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WHAT DOESN'T KILL YOU MAKES YOU STRONGER: THE EVOLUTION OF COMPETITION AND ENTRY-ORDER ADVANTAGES IN ECONOMICALLY TURBULENT CONTEXTS

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We examine the evolution of competition and entry-order advantages in markets under macroeconomic distress. Through formal modeling of early-mover advantages along industry life cycles subjected to economic shocks and based on simulation findings, we propose that such shocks exogenously induce temporary industry discontinuities that shift the relative value of distinct asset endowments, thereby switching the bases for competitive advantages vis-à-vis those found in stable contexts. A vital trade-off then emerges between a firm's financial flexibility and its pace of investments in isolating mechanisms, such that the former operates as a contingency factor for the latter. As such, flexibility superiority boosts early-entrants' advantages, while it alternatively gives laggards a much desired strength to out trump first-mover rivals. Our study informs entry-order advantage theory and management practice in economically turbulent contexts.

Danone and Hyundai recently commanded successful upturns in financial performance and market share under an economic depression (Chung, 2010; Gimbert and Ast, 2013). Having entered later than most rivals in Argentina's bottled water and the U.S. automobile industries, respectively, they lagged incumbents in expertise, process technologies, market space, or other path dependent assets. Remarkably, they overcame these weaknesses either by playing up old skills temporarily turned more valuable during the depression (2002 and 2008, respectively), or internally syphoning funds to outdo rivals in new ways. Their feats trigger the question—what can firms do when competing under rising uncertainty of macroeconomic meltdown?

Unfortunately, scholarly analyses of strategic decision making in these contexts are scant. This is a significant gap for, in the past few decades, markets once considered attractive for global expansion, in Asia, North and South America, as well as Europe, either entirely collapsed or currently suffer from increasing prospects of severe turmoil. Calvo, Izquierdo and Talvo (2006), for instance, using the terms *Sudden Stop* and *Phoenix Miracle*

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to respectively describe depression and recovery, report 30 economic shocks in the 24 years up to 2004, two-thirds of which were described as severe contractions. Firm recovery from such turbulences is known to be highly dissimilar (Ayyagari *et al.*, 2011), and often subject to significant strategic confusion; for instance, countless firms that eagerly entered Argentina's economic opening ten years earlier had regretted their decisions and left the country in the 2002 economic collapse (Carrera *et al.*, 2003). Additionally, most players tend to bring out their proverbial cost-cutting hatches across organizational areas (e.g., Dobbs, Karakolev, and Malige, 2001) or react shortsightedly (Kunc and Bandahari, 2011) only to find this conventional wisdom barely minimizes already expected stockholder losses. The rather anecdotal strategy research on the matter sadly prevents theoretical generalizability, and precludes analytical rigor regarding the discriminating fit between industry dynamics and heterogeneous firm capability endowments.

To begin addressing this gap, we examine how economic shocks affect the evolution of competition and firm advantages. We frame the study with theory elements from the entry-order advantage literature—FMA (e.g., Lieberman and Montgomery, 1988, 1998; Suarez and Lanzolla, 2007), where we track firm entry-based benefits as they evolve along industry life cycles—ILC (e.g., Klepper and Graddy, 1990; Klepper, 1997; Dosi and Malerba, 2001; Agarwal, Sarkar, and Echambadi, 2002). Following the above ILC empirical studies, we constrain our analyses to the competitive-entry and path-dependent investment decisions of early versus late movers during the growth and maturity phases of industry life, rather than those of pioneers during industry birth. This tighter frame thus renders a better contrast of the effects of exogenous economic shocks on entry-order competitive advantages (e.g., Calvo and Mendoza, 2000; Calvo *et al.*, 2006) against the backdrop of more nuanced technological and market uncertainties.

Previous FMA research explains that by assertively preempting laggards (e.g., entering and growing quickly) and maintaining technological leadership (e.g., investing in learning and R&D) early movers can sustain survival, market share and profit advantages. In contrast, late movers often struggle to catch up and close time-dependent resource and performance disadvantages. But we show that economic shocks exogenously impose drastic shifts in demand patterns and the liquidity of financial markets (Calvo *et al.*, 2006), thereby curtailing an industry's carrying capacity in the short run. These shifts, we argue, impose abrupt discontinuities to the otherwise rather predictable industry evolution paths, thus changing the nature of entry-order advantages.

Our study brings notable extensions to the practice of strategy and the theory of entry-order advantages. First, assuming path-dependent processes, we demonstrate that economic shocks *enhance* the value of FMA-yielding isolating mechanisms (e.g., preemption and technology leadership) thus *increasing* the advantages early movers enjoy in otherwise stable contexts. On the other hand, economic shocks induce shifts in relative asset endowment values, such that early and late entrants face unique competitive trade-offs. Specifically, shocks switch the relative value of the aforesaid mechanisms to that of cash liquidity constraints, thereby swapping the relevance of an aggressive pursuit of FMA vis-à-vis financial flexibility. For the practice of strategy, we thus advocate contrarian approaches as to how fast and when early and late movers should invest in isolating mechanisms, both at entry and the ensuing competitive dynamics.

Below, we review the concepts of FMA, *Sudden Stop*, and *Phoenix Miracle*. We then develop a formal model and, based on numerical solutions from multiple simulation runs, formalize our theory of the evolution of competition and entry advantages in economically turbulent contexts. Lastly, we further detail our contributions to theory and practice.

THE INTERPLAY BETWEEN ENTRY-ORDER ADVANTAGES, INDUSTRY LIFE CYCLES, AND ECONOMIC SHOCKS

Three literatures offer elements essential to our study: entry-order advantages (FMA), industry life cycles (ILC), and economic shocks (SSPM). The FMA concept first emerged from simple anecdotal and empirical insights that early movers tended to outperform laggards (Bond and Lean, 1977; Whitten, 1979). Lieberman and Montgomery (1988) then gave this perception more proper theory form, and defined early movers as

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the first firms to enter a market, whereas late movers came to be known as the subsequent entrants. In turn, early mover advantages were first defined as the profits earned in excess of cost of capital (Lieberman and Montgomery, 1988), albeit later broader definitions—which we follow here—included market share and survival benefits (e.g., Agarwal, *et al.*, 2002; Kalyanaran *et al.*, 1995; Tellis and Golder, 1996).

Early-mover advantages arise from isolating mechanisms, which generally operate to delay imitators and deter a natural performance convergence among rivals (Agarwal and Gort, 2001). Various typologies of such mechanisms exist (Suarez and Lanzolla, 2007 offer a review), but Lieberman and Montgomery's (1988, 1998) have become the more accepted categories: technology leadership, preemption of scarce assets, and switching costs to buyers. Technology leadership enables early movers to outperform others based on learning experiences and R&D patenting. Preemption in turn involves forestalling bids for market resources, such as geographic and distribution channel spaces as well as scale economies related to anticipated investments in plant and equipment. Lastly, switching costs reflect the sticky nature of buyer choice habits favoring experiences and brands they have come to value (Suarez and Lanzolla, 2007).

Two aspects of entry-order advantage are critical to the scope of our study. First, the nature and scale of FMA vary along industry life. Industries undergo a major transformation, moving from a fluid to a rigid state, in which markedly distinct technological regimes dictate the resource conditions associated to competitive advantages (Agarwal *et al.*, 2002; Baum and Korn, 1996; Gort and Klepper, 1982). From industry birth to industry growth and maturity, the onset of a major product design implies that sources of advantages move from entrepreneurial to routinized practices (Nelson and Winter, 1982). Namely, in the latter phases vis-à-vis the phase of industry emergence, R&D investments favor incremental process innovation over radical product invention; large-scale production takes precedence over flexible assembly; and entry-order advantages relate to scale and learning economies, rather than searches for radically new goods (Abernathy and Utterback, 1978). This transformation implies that entry-order advantages are not *absolute*, but rather *relative* (Robinson *et al.*, 1992), insofar as industry life cycles embody *strategic windows* (Abell, 1978: 24) that yield advantages only to the extent the value of firm assets reflect market nuances. Tracking the evolution of FMA thus makes sense only insofar as it is done coherently within strategic windows (Agarwal *et al.*, 2002: 971). In accordance with previous empirical literature then (e.g., Jovanovic and MacDonald, 1994; Klepper, 1997), we constrain our analysis to the post-technological regime transformation, that is, the *growth* and *mature* phases of industry life, when path-dependent FMA respectively grows and stabilizes. For this reason, early entrants in our model reflect not the pioneers who start up a new industry, but simply the firms that enter ahead of others in the defined period. Late entrants then are *challengers* trying to close the FMA gap enjoyed by incumbents (i.e., early comers).

