers the cost of capital.

While the theoretical models on international accounting are scarce, there is a small collection of policy pieces written by leading academics on the question of regulatory competition in accounting standards. Dye and Sunder (2001) run through many of the arguments for and against regulatory competition, especially the concern for a "race to the bottom" that plagues the economics of consumer product liability. Sunder (2002) extends this discussion and argues that competition would improve the efficiency of accounting standards because regulators would be forced to cater their standards to both firms and investors. Kothari, Ramanna, and Skinner (2009) also defend competition among accounting regulators, using the arguments of better economic innovation and diversity in a world of regulatory competition. While monopolies may innovate less than competitive firms, my focus here is on optimal diversity rather than optimal level of innovation.

II. A NEOCLASSICAL MODEL

To model accounting standard setting, consider the real line as the space of all possible accounting standards. The government regulator picks each accounting standard $s \in \mathbb{R}$. This accounting standard need not have any ordinal or cardinal interpretation, but is simply a "location" in the universe of all possible accounting standards. In this sense, this is a model of horizontal, rather than vertical, product differentiation, a notion drawn from the economic literature on industrial organization.

Firms and investors vary with respect to the accounting standards. In particular, let x be the type of the firm distributed according to a symmetric probability density function g, with mean μ and variance σ^2 and with cumulative density function G. To comply with an accounting standard $s \in \mathbb{R}$, firm x bears a cost $(s - x)^2$. Therefore, firms vary in their cost of compliance with the accounting standard, and they bear a cost that rises in their "distance" from the standard. For example, s may refer to the level of fair value accounting, to which compliance is less costly for some firms (those with assets whose value is easily reflected in market prices) than for others (firms with thinly traded illiquid assets whose valuation is difficult to obtain). Since the distribution of firm types rests on the same space as the universe of accounting standards, the differentiation between firms is also horizontal, not vertical.[5]

Each firm has a production function f that transforms capital k into output $f(k)$. The production function is non-negative, strictly increasing, and strictly concave. Each firm selects a capital level $k > 0$, which the firm obtains in a competitive market for capital at price r. Investors sell capital to the firm in the capital market, and firms buy capital from investors at price r. Examples of capital include both real (like plants and property) and financial (like debt and equity investments) assets. The price of capital is a market price, not a price specific to the individual firm. Thus, the continuum of firms and investors implies that all parties take prices as given, and no firm or investor can move price on its own. Given an accounting standard s and price of capital r, a firm of type x solves the following to generate firm value:

$$V = \max_{k} f(k) - rk - (s - x)^2. \tag{1}$$

Solving this with respect to k gives the first-order condition $f'(k) = r$. The firm selects capital level such that the marginal product of capital equals its marginal cost, namely, the price r at which the firm buys capital. Because the firm's concave production function yields a diminishing marginal return to capital, lowering the price of capital r leads the firm to buy more capital k in the marketplace. Thus, f' traces out the demand for capital, taking the market price r as given. To be precise, f' is exactly the firm's inverse demand curve for capital because it maps quantities into prices. The inverse of f' produces the firm's demand for capital, mapping prices into quantities.

True firm value is known to the firm itself, but not to outside investors. Rather, investors observe the random variable $\tilde{V}$, which is based on true fundamentals, but where $\tilde{V}$ follows some distribution. Absent any financial reporting, investors cannot know the true fundamentals of the firm precisely and, therefore, may not be willing to supply capital. Accounting provides a mechanism for investors to learn the true firm value V, but will require investors to learn the relevant accounting standards in order to ascertain this knowledge. I abstract away from measurement issues to focus exclusively on whether investors learn new standards to supply capital to firms. Investors supply this capital to firms at price r and bear a cost of funds $C(k)$. This cost is

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[5] Namely, the distribution of firms with respect to their cost of compliance establishes that there is variation between firms. This does not imply that any firm is any better or worse than another. It only tracks their cost of compliance to the standard.

FIGURE 1
Individual Demand and Supply
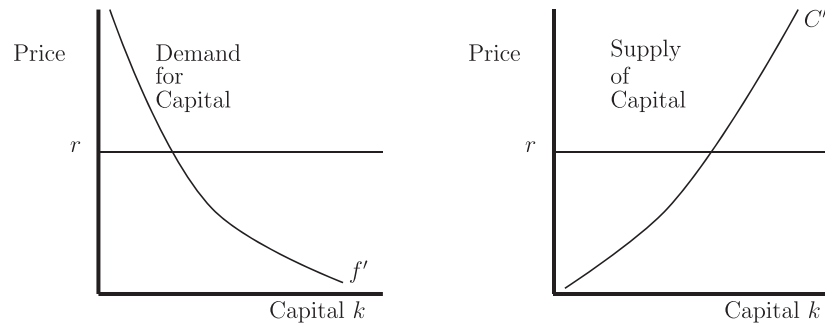
non-negative, strictly increasing, and strictly convex, reflecting the investor's own costs (which include the moral hazard cost of lending) that rise at an increasing rate with the amount of capital k. I limit attention to investors who explicitly use accounting statements to evaluate firms to assist in their capital allocation decisions.[6] Thus, the investor in this model is a sophisticated investor who reads accounting statements and then decides where to allocate capital in the economy.

Diverse accounting standards are costly because the investor must expend resources to translate the two different accounting reports into a common language to value different firms. For example, suppose an investor builds a valuation model to transform inputs from the financial reports into an output of firm value, which the investor then uses to decide whether to lend money. Firms under different accounting regimes report different information to the capital market, which takes the form of different inputs into the investor's valuation model. Therefore, if accounting standards are widely different, then firms reporting under these standards are not easily comparable. More specifically, they are comparable, but at a cost, which the investor bears.

To model this cost, suppose each investor knows one accounting standard, but must bear a cost t to translate and interpret each additional accounting standard. Thus, t is the incremental cost of learning each additional standard. Investors vary in this transition cost t, so t follows a distribution h, which is symmetric and has mean μ_h and variance σ_h^2, and cumulative density H. Let $n = 1, 2$ be the number of accounting standards the regulator sets, so the investor bears a cost t for each additional $(n - 1)$ accounting standard.[7] Given a market price r, an investor of type t earns revenue rk and bears a cost of capital $C(k)$ and the transition cost $t(n - 1)$. So an investor of type t solves:

$$\max_k rk - C(k) - t(n - 1). \tag{2}$$

This leads to the first-order condition $C'(k) = r$. The investor supplies capital k, such that the marginal cost of investor capital equals the marginal benefit r, the price the investor earns from supplying capital to the market. Because of the convexity of the investor's cost of capital, the marginal cost of capital increases in k. As the price r rises, investors supply more capital to the firm. Thus, C' traces out the supply of capital that the investor provides to the firm. In particular, C' is the investor's inverse supply curve. Figure 1 plots the inverse demand and supply curves, given by the firm's marginal production function and the investor's marginal cost of capital.

Firms select the quantity of capital to buy from investors, taking the price r as given, and investors select the quantity of capital to supply, also taking the price r as given. To determine the equilibrium price and quantity simply requires building the market supply and demand curves from the individual supply and demand curves. The necessary equilibrium condition is that market demand equals market supply. This will deliver equilibrium quantity k^* and equilibrium price r^* in the marketplace. Because there is a continuum of firms and investors, an investor can supply capital to any number of firms at price r. Thus, r is a price that equilibrates the supply and demand for capital. Firms take prices as given and select capital to purchase from the

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[6] In practice, these investors are financial intermediaries, like hedge funds and mutual funds, who acquire capital from a larger pool of outside investors (such as individuals, institutions, and so on). Implicit is the assumption of some underlying cost of investing that causes the development of a market for financial intermediation. Modeling the development of the financial intermediation market is outside of the scope of the paper. Instead, I fuse together the sources of funds with the management of funds.

[7] I assume that the regulator must impose at least one accounting standard in order for investors to deploy capital to the firm. Otherwise, investors would never have learned true firm value V. Ultimately, this assumes that investors are so risk-averse that they are unwilling to provide capital to firms based on $\bar{V}$, but would if they knew V.

FIGURE 2
Timeline of Game

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5

Regulator picks number of accounting standards n | Regulator sets standard $s_i, i = 1...n$ | Firm x chooses standard s_i | Capital market clears | Firms and investors collect payoffs

market, investors take price as given and select capital to supply to the market, and supply and demand equilibrate, yielding an equilibrium price r^* and quantity k^*.

Because the primary concern of this paper is to understand international accounting standards, the capital market in the model is the global capital market. There are two reasons for this. First, the majority of the rhetoric behind the push for international accounting standards addresses almost exclusively the global capital market and the impact for better global capital allocation. Second, a richer model that includes the domestic capital market does not qualitatively change the main results of the paper, but does add additional complexity. Specifically, if two separate capital markets exist, then investors can supply and firms can demand both domestic and foreign capital. A uniform accounting standard in this model will draw investors out of the domestic market and into the foreign market, thereby lowering the cost of capital and increasing the total (domestic and foreign) supply of capital, the same effect as in the simpler model. While this additional result is novel, it is impossible to solve for the equilibrium quantity and price of capital in closed form, thereby eliminating the comparative statics and welfare analysis in Section V. As such, I focus the model in this paper on the global capital market only, which eases analysis and provides more results.[8]

The price of capital r is distinct from, but related to, the firm's cost of capital. Following the logic of the capital asset pricing model (CAPM), a firm's cost of capital is its expected stock return, which itself captures the present and all future cash flows from the firm. To represent these future cash flows requires an infinite horizon model. I provide such a model in Appendix A in the proof of Proposition 2, which defines the expected stock return of the firm and shows that it increases in the price of capital. Thus, the cost of capital and the price of capital r move together, and so equilibrium changes in the price of capital also shift the cost of capital in the same direction. This proves relevant as the existing empirical accounting literature measures the cost of capital. Finally, it is important not to confuse the firm's cost of capital with the investor's cost of funds, $C(k)$. Investors themselves obtain funds from other sources. These costs are exogenous, whereas the cost of capital r is endogenous.

The timeline of the game runs as illustrated in Figure 2. First, the regulator selects n, the number of accounting standards. Second, the regulator selects the level of each accounting standard, $s_i \in \mathbb{R}$. Third, each firm decides which accounting standard to adopt if there are diverse standards available. Fourth, firms and investors simultaneously select their capital levels k, and the market for capital clears. Fifth, firms and investors both earn their payoffs based on this equilibrium price and quantity of capital.

To ease analysis, I will first present the solution under a uniform standard and then the solution under diverse standards. I will compute social welfare under both scenarios and then compare the two regimes to give conditions under which the regulator prefers uniform over diverse standards.

III. A UNIFORM STANDARD

Suppose the regulator selects a uniform accounting standard, so $n = 1$. To solve the model, I will calculate social welfare under this regime. To do so, work backward.

Begin with Stage 4, the penultimate market clearing stage. Firms and investors both take prices as given and select equilibrium quantities of capital, which gives rise to an equilibrium price of capital. Given an accounting standard s and a price of capital r, a firm of type x solves the firm's problem (1), yielding first-order condition $f'(k) = r$. This delivers the firm's inverse demand for capital. Let $d(r)$ be the firm's demand for capital, so:

$$d(r) = f'^{-1}(r).$$

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[8] Details on the richer model, with the dual domestic and foreign capital markets, are in Appendix B.

Market demand is the sum of the individual demand curves of each firm over the distribution of firms. So the market demand is:

$$D_1(r) \equiv \int_{-\infty}^{\infty} d(r)g(x)dx = d(r),$$

where the subscript refers to $n = 1$. The term $d(r)$ pulls out of the integral because individual demand does not vary with x in this neoclassical model. Because the density of firm types integrates to one, market demand and individual demand are the same. In this sense, this is a "representative firm" model similar in spirit to the "representative agent" model of macroeconomics. Because the firms vary in their compliance cost to the accounting standard and not in their capital choice, the demand of the representative firm is exactly market demand. Moreover, inverse market demand is simply the inverse of individual demand $d(r)$, which is f'. Hence, the marginal production function f' is the inverse market demand.

Now, consider the investor's problem. Since there is a single accounting standard, the investor does not bear an additional transition cost of translating one standard into another. Therefore, given a price r, an investor of type t selects k to maximize $rk - C(k)$. The investor will choose capital such that $C'(k) = r$, yielding an investor's individual supply of capital, $s(r) = C'^{-1}(r)$. Market supply under a uniform standard ($n = 1$) aggregates these individual supply curves over all investors, and so is:

$$S_1(r) \equiv \int_{-\infty}^{\infty} s(r)h(t)dt = s(r).$$

Thus, the inverse market demand and supply curves are given by f' and C', respectively. Equilibrium is obtained when market supply equals market demand. Because there is only one standard in Stage 3, every firm picks the single standard s. In Stage 2, the regulator picks s to maximize social welfare, which is total surplus, the sum of the payoffs to all firms and investors.

The equilibrium of this game obtains when firms select how much capital to buy in the market, taking prices as given; investors select how much capital to supply to the market, taking prices as given; market supply equals market demand; and the regulator maximizes social welfare. Therefore, we have the following definition of our equilibrium:

Definition 1: A competitive equilibrium under a uniform standard is a triple (r^*, k^*, s^*) such that:

1. For each r, firms solve $max_k \, f(k) - rk - (s - x)^2$, yielding market demand $D_1(r)$.
2. For each r, investors solve $max_k \, rk - C(k)$, yielding market supply $S_1(r)$.
3. Markets clear: $k^* \equiv S_1(r^*) = D_1(r^*)$.
4. The regulator chooses s^* to maximize social welfare.

Under a uniform standard, recall that the market supply and demand curves are equivalent to their individual supply and demand curves because the density g of firms and h of investors both integrate to one. This holds when inverse supply equals inverse demand. Thus, the equilibrium price r^* and quantity of capital k^* will satisfy:

$$r^* = f'(k^*) = C'(k^*).$$

Equilibrium quantity k^* equilibrates inverse supply and inverse demand and, therefore, market supply and market demand. The market clearing price is exactly r^*. At the equilibrium price r^* and equilibrium quantity of capital k^*, social welfare under a uniform standard ($n = 1$) is the payoff of all firms and all investors, which is:

$$SW_1(s) = \int_{-\infty}^{\infty} \left(f(k^*) - r^*k^* - (s - x)^2 \right) g(x)dx + \int_{-\infty}^{\infty} \left(r^*k^* - C(k^*) \right) h(t)dt.$$

The regulator will select an accounting standard s to maximize social welfare.[9] But because the equilibrium price and quantity do not vary with the choice of standard s, maximizing the social welfare is equivalent to minimizing the social cost of compliance. This is the deadweight loss of complying with the accounting standard, namely, the cost for every firm to conform to the standard, integrated over all firms. This cost is:

$$SC(s) = \int_{-\infty}^{\infty} (s - x)^2 g(x)dx = s^2 - 2s\mu + \mu^2 + \sigma^2$$

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[9] The social welfare function implicitly assumes equal Pareto weights between the investors and firms. It is possible to allow more general Pareto weights between the two populations, but this does not qualitatively change the results of the paper, although it does make the social welfare expressions more complex. See Appendix C for details.

since $Ex^2 = \mu^2 + \sigma^2$. Minimizing this social cost with respect to s shows that the regulator will optimally select $s^* = \mu$. Intuitively, the regulator seeks to minimize the social cost of compliance. This involves selecting a standard that achieves the lowest average social cost, so the regulator will choose a standard that is optimal for the average firm. Collecting these results gives:

Proposition 1: The competitive equilibrium under a uniform standard is a triple (r^*, k^*, s^*), such that $r^* = f'(k^*) = C'(k^*)$ and $s^* = \mu$.

At this optimal standard $s^* = \mu$, the social cost of compliance becomes:

$$SC(s^*) = \mu^2 - 2\mu^2 + \mu^2 + \sigma^2 = \sigma^2.$$

This confirms intuition that the social cost of compliance is identically equal to the variance in the distribution of firm types. As the variance of the distribution increases, firms are dispersed more widely in the economy, causing these firms to bear large losses to comply with a single standard. Evaluating the social welfare at the optimal values, r^*, k^*, and s^*, gives an expression for social welfare:

$$SW_1(s^*) = f(k^*) - C(k^*) - \sigma^2.$$

The social welfare function SW_1 separates the real and financial components of capital allocation. The first term $f(k^*) - C(k^*)$ is the real productivity of capital, namely, the value of output minus the cost of capital. This is the surplus from capital allocation and net of transfer payments between the supply and demand sides of the market.[10] The second term σ^2 represents the social cost from complying with accounting standards. Observe, for example, that as the variance on firm distribution rises, this reduces social welfare, possibly to the point where the losses from σ^2 exceed the social benefits of capital allocation $f(k^*) - C(k^*)$.

IV. DIVERSE ACCOUNTING STANDARDS

Now, suppose that the regulator selects diverse accounting standards. To ease computations, we limit the number of standards to $n = 2$. This not only reflects the current state of affairs, with two dominant global accounting standards (IFRS and U.S. GAAP), but is also without loss of generality, as standards with $n > 2$ do not qualitatively change the results.

As before, work backward. Diverse standards affect whether the firm will choose to adhere to standard s_1 or s_2, but do not change the firm's choice of capital. Therefore, in the penultimate Stage 4, given a price r and a standard s_i, a firm of type x will select capital such that $f'(k) = r$. The inverse of this function delivers the individual demand for capital, and averaging over all firms gives the market demand for capital. This analysis is unchanged from the prior section and, therefore, the inverse market demand for capital is given by f'.