The second aspect of FMA crucial to the scope of our study is that early entry does not assure FMA sustainability; it just stacks the cards in one's favor (Mueller, 1997: 846). FMA is greater the longer an early mover remains alone and the more rapidly it initially grows. With a speedy entry, latecomers can catch up to time-based disadvantages (Agarwal and Gort, 2001) and stop incumbents from building advantages that are later hard to overcome (a rather common event, as empirically shown in Mueller, 1972, 1997). Sustaining FMA thus also depends on continuous investments in preemption of new-found markets as well R&D leadership and even luck (Mueller, 1997: 846). The famous "cola wars" case (Yoffie, 2010) illustrates this competitive dynamics, where the pioneer, Coke, has fought vigorously over the years to defend its early entry advantages against formidable challenger Pepsi, as each tries to preempt the other in new retail channels (e.g., grocery shops, vending machine networks), new niches for the same basic good (e.g., caffeine-free cola, cherry cola) and new geographies (e.g., foreign countries). Essentially, FMA emerges not only from initial entry, but also from a relative speed of growth, as incumbent and challenger try to preempt one another into new and yet unexplored markets, as well as gain leadership in new process technologies (Mueller, 1997). Accordingly, to examine the evolution of FMA advantages to early movers and the strategic choices available to latecomers, we examine both entry and the ensuing competitive dynamics.

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The dynamics of macroeconomic shocks and recoveries

If the above literature argues that uncertainties *endogenous* to the life cycle change over time, our goal lies with adding *exogenous* uncertainties to this framework to assess the evolution of competition and firm entry-based advantages along the life of existing industries. One stream in the economics literature helps explain the mechanics of exogenous shocks and supplies theory elements that we borrow to formalize our model. Calvo and colleagues used the terms *Sudden Stop* and *Phoenix Miracle* to respectively describe bust and boom shifts in a country's GDP (Calvo and Mendoza, 2000; Calvo and Mendoza, 1996; Calvo *et al.*, 2006). Sudden Stop (SS) events reflect "current account reversals" that signify sharp falls in capital flows into a country (Calvo *et al.*, 2006: 405). As these disruptions reveal disturbances in international capital markets, they are naturally treated as exogenous factors for individual economies and industries (Calvo and Mendoza, 2000). During an SS event then, a country is excluded from such markets, and as a result, the local context is subject to acute increases in interest rates and severe depression (Calvo *et al.*, 2006: 405). This downturn causes further disruptions in the liquidity of capital and goods markets, with a snowball effect (Mendoza, 2006: 411). As unemployment surges and currency value plummets, local buyers suffer drastic wage losses (Calvo and Mendoza, 1996; Calvo *et al.*, 2006). This chain of economic events culminates then in our two borrowed points of interest: with SS shocks, product markets suffer an acute fall in demand, whereas financial markets tumble, thereby hitting highly leveraged firms especially hard (Calvo and Mendoza, 1996).

The counterpart to an SS, the Phoenix Miracle (PM), is nearly a paradox. The PM reflects an economy that bounces back rather quickly from SS collapses. The apparent contradiction is that GDP, aggregate demand, and inventory levels recover—on average three years after an SS—without the accompanying healing in credit, employment rates, investments, or capital inflows (Calvo *et al.*, 2006). Long-term capital markets are needed for risky investments, but as the focus market dries up in SS events, interest rates shoot up, thus hurting necessary asset investments, as firm leverage turns prohibitively expensive. PM recoveries are often referred to as miracles because although financial frictions play a key role in pushing economies to the abyss, such economies seem to crawl back by means less than apparent to the conventional observer looking for standard macroeconomic fundamentals. The surprising yet swift GDP recovery leads then to the allusion of the mythical bird rising from the ashes (Calvo *et al.*, 2006: 405).

In sum, SS shocks drastically shrink product markets and significantly dry up financial markets, whereas PM events highlight the recovery of the former, but not of the latter (Calvo and Mendoza, 1996). This asymmetry, along with the ubiquitousness and contemporariness of SSPM events, compels us to model below the consequences for early- and late-mover success.

GENERAL MODEL AND SIMULATION MECHANICS

To formally model the phenomenon, we follow standard mainstream practices from strategy scholars. We then generate multiple simulation runs to derive theory propositions (Davis, Eisenhardt and Bingham, 2007; Lant and Mezias, 1990; Miller, Zhao and Calantone, 2006; Siggelkow and Rivkin 2006; Winter, 1984; Zott, 2003). Simulation modeling provides a powerful methodology for advancing theory (Cohen and Cyert, 1965) especially in contexts where systems typically involve interactions with nonlinear feedback or when linear models have limited value, as it is typically the case when samples are sparse and differentiated in time and space. To examine the relative value of asset endowments under SSPM and derive theoretical meaning to entry-order advantages, we take an evolutionary approach, wherein firms develop sets of coordinated activities—known as routines—which evolve slowly, through local learning (Cohen *et al.* 1996). We adapt Winter's (1984) model to describe a Cournot competitive process where shifts in the macroeconomic environment trickle down to the context of firm rivalry and performance. Firms (i.e., their decision makers) are boundedly rational price takers (Klepper and Graddy, 1990), that is, they seek long-run benefits but choose output levels to maximize short-run profits. For simplicity, we model a single product and one input factor, capital.

In our model, firms are heterogeneous regarding production costs and financial leverage.

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Differences in the former arise from (1) distinct sets of production techniques, which themselves result from initial endowments of capital and technology; (2) lifelong capabilities such as learning rate and R&D efficiency (assigned randomly at entry); and (3) firms' own decisions regarding capital expenditure and R&D investment that affect the cost function in a path-dependent manner. In turn, differences in the latter arise from (4) distinct financial strategies, which are assigned at entry, and are defined by a continuous space regarding financial flexibility, as measured by leverage (e.g., firms with debt or excess cash). Leverage ratios are not immediately associated to a firm's cost function, as much as they are to its liquidity. Leverage permits more funds for growth and R&D (so it indirectly speeds learning and reduces costs), but in turn, it decreases a firm's flexibility insofar as higher debt services correspond to smaller cash flow maneuverability. These heterogeneities in turn, combined with order of entry, ultimately determine firm survival and performance in different ways, across stable and distressed contexts.

The model produces short-run equilibria from the aggregation of individual decisions. Every period, each firm chooses the output of its single good by adapting its capacity through capital expenditure decisions. Firm outputs then aggregate into industry supply, which in turn balances with demand. The market subsequently clears, inducing a price equilibrium. The price so obtained will determine each firm's economic profit, which in turn will either provide funds for the next period or make the firm leave the industry. Economic profit of firm i in period t is:

$$\pi_{it} = P_t\, Q_{it} - c_{it}\,(Q_{it}) - (\rho + \delta)\, K_{it} - r_{it} \quad (1)$$

Above, Q_{it} is the firm's output at time t; ρ is the cost of capital, δ is the depreciation per unit of capital, K_{it} is firm i's capital stock at time t; and r_{it} is firm i's R&D expenditure at t. Finally, $Q_{it} = \alpha K_{it}$, being α the capital productivity factor. In turn, $c_{it}(.)$ is the firm's production cost function which depends on accumulated output, on learning rate, and on current technology (which itself is a function of past R&D expenditure). This cost function follows the standard learning curve as in Argote and Epple (1990). Accordingly, firm costs go down by two mechanisms: (1) learning, which in turn is a function of accumulated output; and (2) technology improvement, which is a function of accumulated R&D. Formally,

$$c_{it}\,(Q_{it}) = \tau_{it}\left(AQ_{it}^{LR_i} - \left(AQ_{i(t-1)}\right)^{LR_i}\right) + \lambda\, Q_{it} \quad (2)$$

where τ_{it} is the firm's technology at t (i.e., it is the first unit cost in the learning curve literature); AQ_{it} is the firm's accumulated output up to time t; LR_i is the firm's learning rate, randomly assigned at entry; and λ is the asymptotic limit of the learning curve.

Our model takes a constant elasticity growing demand function that shifts outward, and is punctuated by SS shocks. The demand function is as follows:

$$P_t = D\,(Q_t) = \min\left(S, \varsigma\ (1+\varphi)^{\frac{t}{\epsilon}}\,(Q_t)^{-\frac{1}{\epsilon}}\right) \times (1 - \Pi_t) \quad (3)$$

where S is a price ceiling imposed by a product substitute; ς is a demand parameter; φ is the demand shift at every period; ϵ is the demand price elasticity; and Π_t is the Sudden-Stop magnitude that equals 0 if t falls outside the SS period.