The investor's problem is more complex. Facing two accounting standards, the investor now bears a transition cost $t > 0$ of learning a new standard. Given price r, an investor of type t solves:

$$\max_k rk - C(k) - t,$$

yielding the standard first-order condition $C'(k) = r$. As before, the investor's marginal cost of funds determines how much capital the investor will supply to the market at different prices. Therefore, $s(r) = C'^{-1}(r)$ is the investor's individual supply of capital. The presence of diverse standards does not change $s(r)$ because the transition cost is effectively a fixed cost with respect to capital choice. Once the investor bears this fixed cost, there is no incremental cost from supplying more capital to the market.

However, the presence of diverse standards will affect market supply. Under a uniform standard, every investor in the market was willing to supply capital to every firm in the market because there was no incremental cost of learning a new standard. Now, when such a cost exists, only some investors will supply capital to the entire market. In particular, investors with low transition costs are able to finance the entire market, whereas investors with high transition costs are not.

To be concrete, in a world where U.S. GAAP and IFRS are different, investors with high transition costs specialize in investing either in American or European firms, whereas investors with low transition costs are able to finance firms globally. My concern here is the global supply of capital, and imposing diverse accounting standards reduces this supply because it becomes excessively costly for some investors to learn the new standard and apply capital to firms under the new standard. Thus, the market supply of capital falls because not all investors will supply capital in the global market. In particular, investors will supply capital as long as the transition cost is sufficiently small that the firm's profit $rk - C(k) - t$ is non-negative. Equivalently, if the investor does not choose to enter the global capital market, then he can collect an outside option,

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[10] Note that the transfer payments r^*k^* fall out of the total surplus calculation.

FIGURE 3
Investors Willing to Supply Capital to All Firms
Investor Distribution *h*

$t^*(r)=rs(r)-C(s(r))$
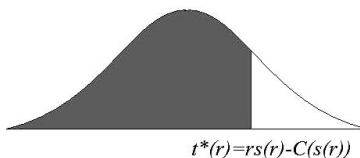
normalized to zero. This outside option is a fixed quantity that can represent the investor's alternative payoff, either from exiting the market or from the average payoff from investing in the (unmodeled) domestic capital market.[11] The investor enters the global market if:

$$t \le t^*(r) = rs(r) - C\Big(s(r)\Big),$$

because the investor supplies capital $s(r)$ to the market.

Figure 3 shows that the transition cost bounds the number of investors that will enter the global market to supply capital to *all* firms. Under a single standard, every investor was willing to finance every firm. But now, only investors with sufficiently low transition costs are willing to supply capital to all firms. Investors with low transition costs ($t \le t^*(r)$) will enter the global capital market, but investors with high transition costs ($t > t^*(r)$) will not. These investors will, for example, finance firms that use the accounting standards that the investors are more familiar with.[12]

The individual investor's inverse supply curve is given by C', so an investor's individual supply curve is the inverse of this, given by:

$$s(r) = C'^{-1}(r).$$

To construct the market supply, it is necessary to aggregate over all investors that enter the market. In this case, that is all investors with $t \le t^*(r)$ for each price r. The market supply under two standards is:

$$S_2(r) \equiv \int_{-\infty}^{t^*(r)} s(r)h(t)dt = s(r)H\Big(t^*(r)\Big).$$

So $H(t^*(r))$ is the relative share of capital available in the market. Since only some investors enter into the market, rather than all investors, this market supply under diverse standards is less than the market supply under a uniform standard for every price r. Thus:

$$S_2(r) = s(r)H\Big(t^*(r)\Big) < s(r) = S_1(r). \tag{3}$$

The transition cost of learning different accounting standards affects the extensive, but not the intensive, supply of capital. Namely, it affects how many investors enter the market, rather than the amount of capital that any individual investor supplies. This occurs because learning a new accounting standard is a fixed cost, but does not vary with the amount of capital invested. As before, a competitive equilibrium will involve firms buying an optimal amount of capital, taking prices as given; investors supplying an optimal amount of capital, taking prices as given; markets clearing; and the regulator maximizing social welfare. Therefore:

Definition 2: A competitive equilibrium under diverse accounting standards is a triple $(\hat{r}, \hat{k}, s_i^*)$ such that:

1. For each r, firms solve $max_k f(k) - rk - (s_i - x)^2$, yielding market demand $D_2(r)$.
2. For each r, investors solve $max_k rk - C(k) - t$, yielding market supply $S_2(r)$.

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[11] As mentioned earlier, a domestic capital market is possible to model with separate capital levels k_f for foreign capital and k_d for domestic capital. However, this richer model does not alter the main results of the simpler model. See Appendix B.

[12] The model does not specify whether these high (transition) cost investors will finance firms on standard 1 or 2. Rather, the model states only that these investors will not finance all firms in the economy. Investors in the model are not differentiated by a more primitive preference for a particular standard. Rather, they simply vary in their costs of learning a new standard. Examining which firms match with which investors is an interesting exercise, but not essential for determining the market supply of capital and the equity cost of capital, which is the objective here.

American Accounting Association

FIGURE 4
Market Demand and Supply
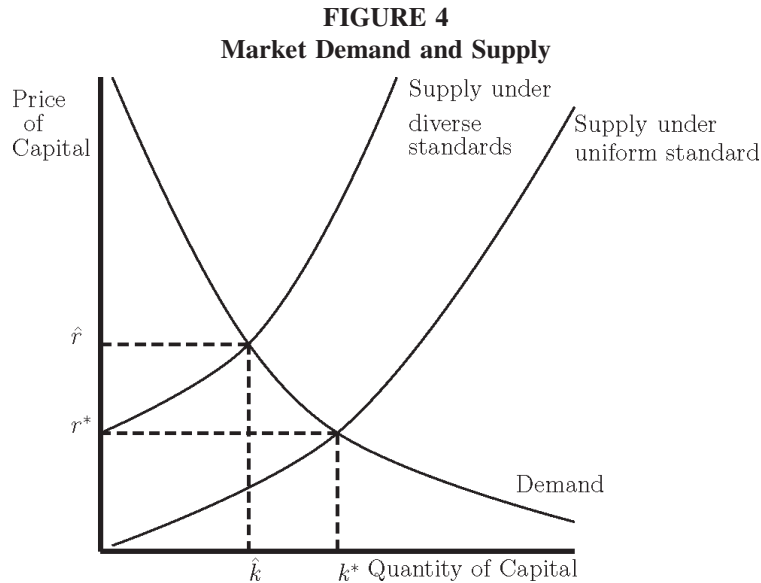
3. Markets clear: $\hat{k} \equiv D_2(\hat{r}) = S_2(\hat{r})$.
4. Regulator selects s_i^* to maximize social welfare.

In a world with multiple standards, each firm selects, at most, one standard. The regulator then chooses the standard s_i^* optimally to maximize social welfare, which I write out explicitly in the next subsection. Observe that under two accounting standards, the demand curve is unchanged, but the supply curve shifts leftward (supply falls). This is clear from (3), where the supply under diverse standards $S_2(r)$ is strictly less than the supply under a uniform standard $S_1(r)$. Because the pool of available investors shrinks, so does the supply of capital. Thus, under diverse accounting standards, the capital market clears at a higher price and lower quantity than under uniform accounting standards. The next proposition, proved in Appendix A, links these changes in the price of capital to the firm's cost of capital.[13]

> **Proposition 2:** Suppose production is Cobb-Douglas. Relative to diverse accounting standards, uniform standards lower the cost of capital and raise the quantity of capital in the economy.

The logic behind Proposition 2 is simple. With diverse accounting standards, investors bear a cost for translating the standards into a single language. Thus, there is a marginal investor $t^*(r)$, who is indifferent between entering and exiting the capital market. Investors with higher transition costs will exit, whereas investors with lower transition costs will enter. The net result is to decrease the supply of capital available in the economy. As such, when the supply curve shifts leftward, the market clears at a higher price in quantity. If r^* and k^* are the equilibrium price and quantity levels under a uniform accounting regime, and $\hat{r}$ and $\hat{k}$ are the price and quantity levels under diverse accounting regimes, then Proposition 2 states that $\hat{r} > r^*$ and $\hat{k} < k^*$. Uniform accounting standards have the benefit of increasing the supply of capital in the marketplace, thereby lowering the price of capital. Since the price of capital is equivalent to the cost of capital (details are in the proof), uniform accounting standards also have the benefit of lowering the cost of capital (see Figure 4).

Choice of Accounting Standards

Now, consider the game in Stage 3. Recall that a firm of type x bears a cost of compliance $(s_i - x)^2$ if it adheres to standard s_i. Because this loss function is quadratic, every firm of type x will choose the "nearest" accounting standard, namely, the standard that minimizes its compliance cost.

Observe that there will be, at most, one marginal firm x^* that is indifferent between s_1 and s_2. This marginal firm faces the same loss from both accounting standards. Therefore, x^* satisfies:

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[13] This proposition shows the equivalence between price of capital and cost of capital in an infinite horizon discrete time framework. The result is more general to a continuous time, although more complex. Details are available from the author on request.

$(s_1 - x^*)^2 = (s_2 - x^*)^2.$

Solving this yields $x^* = \frac{(s_1 + s_2)}{2}$, so the marginal firm is simply the midpoint between the two standards. It is easy to see that all firms $x < x^*$ will choose s_1, and all firms $x > x^*$ will choose s_2. Each firm selects the standard that minimizes its compliance cost. Thus, the universe of firms partitions into two pieces, with the marginal firm x^* denoting the indifference point. The social cost of adhering to the standard is the sum of the social cost for firms picking standard 1 and firms picking standard 2. All firms with $x < x^*$ bear cost $s_1 - x$, while all firms with $x > x^*$ bear cost $s_2 - x$. Therefore, the social cost under two standards is:

$$SC_2(s_1, s_2) = \int_{-\infty}^{x^*} (s_1 - x)^2 g(x) dx + \int_{x^*}^{\infty} (s_2 - x)^2 g(x) dx.$$

The first integral is the compliance cost for all firms adhering to s_1, while the second integral is the compliance cost of all firms adhering to s_2. Furthermore, note that the marginal firm x^* is a function of s_1 and s_2. If the regulator increases s_1, then this is good for firms $x > s_1$ because it brings the standard closer to those firms, but bad for firms $x < s_1$ because it moves the standard farther away from those firms.

In Stage 2, the regulator chooses standards to maximize social welfare. As before, social welfare is the profits of each firm aggregated over all firms in the market plus the profit of each investor aggregated over all investors that enter the market evaluated at equilibrium price $\hat{r}$ and quantity $\hat{k}$:

$$SW_2(s_1, s_2) = \int_{-\infty}^{x^*} \left(f(\hat{k}) - \hat{r}\hat{k} - (s_1 - x)^2 \right) g(x) dx + \int_{x^*}^{\infty} \left(f(\hat{k}) - \hat{r}\hat{k} - (s_2 - x)^2 \right) g(x) dx + \int_{-\infty}^{t^*(\hat{r})} \left(\hat{r}\hat{k} - C(\hat{k}) - t \right) h(t) dt.$$

Collecting terms, this simplifies to:

$$SW_2(s_1, s_2) = f(\hat{k}) - \hat{r}\hat{k} + \left(\hat{r}\hat{k} - C(\hat{k}) \right) H\left(t^*(\hat{r}) \right) - \int_{-\infty}^{t^*(\hat{r})} th(t) dt - SC(s_1, s_2).$$

Observe that the choice of standards does not affect the amount of capital that firms buy in the market, but only determines which standard the firm adheres to. Therefore, it is clear from the expression for social welfare above that standards only affect the social cost of compliance. Thus, to maximize social welfare, the planner will minimize the social cost of compliance.

The optimal choice of s_1 will balance these two competing costs and benefits, taking into account the distribution of firms. Therefore, a similar logic applies to its choice of s_2. In Stage 2, the regulator selects the standards to maximize coverage, namely, to choose standards that minimize the average social cost of compliance.

Consider the following quantities:

$$\mu_1 = \int_{-\infty}^{\mu} xg(x) dx \text{ and } \mu_2 = \int_{\mu}^{\infty} xg(x) dx.$$

These terms are the left and right averages of the distribution. Observe that $\mu_1 + \mu_2 = \mu$. Furthermore, let $\delta = \mu_2 - \mu_1 > 0$. This term δ is the difference between the right average and the left average. This measures the variation in the firm distribution, as the next proposition establishes, and determines the optimal choice of standards.

Proposition 3: The regulator selects optimal standards $s_1^* = 2\mu_1$ and $s_2^* = 2\mu_2$.

Observe that the average standard is simply $(s_1 + s_2)/2 = \mu_1 + \mu_2 = \mu$. Therefore, the regulator selects standards that, on average, are set equal to the average firm. Indeed, the proof of Proposition 3, in Appendix A, shows that the symmetry of the density g makes the choice of standards symmetric around μ. Therefore, the regulator simply chooses how far away the standard should be from the mean, taking into account that narrow standards are good for firms close to the mean, but bad for outlier firms, and wide standards have the reverse quality. Figure 5 shows the location of the standards on a plot of the distribution of firm types. Observe that the standards are located equidistant from the mean and that they are a function of the left and right averages of the distribution. There is self-sorting in the marketplace: firms with quality $x < \mu$ choose standard $s_1^* = 2\mu_1$, while firms with quality $x > \mu$ choose standard $s_2^* = 2\mu_2$.

With these optimal standards s_1^* and s_2^*, the proof of Proposition 3 shows that the social cost evaluated at these optimal points is:

$$SC_2(s_1^*, s_2^*) = \sigma^2 - (\mu_2 - \mu_1)^2.$$

Therefore, social welfare is now:

FIGURE 5
Optimal Standards

$$s_1^* = 2\mu_1 \qquad \mu \qquad s_2^* = 2\mu_2$$
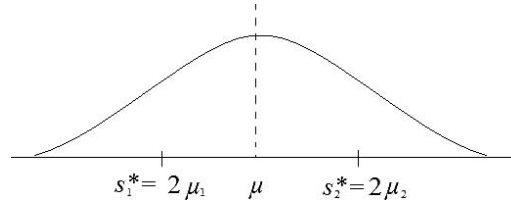
$$SW_2 = f(\hat{k}) - C(\hat{k})H\left(t^*(\hat{r})\right) - \underbrace{\left(1 - H\left(t^*(\hat{r})\right)\right)\hat{r}\hat{k}}_{\text{Investor Fees}} - \underbrace{\int_{-\infty}^{t^*(\hat{r})} th(t)dt}_{\text{Transition Costs}} + \underbrace{\delta^2}_{\text{Compliance Costs}} - \sigma^2. \qquad (4)$$

This expression for social welfare separates the real and financial consequences of accounting rules. The first term is the surplus from capital allocation, and the second is the pool of investor fees lost when investors $t > t^*(\hat{r})$ stay out of the capital market. With diverse accounting standards, the smaller pool of available capital is reflected in $H\left(t^*(\hat{r})\right) < 1$. The integral in the expression above is the total social transition cost of using diverse standards. Finally, diverse standards have an additional benefit of reducing the cost of compliance; therefore, $\delta = \mu_2 - \mu_1$ measures this benefit of diverse accounting standards.

Comparing Accounting Regimes

Finally, consider Stage 1, where the regulator selects either a uniform or diverse accounting standard. From prior computations, we know that the social welfare under one uniform standard is:

$$SW_1 = f(k^*) - C(k^*) - \sigma^2. \qquad (5)$$

The regulator prefers one standard over two if $SW_1 > SW_2$. This occurs if:

(Change in Surplus) + (Investor Fees) > (Transition Costs) + (Compliance Costs).

There are two costs of imposing a uniform standard, displayed on the right-hand side. The first is simply the transition cost of forcing all investors to learn the same language. This is the incremental transition cost t integrated over all investors that enter the marketplace, namely, all investors $t < t^*(\hat{r})$. The second cost is the compliance cost, the cost of forcing all firms onto a single standard. Recall that doing so is costly for firms at the tails of the distribution because there is "greater distance" in the type space of firms.

There are two benefits of imposing a uniform standard, displayed on the left-hand side of the inequality. The Change in Surplus, $\left(f(k^*) - C(k^*)\right) - \left(f(\hat{k}) - C(\hat{k})H\left(t^*(\hat{r})\right)\right)$, is the difference between surplus under a uniform standard and surplus under diverse standards and, thus, measures the real economic effect of a single standard. The investor fees $1 - H\left(t^*(\hat{r})\right)\hat{r}\hat{k}$ are the fees to those additional investors who enter the market under a uniform standard, namely, a payment of $\hat{r}\hat{k}$ for each $t > t^*(\hat{r})$. Call the sum of the investor fees and the change in surplus the "liquidity effect" of a uniform standard. While the change in surplus may rise or fall when switching to a uniform standard, when combined with investor fees, the effect is positive.

Proposition 4: The liquidity effect of uniform accounting standards is always positive.

Uniform standards, thus, surely have the benefit of raising liquidity, but they may or may not outweigh their costs.

V. COMPARATIVE STATICS AND WELFARE IMPLICATIONS

To deliver a richer set of implications, it will be useful to parameterize the model. Suppose that the distribution of firms g is uniform over $(0, b)$ for some $b > 0$. Observe that b measures the support of the distribution and also tracks the mean and variance of the distribution because $\mu = \frac{b}{2}$ and $\sigma^2 = \frac{b^2}{12}$. Similarly, let the distribution of investors h be uniform over $(0, a)$ for some $a > 0$, where $\mu_h = \frac{a}{2}$ and $\sigma_h^2 = \frac{a^2}{12}$. It is easy to calculate that $\mu_1 = \int_0^\mu xg(x)dx = \frac{b}{8}$ and $\mu_2 = \int_\mu^b xg(x)dx = \frac{3b}{8}$. And, therefore, $\delta = \mu_2 - \mu_1 = \frac{b}{4}$. Also note that $\delta = \frac{\mu}{2} = \frac{\sqrt{3}}{2}\sigma$. Therefore, δ rises both in the mean and in the standard deviation of the firm's distribution.