Each period, firm entry and exit modify the competitive landscape. Exit occurs if performance or capital stock results lower than their respective minima or if the firm goes bankrupt. In turn, entry occurs if a firm's expected return results above a minimum performance threshold (i.e., cost of capital), being that we randomly assign initial conditions to potential entrants. Performance is defined as a distributed lag function of return. Formally,

$$\chi_{it} = \chi_{i(t-1)} \times \theta + \phi_{it} \times (1 - \theta) \quad (4)$$

Here, ϕ_{it} is the shareholder return, and θ is the temporal weight. Exit occurs either if $\chi_{it} \le \rho$, *or if* $K_{it} \le K^{min}$, with $K_{i0} \sim N(\mu_K, \sigma_K)$ assigned at entry. Bankruptcy (and then exit) occurs if the firm has no funds to cover a negative operating cash flow. In turn, entry occurs if $\phi_{it} > \rho$.

In each part below, we contrast a base (i.e., stable context) to an SSPM model, being that each simulation run produces a specific evolutionary history, while the analyses average 100 runs, over a total period of 50 years. SSPM models include shocks of different magnitudes, at different moments in industry life. For ease of exposition, we show simulation results through sequences of figures. We calibrated parameters for the base scenario to resemble the regularities in the literature (e.g., Calvo *et al.*, 2000; Klepper and Graddy, 1990; Winter, 1984). Parameters are available from the authors, upon request. Along our analysis, we highlight the robustness of our findings. This is relevant in simulation research as results and theoretical propositions should naturally arise from the model structure, rather than specific parameter choices (Davis *et al.*, 2007). We run the models with the software platform Repast Simphony (Repast, 2013).

MODEL SPECIFICS, SIMULATIONS, AND THEORY PROPOSITIONS

Economic shocks, resources heterogeneity, and early-mover advantages

In our model, firms path-dependently build up preemption and technology leadership-based assets, respectively, through investments in output capacity and R&D. The path-dependent nature of our model arises from decision variables that condense each firm's history as in a Markov process. Firm capital expenditure decisions determine the evolution of capital stock (K_{it}) and accumulated output (AQ_{it}). Capital expenditure decisions follow a Cournot rule (similar to that in Winter, 1984), wherein firms choose output by investing in capacity (i.e., by influencing their capital stock) so as to maximize profits the following period. Maximization occurs under the assumption that rivals behave collectively with known supply elasticity. Winter's (1984) decision rule is straightforward: it is advisable to grow if current markup u_{it} is bigger than the optimal markup ${u_{it}}^{*}$; otherwise it is better to let assets depreciate. Formally, gross investment is

$$I_{it} = K_{i(t-1)}\left(\omega\left(1-\frac{\mu_{it}^{*}}{\mu_{it}}\right)+\delta\right) \tag{5}$$

Here δ is the depreciation per unit of capital, and μ_{it} (markup) is price divided by marginal cost. As in Winter (1984), the optimal markup maximizes profit and is $\mu_{it}^{*} = \frac{\epsilon+\left(1-s_{i(t-1)}\right)\Psi}{\epsilon+\left(1-s_{i(t-1)}\right)\Psi-s_{i(t-1)}}$, where ϵ is the demand price elasticity; s_i is the market share of firm i; ω is a parameter regulating industry growth, and Ψ is the supply elasticity of competitors as a whole.

Firms build up technology stock (τ_{it}) through R&D investments, which are made to optimize economic profit the following period.

$$\tau_{it}\left(r_{it},\ \tau_{i(t-1)}\right) = \tau_{i(t-1)} \times \frac{1}{\gamma_i \times (r_{it}+1)} \times \xi_{it} \tag{6}$$

With γ_i being R&D efficiency (i.e., firm i skills), and ξ_{it} is the innovation error of firm i, at t, such that $\xi_{it} \sim N(1,\xi)$. For simplicity, capital expenditure and R&D investments are made sequentially, such that firm i's capital stock K_{it} is known when maximizing to obtain optimal R&D investment, which is defined as $r_{it}^{*} = \sqrt{\frac{\tau_{i(t-1)}}{\gamma_i} \times \left(AQ_{it}^{LR_i} - \left(AQ_{i(t-1)}\right)^{LR_i}\right)} - 1$, where γ_i is the firm's R&D efficiency, randomly assigned at entry. The optimal R&D investment is constrained both by an inferior limit $r_i^{\min} = \frac{1}{\gamma_i} - 1$ (so that expected increments are positive), and an upper limit (so that technology increments occur if funds are available).

With these specifications, we initially produce Figure 1. The base industry evolution path shows the number of firms (y-axis) changes over the years (x-axis). Our Cournot model assumes an earlier new product introduction, such that buyers have growingly accepted the current product standard. Our industry then—as defined earlier—begins in the growth period, which is characterized by high profits and fast growth and where the number of firms rapidly rises to a peak. Over time, as the most cost-efficient firms scale up their operations to their desired Cournot capacity levels (i.e., their best response to prevailing output of other firms), competition intensifies. Such competition, in turn, endogenously induces a shakeout of ineffective players, such that the number of firms then drops notably. Maturity occurs around year 20, and thereafter output more or less stabilizes. Such patterns are consistent with well-documented empirical literature (Klepper and Graddy, 1990; Klepper, 1997; Agarwal *et al.*, 2002).

We then impose economic shocks of different magnitudes (respectively 8 and 10%). SS events cause two effects of interest: demand falls and financial markets tumble. For didactics, in this section we examine the former and only subsequently integrate the latter. Accordingly, we operationalize SS effects by means of a downward shift Π_t of the demand curve P_t (in 3). This shift in turn causes an abrupt decrease in the price equilibrium.

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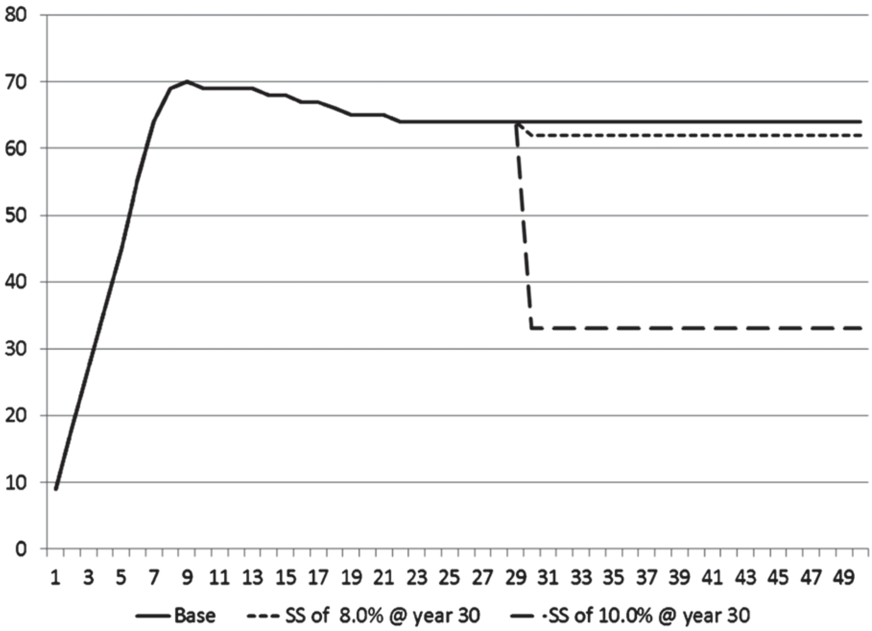

Figure 1. Evolution of firm survival—stable (base model) × SSPM contexts

In Figure 1, we highlight two notable effects: (1) the fewer players in the immediate aftermath of a shock, being that survival advantages are asymmetrically related to SS magnitudes, and (2) the stickiness of such advantages over time, with significant consequences for entry-order advantages. Regarding the short-run effect, the logic is that the harsh fall in demand *exogenously* induces a shakeout; that is, several firms fall short of minimally required performance levels (in 4, either $\chi_{it} \leq \rho$ or $K_{it} \leq K^{min}$) and are forced out at an otherwise *unexpected* time in industry life. We tested the model with varying shock levels and note the findings are sensitive: in "mild recessions" (e.g., SS ≤ 4%) shakeouts are small, killing few firms. In turn, in "severe depressions" (e.g., SS ≥ 12%), they are deep, killing most firms. As a result, we conclude that the size of exogenous shakeouts monotonically increases with the SS magnitude. For matters of illustration, in Figure 1, survivors of a ten percent Sudden Stop are about half those from a simulated eight percent Sudden Stop.