To ease analysis, consider a one-factor Cobb-Douglas production function $f(k) = 2A\sqrt{k}$. The productivity factor A measures the marginal product of capital; firms with higher levels of A are more productive, making each dollar of capital more valuable. The first-order conditions for the firm's problem give $f'(k) = \frac{A}{\sqrt{k}} = r$. This is the individual firm's inverse demand. Under a single accounting standard, market and individual demand are the same, given by f'^{-1}:

$$D(r) = d(r) = \frac{A^2}{r^2}.$$

This shows that demand slopes down because higher prices induce the firm to buy less capital in the marketplace. It also shows that demand increases in the firm's productivity because more productive firms earn a higher return for every dollar of capital and, therefore, purchase more capital in the marketplace.

Suppose the investor's cost of capital is $C(k) = \frac{c}{2}k^2$. The first-order conditions from the investor's problem give $C'(k) = ck = r$. Inverting this gives the firm's supply curve $S(r) = \frac{r}{c}$. Recall that under a single accounting standard, there are no transition costs of interpreting diverse standards and, therefore, all investors enter the marketplace. Market supply under a single accounting standard is:

$$S_1(r) = s(r) = \frac{r}{c}.$$

As expected, market supply is upward-sloping as it increases in price r. But market supply decreases in the investor's cost of capital. As the cost of raising each additional dollar of capital for the investor rises, this causes the supply of capital to decrease. The competitive equilibrium equates supply and demand and, therefore, requires $D(r) = S_1(r)$, yielding equilibrium prices and quantities under a single accounting standard:

$$r^* = \sqrt[3]{cA^2} \text{ and } k^* = (A/c)^{\frac{2}{3}}.$$

These quantities directly express the impact of the investor's cost of capital and the firm's marginal productivity on equilibrium prices and quantities. In particular, increases in firm productivity shift out demand, causing the market to clear at a higher price and quantity. Similarly, increases in the investor's cost of capital decrease market supply for capital, causing the market to clear at a lower price, but higher quantity. Thus, increases in either firm productivity or investor's cost of capital induce in the marketplace a larger equilibrium quantity of capital, but the effect on price depends on whether the demand or supply curve shifts.

Under two accounting standards, the demand side of the economy is unchanged because the transition cost of interpreting diverse accounting standards, t, falls on the investor, not on the firm. Therefore, the individual and firm demand curves are still given by $D(r) = d(r) = \frac{A^2}{r^2}$. Furthermore, observe that in the investor payoff function $rk - C(k) - t$, the transition cost does not affect the firm's marginal decision to supply capital. Therefore, the individual supply curve is still $s(r) = \frac{r}{c}$. However, the market supply will differ now that some investors choose not to enter the marketplace.

Who are these investors? For a given price r, $s(r)$ is the quantity of capital each firm supplies to the marketplace, and so the marginal investor is indifferent between entering and exiting this market. This marginal investor is defined by marginal investor:

$$t^*(r) = rs(r) - C\Big(s(r)\Big) = \frac{r^2}{2c}.$$

Size of the Investor Pool $H\Big(t^*(r)\Big) = \frac{r^2}{2ca}.$

As price r rises, investors earn more profit for every dollar of capital supplied to the firms, causing the marginal investor to increase, thereby expanding the pool of investors that enter the marketplace. Similarly, as investors' cost of capital rises, this decreases the return to every dollar of capital supplied to the market, eroding the investors' return and decreasing the pool of investors who enter the capital market. And finally, as the group of investors becomes more diverse (a rises), fewer investors are willing to enter the marketplace, causing the investor pool to shrink.

Market supply is individual firm supply adjusted by the size of the investor pool. Therefore, under two accounting standards, market supply for capital is:

$$S_2(r) = s(r)H\Big(t^*(r)\Big) = \frac{r^3}{2c^2a}.$$

This market supply, like $S_1(r)$, rises in price and falls in investors' cost of capital c. In addition, as a rises, the investor pool becomes more disperse, and few investors are willing to enter the marketplace, thus reducing the market supply of capital.

FIGURE 6
Market Clearing Under Uniform Distributions
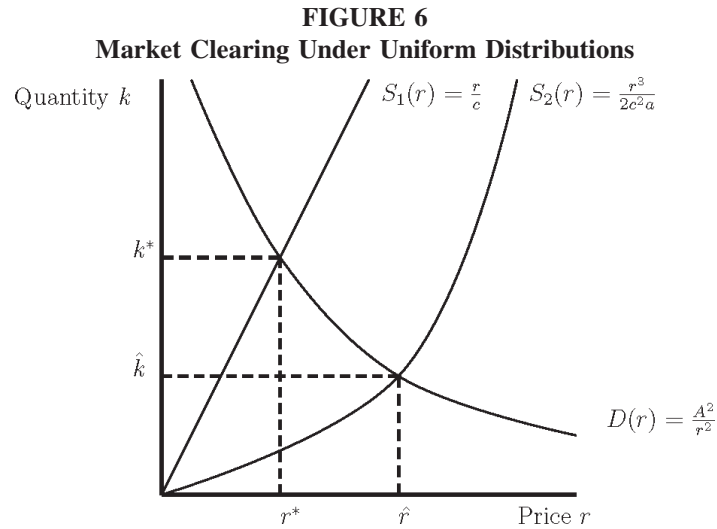
Since the demand for capital is the same under either regime, the equilibrium conditions require that $D(r) = S_2(r)$ in the equilibrium under diverse standards. Solving this yields the optimal price and quantity under diverse accounting standards:

$$\hat{r} = (2c^2 Aa)\frac{1}{5} \quad \text{and} \quad \hat{k} = \frac{A^2}{\hat{r}^2}.$$

Figure 6 plots the supply and demand curves under both uniform and diverse accounting standards. It is clear from the picture that diverse accounting standards do not affect the demand for capital, but they do decrease the supply of capital.[14] This causes the market to clear at a higher price and lower quantity, thereby reducing the quantity of capital circulating in the marketplace and increasing the price at which that capital trades.

The transition costs of diverse accounting regimes is:

$$\int_0^{t^*(r)} th(t)dt = \int_0^{\frac{r^2}{2c}} \frac{t}{a}dt = \frac{r^4}{8ac^2}.$$

The behavior of this transition cost follows the behavior of $t^*(r)$. Any parameter that increases the marginal investor will expand the pool of investors entering the market, thereby increasing the transition cost of diverse standards.

When are Uniform Standards Better?

To get traction on this issue, it is necessary to evaluate the effects of changes in the parameters of the model with respect to $\Delta = SW_1 - SW_2$, the net benefit of uniform accounting standards over diverse accounting standards. I derive this expression in Section IV, which effectively requires that:

(Change in Surplus) + (Investor Fees) > (Transition Costs) + (Compliance Costs).

The change in surplus is the real economic effect of imposing a single uniform standard, which varies depending on how much capital enters the marketplace. The investor fees are the additional fees investors earn under a uniform standard because all investors supply capital to the market. The transition costs are the costs of learning and adapting to a second standard, and the compliance cost is the cost of adhering to a single standard. This compliance cost reflects the fact that diverse standards provide better coverage of the marketplace because the regulator can tailor the standards to the distribution of firms.[15] The parameters of the model are the variation between firms, σ^2, the variation between investors (proxied by support of the distribution, (a), firm productivity (A), and the investor's cost of capital (c). I give conditions under which uniform standards

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[14] Observe that price is on the x-axis, so a decrease in supply means the supply curve shifts down.

[15] A single standard is costly because firms from the tails of the distribution must comply with a standard located in the center of the distribution.

are better than diverse standards, where a standard is "better" than another if it generates more total surplus, and hence is more efficient.

Corollary 1: Diverse accounting standards are better than uniform accounting standards when the variation between firms is large.

Firm variation is captured by the term $\delta = (\mu_2 - \mu_1) = 3\sigma^2$. Thus, the difference between the left and right means $\delta = \mu_2 - \mu_1$ directly tracks the variance on firm distribution σ^2. As the variation between firms rises, σ^2 rises and so does δ^2. As such, this increases the "penalty" from uniform accounting standards because uniform accounting standards force diverse firms onto a single rigid standard, which causes deadweight losses. As these welfare losses increase, so does the relative benefit of diverse accounting standards. Now, the variation between investors has exactly the opposite effect than the variation between firms on the optimality of diverse standards.

Corollary 2: Uniform accounting standards are better than diverse accounting standards when the variation between investors is large.