As the number of players fall, average market share naturally rises. In Figure 2, the base model shows that average firm output starts low but significantly increases during the growth period, to then ease out in the maturity phase. In contrast, as we exogenously induce shakeouts, survivors average a much higher output level. Given the market has fewer players (Figure 1), each firm then grabs a bigger share vis-à-vis its counterpart in stable contexts, even if aggregate sales are lower. As with the earlier survival simulation, the exact sizes of share advantages are sensitive to SS levels, but the pattern of share gains relative to shock sizes is robust.

Beyond the contrast of survival and market share across base and SSPM models, we also examine shock effects on entry-order advantages. Our findings are that SSPM events tend to be mild on early movers but severe on laggards, thus *enhancing* the scale of FMA vis-à-vis those observed in stable contexts. In our model, preemption and technology-related benefits (the result of aggressive investments in capacity and R&D) build up over time, and induce cost-level heterogeneities. This path-dependent mechanic then makes late entrants less cost competitive, as they lag behind in scale efficient production capacities, learning, and technology. When demand contracts sharply then, they—rather than early movers—more likely meet the conditions $\chi_{it} \leq \rho$ or $K_{it} \leq K^{min}$ (in 4) related to a forced exit during the exogenously-induced shakeout.

We showcase this enhancement in survival FMA in Figure 3. The graph offers a similar rationale of cohort survivability as presented in Klepper (1997: Figure 3, pp156). We divided the industry in three cohorts of entry. As in previous literature, early

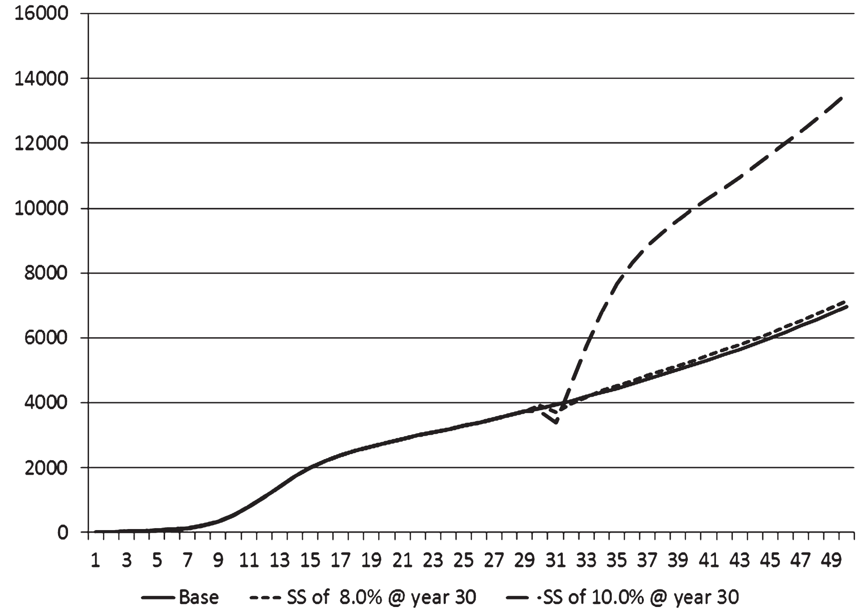

Figure 2. Average output per firm—stable (base model) × SSPM contexts

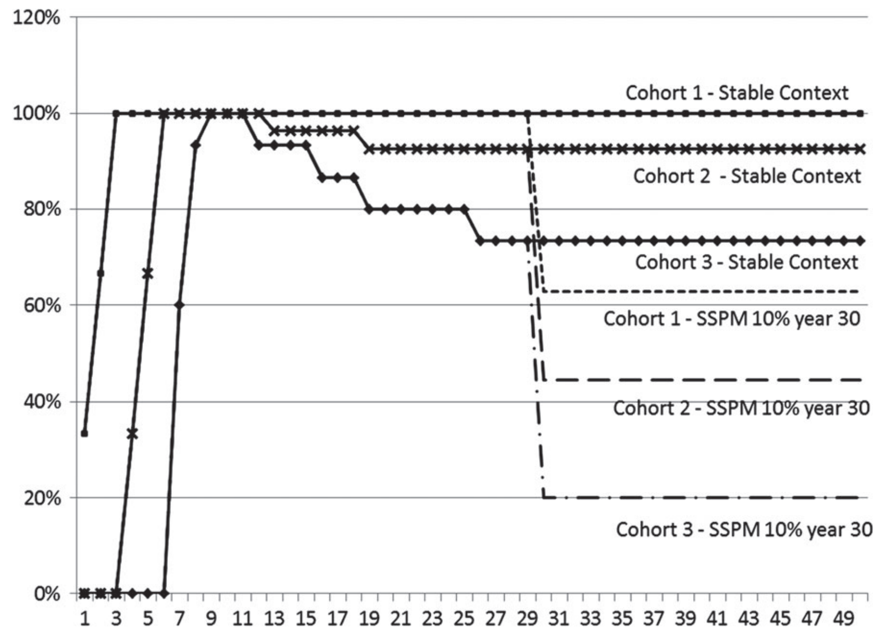

Figure 3. Evolution of survivability, by Entry Cohort

movers have a survival advantage over laggards in stable contexts. But in turn, SSPM contexts impose a notably higher mortality rate for late versus early movers. We tested this difference again by partitioning the population into more cohorts and in different ways (e.g., 4 and 5 cohorts separated by one year or two). We found the pattern to be very robust and conclude in support for the validity of the model.

This FMA swell also occurs in market share (Figure 4). In stable contexts, early movers naturally accrue market share advantages over laggards due to their path-dependent resource investments. In contrast, in SSPM contexts, survivors observe

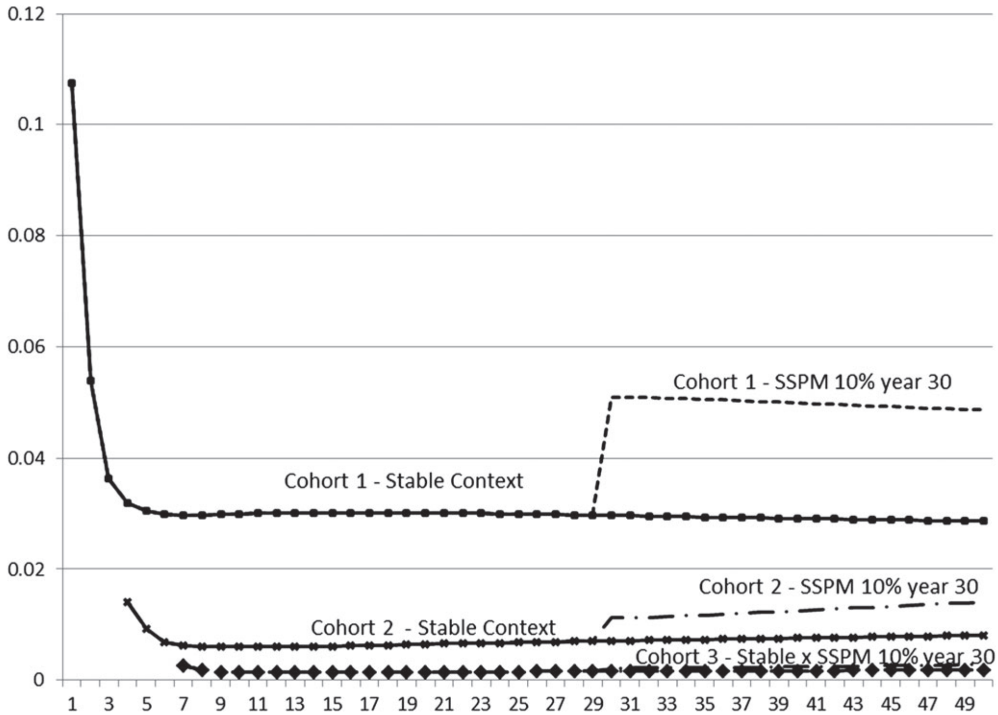

Figure 4. Evolution of market share, by Entry Cohort

an upsurge in market share vis-à-vis their respective counterparts in stable contexts. However, we point out here that this gain accrues significantly more to early rather than late movers. This asymmetric FMA bump results directly from the different survival rates shown previously (Figure 3), which, as we highlight, favor those farther ahead in production process learning curves (i.e., the firms who preempted more scale-efficient production capacity spaces through cumulative capital expenditure and R&D).