Under a uniform distribution, increasing the variance is equivalent to increasing a, the support of distribution h. The marginal investor $t^*(\hat{r}) = \frac{\hat{r}^2}{2c}$ is unchanged, but expanding the support of the distribution of h means fewer investors satisfy $t < t^*(\hat{r})$, causing the pool of available capital $H\left(t^*(\hat{r})\right) = \frac{\hat{r}^2}{2ca}$ to shrink. Now, the surplus under a uniform standard $f(k^*) - C(k^*)$ remains unchanged, but the surplus under a diverse standard $f(\hat{k}) - C(\hat{k})H\left(t^*(\hat{r})\right)$ rises because the smaller investor pool reduces the aggregate cost of investing (simply because fewer investors enter the market). Thus, the change in surplus rises. As the investor pool shrinks, so do transition costs and investor fees, but not enough to offset the rise in the change in surplus.[16] In sum, increasing variation between investors shrinks the investor pool, allowing uniform standards to have an even larger effect by drawing in many of these investors outside the capital market. This raises the welfare benefit from uniform standards. Now, consider the effect of increases in firm productivity.

Corollary 3: Uniform accounting standards are better than diverse accounting standards when firm productivity is high.

The productivity parameter A measures the marginal productivity of capital. As A rises, every unit of capital generates more surplus for society. Recall that uniform accounting standards draw capital into the market and the market clears at a lower price (lower r^*) and a higher quantity of capital k^*. This influx of capital has a greater benefit as the firm productivity rises. In other words, every dollar of capital is more valuable to society, and this influx of capital arises from the uniform accounting standards. Thus, uniform accounting standards give incentives for investors to enter the capital market, thereby raising the quantity of capital circulating in the marketplace and generating surplus. As such, the benefit from uniform accounting standards rises as productivity of firms rises. An implication is that economies that are more productive are better candidates for uniform accounting standards than less productive economies. Finally, consider changes in the investor's cost of capital c.

Corollary 4: Diverse accounting standards are better than uniform accounting standards when the cost of investment is large.

Recall that $C'(k) = ck$ and $C''(k) = c$. Therefore, c exactly measures the convexity of the investor's cost of capital function. As the cost of investment increases, investors require a higher return to justify their investments. This makes them less likely to invest in other activities, such as learning another accounting standard. Like an increase in a, a rise in c, thus, reduces the pool of investors willing to enter the capital market, shrinking the total supply of capital. But unlike a, c also effects surplus under a uniform standard, in that higher c raises the equilibrium price and lowers the equilibrium quantity of capital. This reduces surplus $f(k^*) - C(k^*)$, cutting the benefit of a uniform standard.

Thus, even though a uniform standard draws investors into the market, the smaller surplus reflects a smaller prize (surplus) upon entry. As such, society benefits less from a uniform standard, compared to diverse accounting standards.

This last corollary speaks to the "reporting incentive" view of international accounting. This view emphasizes the incentives of firms to report high-quality information to the marketplace as the leading determinant of accounting quality, rather than the accounting standard. Although my model does not directly model the incentives of the firm to report information to the marketplace, the cost of investment parameter c captures the legal institutional environment. The cost c is a reduced form

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[16] This result relies on the fact that the uniform distribution is fixed from below. If, instead, the uniform distribution was fixed from above, then increasing the support would increase the investor pool, thereby making diverse accounting standards dominate uniform accounting standards. Moreover, if the support of the uniform distribution symmetrically expanded around the mean, then increasing the support will increase the investor pool if and only if the marginal investor t^* lies below the mean of the distribution. In sum, the Corollary 2 is sensitive to the assumptions on the specific nature of the distribution used. Details are furnished in Appendix D.

expression for all of the legal and environmental problems that make investment costly, such as weak enforcement, poor property rights, bad corporate governance, etc. These are the same costs that dampen incentives for firms to provide high-quality accounting to the marketplace. The corollary states that when these costs are small, uniform standards are better. Thus, uniform standards and the institutional and legal environment are complements; they reinforce each other, and a uniform standard is better when the institutional environment is sound, which occurs when the cost of investment is low.

VI. CONCLUSION

By their very construction, all accounting standards face an inherent tension between ease of interpretation and compliance. Accounting standards evolve because investors seek predictable and reliable ways of interpreting information from firms. Therefore, from their birth, accounting standards are designed to reduce a vast array of information into a format that is easy to interpret and understand. The very fact that accounting standards exist and have developed over time proves that investors demand comparability in financial reports and use this to allocate capital efficiently. But therein lies the inherent tension in accounting standards because firms are quite diverse. A manufacturing firm differs from a technology firm, which differs from a financial services firm, and requiring all three types of firms to adhere to a rigid standard will be costly to at least two of them, if not all three.

This paper presents a first-order cost and benefit analysis of this inherent tension. Uniform standards have the benefit of easing interpretation of financial reports across the investor community. But they also impose a compliance cost on firms, some of which may bear large costs to comply with a standard that fits the average firm, but not themselves. A government regulator seeks to balance these twin effects when selecting the optimal number and level of accounting standards. Specifically, a uniform standard provides a liquidity benefit by easing interpretation of the standard among investors, thereby drawing more investors into the capital market and increasing the supply of capital, and ultimately decreasing the equity cost of capital. Uniform standards also save investors from having to learn multiple accounting standards, which effectively are multiple languages in the capital marketplace. The regulator trades off these costs and benefits against the benefit of diverse standards, namely, lower compliance costs among firms, because the diverse standards allow the regulator to more finely pick the accounting standard and thereby reduce the deadweight loss from compliance.

The secondary implications of the theory show that uniform standards are better when variation between firms is small, whereas diverse standards are better when variation between investors is small. Small firm variation means that the cost of compliance is low because firms at the tail of the distribution are not very "far" from the optimal standard. Therefore, as firms become more similar, uniform accounting standards dominate diverse standards. Conversely, as investor variation grows, the pool of investors willing to supply capital to the market under diverse standards shrinks, causing the supply curve to shift by a larger amount, causing the liquidity benefit from uniform standards to expand. This leads to the result that uniform standards dominate diverse accounting standards.

Future research in this area will incorporate a model of rules- versus principles-based accounting standards and a model of the evolution of accounting standards over time. Those models will require more infrastructure in modeling the legal environment in the economy within which accounting standard setting takes place. The neoclassical investment model in this paper can surely be of use in making progress on these questions. Some may argue that "the ship has sailed" on harmonization of GAAP and IFRS and that the world is already well on its way toward a uniform international accounting standard. Even if so, a first-order analysis of the costs and benefits is not only important for theoretical and academic purposes, but also to remind policy makers of the trade-offs that they face and to validate some of the legitimate arguments for and against a uniform standard. The slow rate of convergence and the arguments already aired by the most senior accounting regulators in the world testify to the fact that a uniform international standard does not dominate in every state of the world. This paper adds to the growing chorus of academic skepticism toward a "one size fits all" approach to accounting standards.

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APPENDIX A

Proof of Proposition 2

Consider the infinite horizon version of the model in discrete time. The firm selects capital k_t in each period at price r. The production function is: $f(k_t) = A_t k_t^{\alpha}$, where $\alpha < 1$.

The cash flows from the firm are its operating profits, $\pi_t = f(k_t) - rk_t$, and the value of the firm V_t is the discounted sum of current and all future cash flows of the firm. The cost of capital is the expected stock return, based on the value of the firm V_t.

Recall from the first-order condition that $f'(k^*) = r$. Under Cobb-Douglas production with parameter $\alpha < 1$, the operating profit of the firm $\pi = f(k_t) - rk_t$ decreases in r, as does the optimal capital choice k^*. But observe that the normalized cash flow, the operating profit per unit of capital, is:

$$\frac{f(k^*)}{k^*} - r = f'(k^*)/\alpha - r = r\left(\frac{1-\alpha}{\alpha}\right),$$

since $f'(k)k = \alpha f(k)$ under Cobb-Douglas production. It is easy to see that $\frac{\partial[\pi/k]}{\partial r} = \frac{1}{\alpha} - 1 > 0$ since $\alpha < 1$ because of decreasing returns to scale. Under Cobb-Douglas production, the average output of the firm $\frac{f(k)}{k}$ is proportional to the marginal output of the firm $f'(k)$, with a factor of proportionality α. And because at the optimal capital choice, the marginal output of the firm is exactly equal to the price of capital r, the normalized cash flow $\frac{\pi}{k}$ is directly proportional to the price of capital. Thus, even though capital and output both fall as the price rises, the decreasing returns to scale mean that the capital falls by a larger amount, causing the normalized cash flow $\frac{\pi}{k}$ to rise. Thus, the normalized cash flows increase in r. Because the expected stock return is the present and future discounted sum of all these cash flows, the expected stock return also increases in r. ∎

Proof of Proposition 3

Suppose the regulator selects $n = 2$. The regulator then must select the standards s_1 and s_2 to maximize social welfare. Observe that the choice of the standards does not affect the capital allocation decision, namely, the decision of the firm to buy capital and of the investor to supply capital. Therefore, the standard only affects the compliance cost of the firm. Maximizing social welfare is equivalent to minimizing these compliance costs. Therefore, the regulator solves:

$$\min_{s_1, s_2} SC(s_1, s_2),$$

where:

$$SC(s_1, s_2) = \int_{-\infty}^{x^*} (s_1 - x)^2 g(x)dx + \int_{x^*}^{\infty} (s_2 - x)^2 g(x)dx, \tag{6}$$

and $x^* = \frac{(s_1+s_2)}{2}$. Because g is symmetric, the regulator will choose standards symmetric around μ. Therefore, we can rewrite the regulator's problem in terms of a single quantity, γ, where $s_1 = \mu - \gamma$ and $s_2 = \mu + \gamma$. Thus, the two programs are equivalent:

$$\min_{s_1, s_2} SC(s_1, s_2) = \min_{\gamma} SC(\gamma).$$

Observe that $x^* \equiv \frac{(s_1+s_2)}{2} = \left((\mu - \gamma) + (\mu + \gamma)\right)/2 = \mu$. So the regulator solves:

$$\min_{\gamma} \int_{-\infty}^{\mu} (\mu - \gamma - x)^2 g(x)dx + \int_{\mu}^{\infty} (\mu + \gamma - x)^2 g(x)dx.$$

Consider the left and right averages of the distribution g:

$$\mu_1 = \int_{-\infty}^{\mu} xg(x)dx \text{ and } \mu_2 = \int_{\mu}^{\infty} xg(x)dx.$$

Observe that $\mu_1 + \mu_2 = \mu$. Solving (6) gives a first-order condition in terms of μ_1 and μ_2:

$$\frac{\mu + \gamma}{2} - \mu_2 = \frac{\mu - \gamma}{2} - \mu_1.$$

Rearranging terms gives the solution for optimal γ:

$$\gamma^* = \mu_2 - \mu_1.$$

Therefore, the optimal standards are:

$$s_1^* = \mu - \gamma^* = 2\mu_1,$$

$$s_2^* = \mu + \gamma^* = 2\mu_2.$$

Observe that $\frac{(s_1^* + s_2^*)}{2} = \frac{(2\mu_1 + 2\mu_2)}{2} = \mu_1 + \mu_2 = \mu = x^*$. Now, to calculate the optimal social cost from diverse standards, plug in the optimal standards s_1^* and s_2^* into the social cost function:

$$\begin{aligned}
SC(s_1^* + s_2^*) &= \int_{-\infty}^{\mu} (2\mu_1 - x)^2 g(x)dx + \int_{\mu}^{\infty} (2\mu_2 - x)^2 g(x)dx \\
&= \int_{-\infty}^{\mu} (4\mu_1^2 - 4\mu_1 x + x^2)g(x)dx + \int_{\mu}^{\infty} (4\mu_2^2 - 4\mu_2 x + x^2)g(x)dx \\
&= 2\mu_1^2 - 4\mu_1^2 + \int_{-\infty}^{\mu} x^2 g(x)dx + 2\mu_2^2 - 4\mu_2^2 + \int_{\mu}^{\infty} x^2 g(x)dx.
\end{aligned}$$

Now, $\sigma^2 \equiv Ex^2 - \mu^2$, so:

$$\mu^2 + \sigma^2 = Ex^2 = \int_{-\infty}^{\mu} x^2 g(x)dx + \int_{\mu}^{\infty} x^2 g(x)dx.$$

Thus:

$$SC(s_1^*, s_2^*) = -2\mu_1^2 - 2\mu_2^2 + \mu^2 + \sigma^2 = 2\mu_1\mu_2 - \mu_1^2 - \mu_2^2 + \sigma^2 = \sigma^2 - (\mu_1 - \mu_2)^2.$$

∎

Proof of Proposition 4

By construction, $f'(k^*) = C'(k^*)$, so k^* maximizes $f(k) - C(k) + z$ for some constant z. Now $f''(k) - C''(k) < 0$ for all k, so k^* is the unique max.

Equilibrium capital under two standards $\hat{k} < k^*$, so:

$$f(\hat{k}) - C(\hat{k}) + z < f(k^*) - C(k^*) + z.$$

Now, $H\left(t^*(\hat{r})\right) < 1$, so:

$$f(\hat{k}) - \hat{r}\hat{k} + \left(\hat{r}\hat{k} - C(\hat{k})\right)H\left(t^*(\hat{r})\right) < f(\hat{k}) - C(\hat{k}) < f(k^*) - C(k^*).$$

Thus, the Liquidity Benefit:

$$f(k^*) - C(k^*) - \left(f(\hat{k}) - H\left(t^*(\hat{r})\right)C(\hat{k})\right) + \left(1 - H\left(t^*(r)\right)\right)\hat{r}\hat{k} > 0.$$

∎

Proof of Corollaries

For the production function $f(k) = 2A\sqrt{k}$ and cost function $C(k) = \frac{c}{2}k^2$, under a single standard $r^* = \sqrt[3]{cA^2}$ and $k^* = \left(\frac{A}{c}\right)^{2/3}$. Evaluated at the optimal price and quantity, this leads to:

$$f(k^*) = 2\frac{A^{4/3}}{c^{1/3}} \text{ and } C(k^*) = \frac{A^{4/3}}{2c^{1/3}}.$$

Under diverse accounting standards, the optimal price and quantity are:

$$\hat{r} = (2c^2Aa)^{1/5} \text{ and } \hat{k} = \frac{A^2}{(2c^2Aa)^{2/5}} = \frac{A^2}{\hat{r}^2}.$$

Evaluated at these quantities, observe:

$$f(\hat{k}) = 2A\left(\frac{A}{(2c^2Aa)^{1/5}}\right) = 2A\sqrt{\hat{k}} \text{ and } C(\hat{k}) = \frac{c}{2}\frac{A^4}{(2c^2Aa)^{4/5}} = \frac{c}{2}\frac{A^4}{\hat{r}^4}.$$

The cost of compliance is the deadweight loss:

$$\delta^2 = (\mu_2 - \mu_1)^2 = \frac{3}{4}\sigma^2.$$

Under diverse accounting standards, the marginal investor is:

$$t^*(\hat{r}) = \frac{\hat{r}^2}{2c}.$$

The pool of available capital is:

$$H\left(t^*(\hat{r})\right) = \frac{\hat{r}^2}{2ca}.$$

The transition cost of implementing these accounting standards is:

$$TC = \int_0^{t^*} th(t)dt = \frac{\hat{r}^4}{8ac^2}.$$

To do the welfare comparison, consider the difference in social welfare under uniform and diverse accounting standards. Let $\Delta = SW_1 - SW_2$. Now:

$$\Delta = \underbrace{\left(f(k^*) - C(k^*)\right)}_{W} \underbrace{-\left(f(\hat{k}) - C(\hat{k})H\left(t^*(\hat{r})\right)\right)}_{X} \underbrace{-\int_0^{t^*(\hat{r})} th(t)dt}_{Y} + \underbrace{\left(I - H\left(t^*(\hat{r})\right)\right)\hat{r}\hat{k}}_{Z} - \delta^2.$$

So $\Delta = W + X + Y + Z - \delta^2$. Writing these out:

$$W = \frac{3A^{4/3}}{2c^{1/3}}$$

$$X = -\frac{2A^2}{\hat{r}} + \frac{A^4}{4a\hat{r}^2} = -\frac{8aA^2\hat{r} - A^4}{4a\hat{r}^2}$$

$$Y = -\frac{\hat{r}^4}{8ac^2}$$

$$Z = \frac{A^2}{\hat{r}} - \frac{A^2\hat{r}}{2ca} = \frac{2caA^2 - A^2\hat{r}^2}{2ca\hat{r}},$$

where $\hat{r} = (2c^2Aa)^{1/5}$. First, observe that $\delta^2 = \frac{3}{4}\sigma^2$, so $\frac{\partial\Delta}{\partial\sigma} = -\frac{3}{2}\sigma < 0$ for all σ. This proves Corollary 1.

Write Δ as a single fraction. Let $I = \{W, X, Y, Z\}$. Let d_i be the denominator for each term above, $i \in I$. So $d_W = 2c^{1/3}$, $d_X = 4a\hat{r}^2$, $d_Y = 8ac^2$, $d_Z = 2ca\hat{r}$. Let $D \equiv d_Wd_Xd_Yd_Z$ be the common denominator. Let:

$$d_{-i} = \prod_{\substack{j \neq i \\ j \in I}} d_j \text{ for each } i \in I.$$

Let n_i be the numerator of each term, so $i = n_i/d_i$ for $i \in I$. Then:

$$\Delta + \delta^2 = \sum_{i \in I} \frac{n_i}{d_i} = \sum_{i \in I} \frac{n_i d_{-i}}{d_i d_{-i}} = \sum_{i \in I} \frac{n_i d_{-i}}{D}.$$

We wish to solve for the limit:

$$\lim_{\theta \to \infty} \Delta \text{ for parameters } \theta = a,\ c,\ A.$$

Observe that each n_i and d_i is a polynomial in a, c, or A. Let $O_\theta(\varphi)$ be the order of the polynomial φ with respect to $\theta = a, c, A$. This is the degree of the polynomial φ (i.e., the highest exponent). For example, $O_A(n_w) = O_A(3A^{4/3}) = 4/3$. Let $q_i = n_i d_{-i}$. Let $M = \max_{i \in I} O_\theta(q_i)$ be the maximal order and $m = \arg\max_{i \in I} O_\theta(q_i)$ be the index of the term of maximal order. Observe that $O_\theta(\theta^M) = M$.