As rather intuitive the logic above may seem, the second result unveiled by our model (i.e., the persistence of such effects over time) is considerably less so. As is noticeable in Figures 1–4, the industries hit by economic shocks *remain* more concentrated over time, making the exogenously induced FMA gains sustainable in the long run. The logic behind the sustainability of FMA increments relates to the barriers that prevent new entry in the aftermath of Phoenix Miracles. The first of these barriers reflects the accumulated learning advantage. From Equation 2, accumulated output directly affects learning, and thus cost levels. Thus, in the aftermath of a shakeout, survivors continue to accrue learning experiences and reduce costs even in the absence of newer capital investments. This learning is obviously unavailable to outsiders, so when potential new entrants periodically assess the attractiveness of an entry move, fewer will find performance levels that surpass the minimally accepted (as per Equation 4). In essence, the cost competence discrepancy is significant in the current period and only grows asymptotically larger in favor of incumbents. New entry in the aftermath of a Phoenix Miracle thus evolves ever lower, subsequently explaining the long-term persistence of FMA increments as shown before.

A similar model process characterizes a second barrier, cumulative R&D. Firms invest in R&D to maximize profits the following period. In 1, R&D investment r_{it} affects profits negatively. However, while cost c_{it} also affects profits, it varies in direct proportion to τ_{it}, the cumulative technology level of firm i in period t (in 2). R&D investments then occur if net effects are positive. Similar to the learning process, r_{it} accrues path dependently but is exclusive to incumbents. Thus, subsequently to PM events, incumbents further boost R&D-based cost advantages, such that when potential new entrants periodically assess the attractiveness of the business, fewer and fewer over time find performance levels to be acceptable.

At this point then, we summarize the above findings with a succinct set of propositions:

Proposition 1a: Industries subject to a Sudden Stop will observe an exogenous shakeout, the severity of which has a positive monotonic relationship with the SS magnitude.

Proposition 1b: Given that path-dependent resources enable cost advantages, the set of *exogenous* shakeout survivors will be made up mostly of early rather than late movers.

Proposition 1c: In industries subject to SSPM events, early movers will accrue higher market share relative to their counterparts in stable contexts.

Proposition 1d: In contexts subject to SSPM events, early mover market share advantages are sustainable in the long run.

Asymmetric persistence of first-mover advantages along industry life

Further analyses of the model also made us conclude that the FMA boost discussed earlier is subject to time-dependent asymmetries. To arrive at this conclusion, we examined SSPM events at two distinct life cycle times: growth and maturity. In the former, buyer demand (and hence, firm profits) tends to grow very quickly, but in the latter, it asymptotically stabilizes.

According to previous literature (e.g., Lieberman and Montgomery, 1998; Agarwal *et al.*, 2002; Suarez and Lanzolla, 2007), ambiguity in industry standards decreases and FMA grows significantly over time until it peaks and stabilizes at the maturity stage. In our base model, this evolution has significant yet opposite effects on firm margins and entry barriers: the former asymptotically decreases along industry life, whereas the latter grows following accumulated learning and R&D. These shifts in turn affect the significance of SSPM events across these two periods, as they affect the likelihood of exit and entry, respectively. For one, the downward evolution of margins as the industry matures makes firm survival to SS events less likely, because the lower the average margins practiced, the smaller the SS magnitude needed to induce a significant shakeout. Thus, at any SS level, more firms would leave the industry if the event occurred in the mature rather than the growth phase of industry life. Moreover, the growth in entry barriers reinforces the effect. As per our earlier analysis, the FMA increment that early movers sustain over time relates to cost-based efficiencies that affect *expected performance* of potential new entrants, such that subsequently to an exogenous shakeout, fewer potential entrants over time find their expected performance to surpass minimum thresholds. As demand grows more slowly and prices more competitive, the probability that $\phi_{it} \geq \rho$ or $K_{it} \geq K^{min}$ (in 4) is higher in the growth, rather than the maturity stage of the life cycle.

In essence, the *endogenous* uncertainties known to enhance FMA along industry life also moderate the FMA increments caused by *exogenous* shocks. This occurs because endogenous uncertainties create higher margin and lower entry barrier conditions in the growth phase that ease new entry in contrast to what occurs in maturity. By interacting endogenous and exogenous uncertainties, we can thus highlight that FMA increase to levels beyond those shown in previous literature, but this *additional* FMA varies along industry life. We further tested whether the fact that some industries grow faster than others (hence, prices shift in different ways) could induce different results. Klepper (1997) in fact catalogued industry cycles and verified that they vary from multiple decades to just a few years. For this, we added a factor ω (in 5) both to accelerate and to slow down industry growth. Our results are robust and allow us to conclude that the time-dependent asymmetry in FMA increments occurs solely due to the different demand growth and price levels as the industry evolves toward maturity, therefore validating our logic.

We note that the number of firms, under an SSPM of ten percent in year 7, quickly approaches (but never reaches) that of the base model, making the effect nearly imperceptible (we applied a 20% shock, for illustration). In contrast, the number of firms under an SSPM of ten percent in year 30 drastically deviates from that of the base model (Figure 5) and remains visibly deviant thereafter. Based on the same logic, an analogous asymmetry occurs with market share (Figure 6). In sum, the FMA increases will be more ephemeral if SSPM events occur in the growth, rather than mature, phase:

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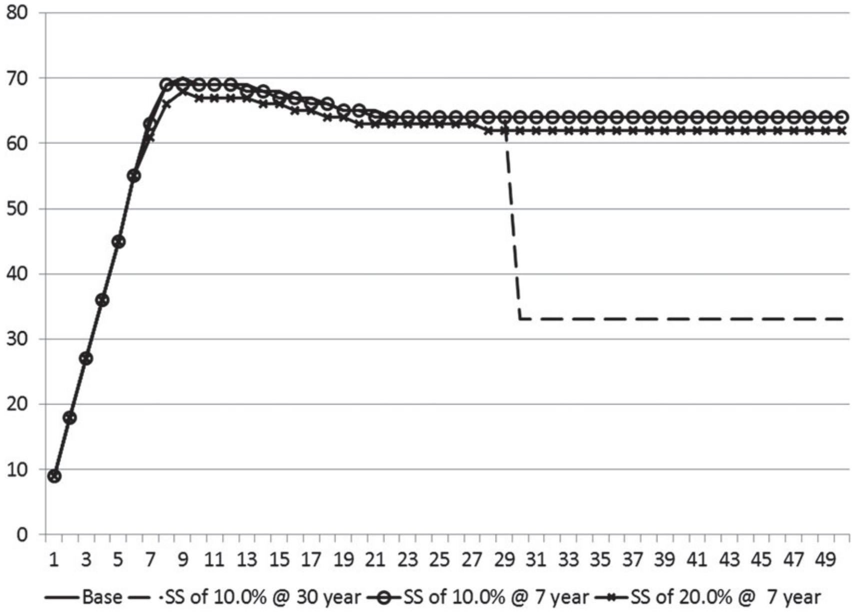

Figure 5. Time asymmetric SSPM effects on survival

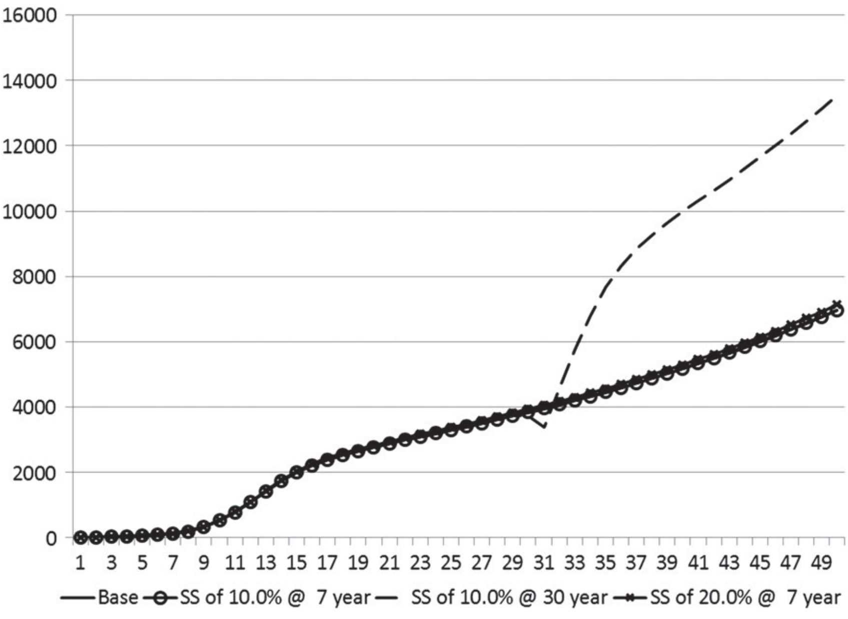

Figure 6. Time asymmetric SSPM effects on average output per firm

Proposition 2: The later in industry life SSPM events occur, the more pronounced will be the additional gains in early mover advantages. Specifically if SSPM events occur in the maturity versus the growth phase of industry life, the larger and more durable will be the deviations in early-mover market share and survival advantages in the long run vis-à-vis those observed of their counterparts in stable contexts.

Economic shocks, financial flexibility, and entry-order advantages

Preemption and technology leadership resources are not the only assets increasing in value, under SSPM. Economics and corporate finance scholars argue that a firm's financial flexibility also becomes particularly salient in distressed markets (e.g., Levine and Zervos, 1998; Love, Preve, and Sarria-Allende, 2007). But we argue that there exists an SSPM-induced switch in relative resource endowment value, such that path-dependent assets become comparatively less valuable and relevant vis-à-vis financial flexibility. Our point of interest is that this switch brings notable effects for entry-order advantages and the post-entry competitive dynamics.

We define financial flexibility as one's capacity to overcome cash flow (OC) distresses induced by SS shocks, due to the mismatch between rigid debt services (INT), and faltering revenues (P × Q), in the following relation:

$$OC_{it} = P_t \times Q_{it} - c_{it}\left(Q_{it}\right) - INT_{it} - r_{it}. \quad (7)$$

Lack of financial flexibility prevents a firm from covering its operating cash flow, thus increasing the risk of premature exit. Firms use up financial resources following a requested order: they (1) cover up negative cash flow (OC); (2) conserve the minimum required capital (K^{min}); and (3) invest to grow to the optimal Cournot level. Funds to meet these needs arise from positive OC, new debt, and/or reductions in cash excess. Under SSPM, capital markets quickly dry up, and the cost of debt rises, so flexibility turns critical for one's cash needs.

We randomly assign each firm a financial strategy that consists of a target leverage level. We define these targets by brackets, where level 1 ranges from -30 to 0 percent (i.e., firms with cash excess up to 30% of its assets); level 2 ranges from 0 to 30 percent debt relative to assets; and level 3 ranges from 30 to 60 percent debt to assets. Firms can raise any amount of debt over time, so long as their leverage remains within the assigned bracket. Importantly, target levels assigned have a random relation to entry-order and occur with equal probabilities to early or late entrants. For this reason, to better examine the trade-offs explained above, we assess firm behavior at the post-entry competitive dynamics, looking at the relation between speed of growth (i.e., how incumbents strive to *increase* FMA, while challengers try to *catch up*) and firm survival.

With this model, in Figure 7, we display the evolution of firm survival in each of the 3 financial leverage groups, with an SS of ten percent. In the base model, all 3 groups develop more or less consistently, being that firms with more cash options (i.e., more leveraged) have a noticeable survival advantage. This indicates that in stable settings, financial flexibility offers no advantage; on the contrary, it is obviously the case it pays to

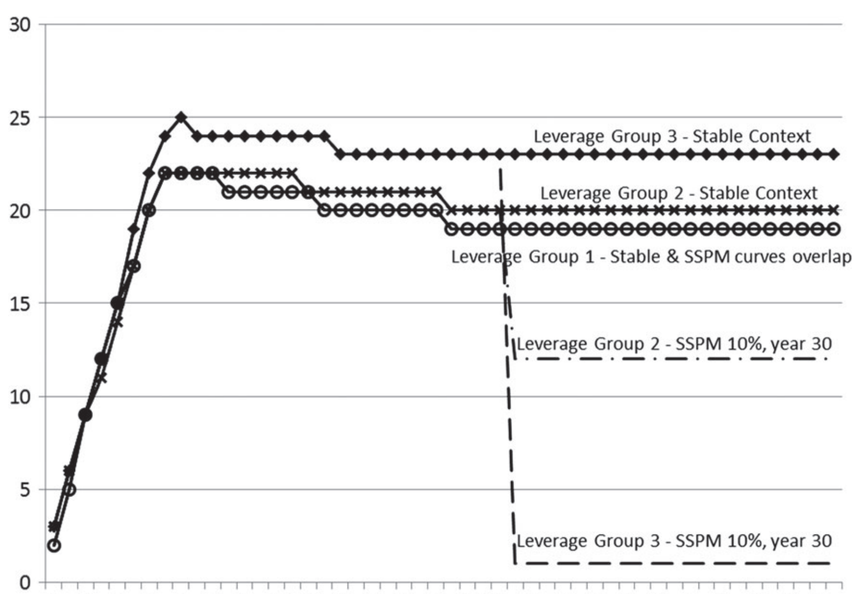

Figure 7. Evolution of survival, by Leverage Group

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be financially aggressive. Higher debt allows for a faster pace of investments, which materializes in subsequent preemption and technology leadership, the very sources of FMA. Higher financial flexibility in turn limits growth and the corresponding learning and scale economies. In contrast, in SSPM settings, this benefit turns into a disadvantage. In Figure 7, more leveraged firms (i.e., level 3) display a higher mortality rate than less leveraged firms (i.e., level 1), and a slightly higher death rate than firms with moderate debt (i.e., level 2). This effect arises directly from our model, where debt service is an intrinsic part of the firm's operating cash flow. Higher debt together with sharply smaller revenues enhances the likelihood of bankruptcy (i.e., in 4, $\chi_{it} \leq \rho \ or \ K_{it} \leq K^{min}$). In turn, firms with excess cash (i.e., lower leverage) are more likely to endure negative *OCs*, and survive. In SSPM settings, because new debt is unavailable, firms can only cover up a negative operating cash flow by reducing cash excess. However, by definition, cash excess is only available to firms without previous debt, so a negative *OC* likely brings leveraged firms to bankruptcy.

As rather intuitive the logic above may seem, the second result unveiled by our model (i.e., that the switch in relative resource endowment value affects and at times even upturn entry-order advantages) is significantly less so, and conforms our point of interest. If on the one hand preemption and technology-related assets amassed path-dependently make the firm more cost competitive to withstand SSPM events, on the other, many players, lured by the significant FMA payoffs (Figure 7), build these resource advantages by maintaining high leverage. It is here that these early-mover survival and market share advantages can be eclipsed by the short-term revenue/debt service mismatch. This deceptive investment tendency results from managerial biased heuristics in asymmetrically overvaluing gains over losses, when they find themselves immersed in a succession streak of positive outcomes (Kahneman and colleagues, 1981; 2002). The SSPM-related FMA advantages shown earlier, however, must to be weighted more mechanically against the risk of high leverage, insofar as surviving an exogenous shock requires both cost competitiveness and financial flexibility. In Figure 8, we show for market share the same trends observed for survival in Figure 7. In a stable context, leveraged firms grab a larger share of the market. But leverage becomes a relative handicap once the context turns turbulent, so in such settings more low-leverage firms survive, thereby taking a larger share of the industry.