For any two polynomials φ and ψ:

$$\lim_{\theta \to \infty} \frac{\varphi}{\psi} = \begin{cases} +\infty & \text{if } O_\theta(\varphi) > O_\theta(\psi) \\ 0 & \text{if } O_\theta(\varphi) < O_\theta(\psi) \\ \text{constant} & \text{if } O_\theta(\varphi) = O_\theta(\psi). \end{cases}$$

Then divide Δ through by the highest-order θ-term, and take limits:

$$\lim_{\theta \to \infty} \Delta = \sum_{i \in I} \frac{\lim_{\theta \to \infty} q_i / \theta^M}{\lim_{\theta \to \infty} D / \theta^M}.$$

Consider $\theta = A$. Then straightforward computations show $m = X$ and $D = 128c^{10/3}a^3\hat{r}^3$, where $\hat{r} = (2c^2Aa)^{1/5}$ and $q_m = -(8aA^2\hat{r} - A^4)32c^{10/3}a2\hat{r}$ and $M = OA(q_m) = 4\frac{1}{5} = 21/5 > OA(D) = 3/5$. Now:

$$\frac{q_m}{\theta^M} = \frac{A^4 32c^{10/3}a^2(2c^2aA)^{1/5}}{A^{21/5}} - \frac{8aA^2\hat{r}^2}{A^{21/5}} \to 32c^{10/3}a^2(2c^2a)^{1/5} \text{ as } A \to \infty$$

$$\frac{D}{\theta^M} = \frac{128c^{10/3}a^3\hat{r}^3}{A^{21/5}} \to 0 \text{ as } A \to \infty.$$

Thus, $\displaystyle\lim_{A \to \infty} \Delta = +\infty$.

Consider $\theta = c$. Then $m = Y$ and:

$$q_m = -16a^2c^{4/3}\hat{r}^7.$$

So $M = \frac{4}{3} + 7\left(\frac{2}{5}\right) = \frac{62}{15} > O_c(D) = \frac{10}{3}$. Now:

$$\frac{q_m}{\theta^M} \to -16a^2(2Aa)^{1/5} \text{ and } \frac{D}{\theta^M} \to 0 \text{ as } c \to \infty.$$

Thus, $\displaystyle\lim_{c \to \infty} \Delta = -\infty$.

Consider $\theta = a$. Then $m = W$ and:

$$q_m = 192A^{4/3}a^3\hat{r}^3c^3.$$

So $M = 3 + \frac{3}{5} = \frac{18}{5} = O_a(D) = \frac{18}{5}$. Now:

$$\frac{q_m}{\theta^M} \to 192A^{4/3}c^3(2c^2A)^{3/5} \text{ and } \frac{D}{\theta^M} = 128c^{10/3}(2c^2A)^{3/5} \text{ as } a \to \infty.$$

Thus:

$$\lim_{a \to \infty} \Delta = \frac{\sum_{i \in I} \lim_{a \to \infty} q_i / \theta^M}{\sum_{i \in I} \lim_{a \to \infty} D / \theta^M} = \frac{\lim_{a \to \infty} q_m / \theta^M}{\lim_{a \to \infty} D / \theta^M} = \frac{192 A^{4/3}}{c^{1/3}} > 0.$$

So Δ converges to a positive constant as $a \to \infty$. ∎

APPENDIX B

Consider a more general model that includes both foreign and local investment. Investors pick capital levels k_g and k_d for global and domestic investment in firms. Each investment $i = d, g$ has a separate cost of funds $C(k_i)$. Assume separability, so $C(k_g) + C(k_d) < C(k_d + k_g)$. Suppose capital k_i in each market trades at price r_i. Since capital is identical, firms will buy only the cheapest capital. So prices $r_g = r_d \equiv r$ must be the same; otherwise, one market would collapse. Under uniform standards, each investor solves:

$$\max rk_d - C(k_d) + rk_g - C(k_g),$$

yielding $C'(k_i) = r$, which gives individual supply curve $k_i = s(r)$. Market supply is $S_1(r) = 2s(r)$. New Welfare is Old Welfare $SW_1 + r^* k^* C(k^*)$. Under Diverse Standards, the investor solves:

$$\max rk_d - C(k_d) + rk_g - C(k_g) - t,$$

yielding $C'(k_i) = r$, which again gives individual supply $k_i = s(r)$. The investor invests globally if:

$$r(k_d) - C(k_d) + rk_g - C(k_g) - t > r(k_d) - C(k_d),$$

or:

$$rk_g - C(k_g) > t.$$

Thus, $t^* = rk_g - C(k_g)$ is the threshold investor type. Only investors below the threshold will enter the global market. Market supply is the sum of domestic investment plus smaller global investment, so:

$$S_2(r) = s(r) + H\left(s(r)\right) < 2s(r) = S_1(r),$$

because $H(s(r)) < 1$. Finally, New Welfare is Old Welfare $SW_2 + \hat{r}k - C(\hat{k})$.

Thus, diverse standards decrease the total supply of capital, which is the sum of domestic and foreign investment. Said differently, uniform standards increase the supply of capital and will have the same effects on the price (and, ultimately, cost) of capital as the model in the main text.

APPENDIX C

This appendix shows that the results of the model generalize if social welfare includes general Pareto weights, rather than equal Pareto weights as in the main text. We will calculate the functions SW_1 and SW_2 for Social Welfare under one and two standards, respectively.

Let (α, β) be the Pareto weights for firms and investors, respectively. Social Welfare under Uniform Standards is:

$$SW_1(s) = \alpha \int_{-\infty}^{\infty} [f(k^*) - r^* k^* - (s - x)^2] g(x) dx + \beta \int_{-\infty}^{\infty} [r^* k^* - C(k^*)] h(t) dt = \alpha f(k^*) + (\beta - \alpha) r^* k^* - \beta C(k^*) - \alpha \sigma^2.$$

Social Welfare under Diverse Standards is:

$$SW_2(s_1, s_2) = \alpha \int_{-\infty}^{x^*} [f(\hat{k}) - \hat{r}\hat{k} - (s_1 - x)^2] g(x) dx + \alpha \int_{x^*}^{\infty} [f(\hat{k}) - \hat{r}\hat{k} - (s_2 - x)^2] g(x) dx + \beta \int_{-\infty}^{t^*(\hat{r})} [\hat{r}\hat{k} - C(\hat{k}) - t] h(t) dt.$$

Evaluating these integrals, this becomes:

$$SW_2(s_1, s_2) = \alpha\left(f(\hat{k}) - \hat{r}\hat{k}\right) + \beta\left(\hat{r}\hat{k} - C(\hat{k})\right)H\left(t^*(\hat{r})\right) - \beta\int_{-\infty}^{t^*(\hat{r})} th(t)dt - \alpha(\sigma^2 - \delta^2).$$

Observe that Social Welfare under both regimes includes the Pareto weights, as it should. The regulator prefers one standard over two if $SW_1 > SW_2$, or if:

(Change in Surplus) + (Investor Fees) > (Transition Costs) + (Compliance Costs),

just as in the main text. It is straightforward to see that these weights will not alter this inequality; it will only complicate the expressions.

APPENDIX D

This appendix generalizes Corollary 2 under different kinds of uniform distributions. Decreasing (increasing) the available pool of capital makes uniform standards better (worse) than diverse standards.

Corollary 5: If the uniform distribution is fixed from above, then increasing its support will increase the pool of available capital.

Proof of Corollary 5

Fix $k > 0$ as a constant. Let h be a uniform distribution over (a, k), so $h(t) = \frac{1}{k-a}$. Assume k is large enough that $t^* < k$. The pool of available capital is:

$$H(t^*) = \int_a^{t^*} h(t)dt = \frac{t^* - a}{k - a}.$$

Differentiating with respect to a shows:

$$\frac{\partial H(t^*)}{\partial a} = \frac{t^* - k}{(k - a)^2} < 0,$$

because $t^* < k$. Therefore, increasing variance of the distribution by the support (decreasing a) will increase the pool of available capital. ■

Corollary 6: If the uniform distribution is neither fixed from above nor below, then increasing its support will increase the pool of available capital if t^* lies below the mean of the distribution.

Proof of Corollary 6

Fix $k > 0$ as a constant. Let h be a uniform distribution over $(k - a, k + a)$, so $h(t) = \frac{1}{2a}$. The pool of available capital is:

$$H(t^*) = \int_{k-a}^{t^*} h(t)dt = \frac{t^* - k + a}{2a}.$$

Differentiating with respect to a shows:

$$\frac{\partial H(t^*)}{\partial a} = \frac{k - t^*}{4a^2} > 0,$$

if and only if $t^* < k$. Therefore, increasing the support (increasing a) will increase the pool of capital iff $t^* < k$. ■