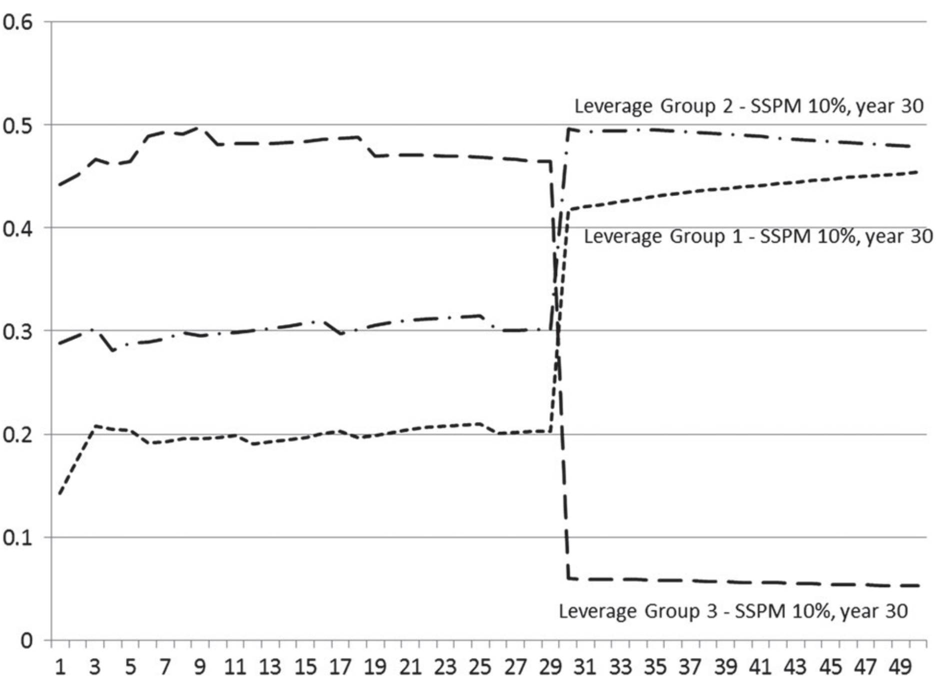

Figure 8. Evolution of aggregate market share, by Leverage Group

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The useful aspect to our theory is that, given leverage cohorts include early *and* late movers alike, the latter is more likely to catch up to incumbents in SSPM contexts, not with faster paces of investments as in stable contexts, but if it is endowed with a financial flexibility advantage.

In Figures 9(a–d), we show the aforementioned resource value shift with the associated implications for strategy, by plotting firm survival against its purported pace of investments, in the post-entry competitive dynamics. In Figure 9(a), we isolate the value of preemption and technology leadership, ceteris paribus (i.e., assuming away cash limitations). Firms accrue an ever-increasing chance of survival in stable settings the more aggressive their investment pace (asymptotic line). Under SSPM, the relevance of this pace is even more evident (S-shaped line). From our prior theory (propositions 1b–1d), FMA advantages add a significant survival premium, whereas FMA disadvantages add to death risks. *Controlling for leverage*, if firms can choose investment pace levels, we conclude that it pays to be investment aggressive in the aforesaid competitive dynamics in stable, and even more so in SSPM, settings. In Figure 9(b) in turn, we isolate the value of financial leverage to survival, as investment pace quickens. Ceteris paribus, higher debt per se does not harm survival rates in stable settings, except if one is too leveraged (upper curve bends at very high paces). In turn, in SSPM, the value of financial flexibility increases significantly (lower curve), such that the chance of survival falls precipitously, from moderate to high paces.

In Figure 9(c), the trade-off then becomes apparent when we join both effects and plot four hypothetical firms. Without considering entry order at first, in the stable context (asymptotic line), firm B invests significantly more than A and, as expected, has a notably higher chance of survival. In contrast, under SSPM (S-shaped line), B invests notably more than A, but it has a smaller chance of survival. It is this shift that, we argue, brings important consequences for FMA advantages and firm competitive behavior. Specifically, in 9d, we contrast early and late movers (full and dotted lines, respectively) in stable versus SSPM contexts (asymptotic and S-shaped lines). In stable settings, it takes a significant faster pace for a latecomer (firm D) to catch up to an early mover's (firm C) time-based survival advantage. But under SSPM, with the aforesaid endowment value trade-off, the late mover's (D) catch-up requires a different class of asset endowment altogether, represented by a financial flexibility advantage over incumbents (C), even if the associated slower investment pace results in a larger FMA disadvantage. Essentially:

Proposition 3a: Under SSPM, ceteris paribus, firms engaged in the post-entry FMA competitive dynamics (i.e., incumbents try to increase their FMA lead, while challengers try to close the FMA gap) face a critical trade-off between investment pace (which entails higher FMA benefits) and financial flexibility. Higher investment paces enhance cost-effectiveness advantages, but increase financial inflexibility and the risk of death.

Proposition 3b: There is a curvilinear relationship between the investment pace in the post-entry FMA competitive dynamics and the likelihood of survival under SSPM. The faster paces known to afford greater FMA survival benefits in stable settings actually increase the risk of death in SSPM settings.

Proposition 3c: In SSPM contexts, the resource base for late movers to upturn market positions with incumbent's changes. Late movers in these contexts are more likely to outsurvive incumbents over whom they have a financial flexibility resource advantage, in contrast to their respective peers in stable contexts who instead depend on catching up to time-based preemption and technology leadership resource gaps.

Sensitivity analyses

As with any formal model, our results depend on the structural characteristics assumed as part of the set of behaviors displayed by firms and groups, which in turn define the scope and validity of our conclusions. As we discussed simulation results, we introduced several relevant checks for different parameter values, to verify the robustness and to confirm our model output is not driven by narrowly convenient parameter choices. Given the extent of our model, we ran several additional checks not reported herein (e.g., lower prices of substitute goods induce price rivalries much earlier in industry life) but that do not change the propositions offered here. While we confirm

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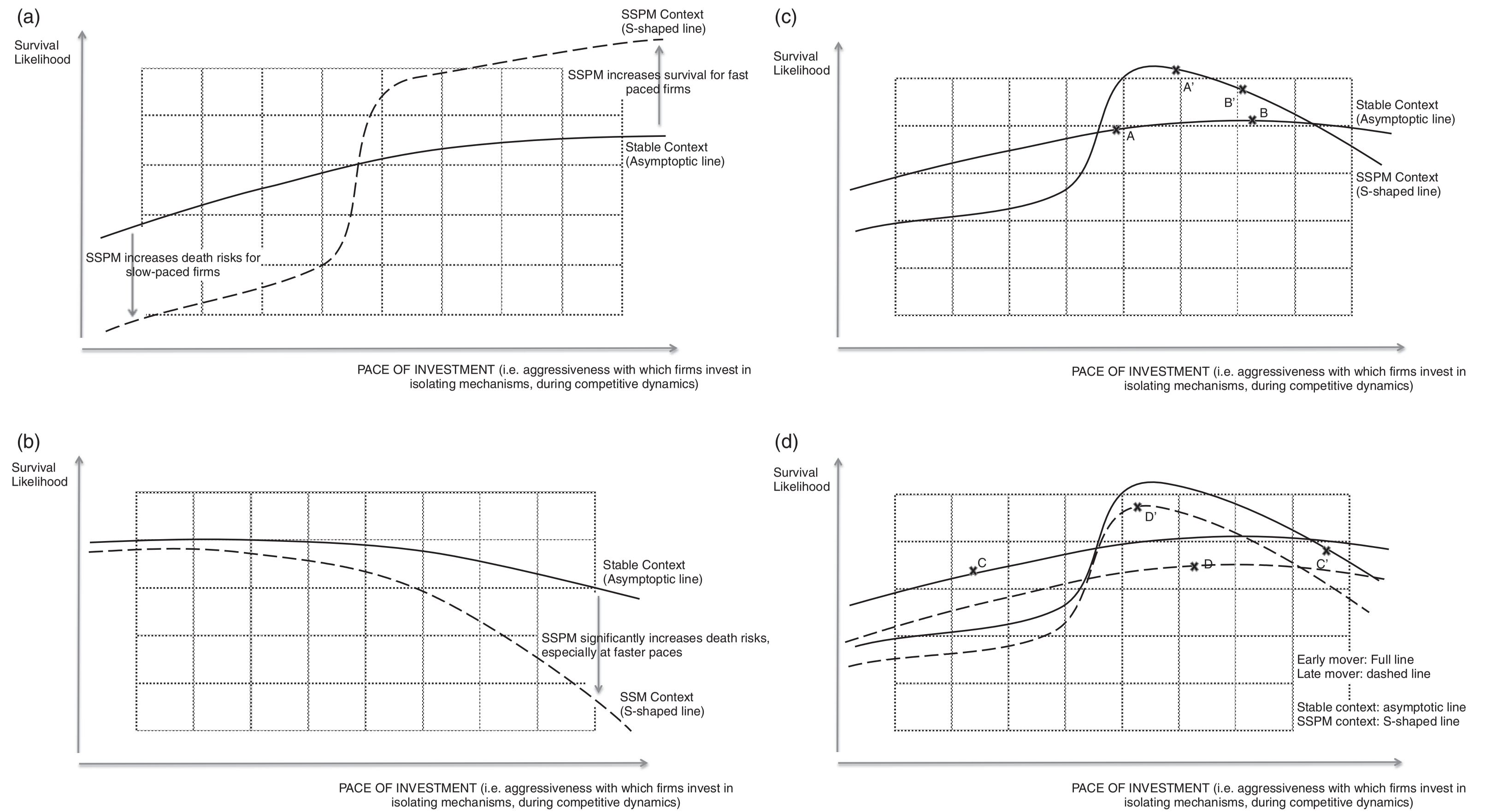

Figure 9. (a) Scale and R&D resources (i.e., path dependent FMA isolating mechanisms). (b) Financial flexibility on survival likelihood, as speed of growth increases. (c) Combined effects, isolating mechanisms × financial flexibility. (d) Combined effects, contrasting early and late movers

the qualitative results were the same for these extra checks, for parsimony here, we make them available upon request. From this extra set of checks, we call attention to only one, which we find intriguing. Under SSPMs of significant magnitude, prices plummet so low that all firms exit the industry, while in some runs industry populations actually never quite recovered. This latter finding was especially the case when strong substitute products exist. Though we reckon that in real life entire populations can disappear when hit by SSPMs, prices often recover dramatically quickly, when the shakeout wipes off supply capacity. In this case, the discrete nature of any simulation model requires steps small enough for the price adjustment to occur before an industry disappears. To avoid the possibility that results correlated with the step size, we ran simulations with different sizes, and still found robust results. Moreover, because the range of Π_t follows that of previous literature, we observe that these results do not affect our conclusions, since these occurred in an insignificant number of runs.

CONTRIBUTIONS, FUTURE RESEARCH, AND CONCLUSION

In this paper we examine the implications of economic shocks to the evolution of competition and entry-order advantages (FMA), which are critical to firm strategy. Reasoning from the fact that SS events induce drastic falls in demand and disrupt capital markets, while PM events involve a recovery of the former, but not of the latter (Calvo and colleagues, 2000, Calvo and colleagues, 2006; Calvo and colleagues, 1996), we propose that economically turbulent settings induce shifts in the values of distinct resource endowments, thereby, at one point, increasing the relevance of preemption and technology leadership (i.e., the isolating mechanisms that yield FMA); but on the other, switching the bases upon which firm advantages are built and sustained over time. Previous FMA research suggests firms are to enter early as well as invest in fast-paced growth and learning, so as to build path-dependent sources of advantage. Based on formal modeling and simulation runs, we demonstrate that, in SSPM contexts, early entry brings an even higher payoff. But we also point to a vital trade-off between one's growth speed (i.e., investment aggressiveness in preemption and technology) and its financial flexibility. Compared to their peers in stable settings, early movers then have even more reasons to be first under SSPM so long as this is not done at the expense of one's flexibility. In turn, laggards will catch up to incumbents more easily by pursuing not the conventional race to close gaps of isolating mechanisms, but those of financial flexibility.

What does our study bring to strategic management research?

We frame our study in the entry-order advantage (FMA) literature (Agarwal *et al.*, 2002; Kalyanaram, Robinson and, Urban, 1996; Lieberman and Montgomery, 1988, 1998; Robinson and Min, 2002; Suarez and Lanzolla, 2007; Tellis and Golder, 1996; Tellis and Golder, 1993). Conceptually, examining FMA advantages (which build up from quick entry as well as decisive behavior in the ensuing competitive dynamics) enables us to contrast endogenous and exogenous uncertainty effects along industry life and their related asset endowment trade-offs. Where endogenous uncertainties prevail, firms win out by investing in path-dependent assets. But, if both uncertainties overlap, firms must trade-off their assertive investment patterns—which yield FMA gains to respond to endogenous forces shaping industry life—with the maintenance of flexibility—which instead respond to the exogenous uncertainties. By considering an additional layer of uncertainty to the life cycle, we are able to reflect upon two important matters. For one, exogenous shocks yield *increments* to FMA otherwise unexpected in stable contexts. For another, they also switch asset endowment values, such that the aforesaid *added* FMA is contingent upon firms up keeping distinct resource sets often overlooked by those accustomed to stable settings.

Further, the evolutionary concept that *when markets retract, weak firms leave and strong firms grow* (e.g., Klepper, 1997) is an intrinsic element of models that examine the endogenous processes that characterize industry evolution. With rare exceptions (e.g. Jovanovic & MacDonald, 1994) have exogenous forces been considered in these processes. Paradoxically however, in SSPM contexts, the definition of what constitutes a strong firm shifts from those who invest in path-dependent asset endowments to those who, despite otherwise gaining even further from stronger pledges to such asset building, trade-off

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some resources that respond to endogenous evolutionary forces with those necessary to withstand exogenous ones. This is an important supplement to the industry life cycle literature, for it points to resource-based management approaches otherwise overlooked due to research model scope.

Our study also weighs in on the debate about whether entry-order advantages are absolute or comparative (Robinson and Fornell, 1985; Robinson *et al,* 1992). In contrast to the notion of absolute FMA gains (i.e., entering early always yields FMA), the comparative advantage view has it that to each industry life phase corresponds a distinctively valued asset endowment. Empirical studies corroborate this comparative view, for example, by highlighting the superiority of cash and R&D skills of firms entering industries in the emergent phase (Biggadike, 1976; Robinson *et al.*, 1992) or the production (Lambkin, 1988) and marketing skills (Robinson *et al.*, 1992; Sullivan, 1992) for those entering the growth and mature stages. Therefore, by juxtaposing endogenous and exogenous uncertainties in the evolutionary cycle, we add to the debate on comparative advantages but not from the traditional endogenously expected phase succession point of view. Exogenous forces shift asset endowment values *within* the strategic windows pointed out by Abell (1978). Specifically, we show that FMA may increase or decrease depending on whether one considers the value of assets that build path dependently (FMA increases) or that of assets that afford flexibility (FMA may increase or decrease, depending on which firms possess these).

Another strategy research implication related to FMA results from the scope of our study. Usually, FMA research focuses on *the very act of entry*, although Mueller (1997) warns that FMA builds up and persists due to the incessant zealousness in the ensuing competition between incumbent and challenger. By modeling both entry timing and speed of growth we highlight the distinct resource-based approaches that latecomers will rely on to catch up. In stable settings, laggards will hope incumbents will turn careless, so as to stealthily surprise them with aggressive preemption of newer markets or discovery of newer technologies and close FMA gaps (Mueller, 1997). Yet, when challengers (i.e., late movers) face exogenous forces, they will strategize differently and will instead pursue flexibility advantages over incumbents. Because the *relative* value of flexibility-related resources increases significantly, firms will thus compete dynamically on the basis of exchanging some of their growth zealousness for maintaining financial flexibility. It is because we expand the scope of our analysis to include post-entry competition that we can point to the different manner late movers catch up to incumbents.

A group of scholars has recently considered firm adaptation under so-called "environmental jolts" (loosely defined as sudden and unprecedented events in the firm surrounding context). Although SSPM events could be considered a type of "jolt," this theoretical concept specifies neither the sources (e.g., endogenous versus exogenous to life cycles) nor the qualities of such events. For instance, such events can range from doctors' strikes affecting service supply, trusted clients suing the firm, federal regulations shifting the constraints imposed on a firm, or even ecological activisits boycotting the business (Meyer, 1982). By relying more directly on the literature of macroeconomic volatility, we are able to specify more precisely the mechanics associated with intrinsic firm decisions related to balancing the need in a macroeconomic meltdown (e.g., cash flow maneuverability) vis-à-vis the long-term investments necessary to create and sustain path-dependent advantages. Very few managerial studies exist that consider economic crises, with some notable exceptions, such as the examination of corporate acquisitions (Wan *et al.*, 2009), strategic reactions (Kunc and Bandahari, 2011), export performance (Lee *et al.*, 2009), and prior managerial experience (Wang *et al.*, 2005). Our model adds significant light to our understanding of strategic decision making as firms trade-off asset endowment positions in a competitively dynamic process. We hope our study will help inspire further studies of strategy and management under significant environmental turbulence.

Lastly, our study has policy implications. The analyses of recessions and their consequences to firm behavior have for a long time highlighted the cleansing effects such downturns have on competitive markets. This tradition can be traced back to the Schumpeterian idea of creative destruction and have positive valuations to recessions. Previous research explains that market cleansing occurs due to the fact that recessions reduce the opportunity costs for firms to engage in activities that will contribute to future productivity gains, whereas those firms that exhibit outdated technologies are pushed out of the market (Aghion and St. Paul, 1998; Caballero and Hammour, 1994; Cooper and Haltiwanger, 1993). But the idea that recessions hit mostly firms lagging behind productivity and technology frontiers assumes perfect financial markets. By shifting this assumption (i.e., by considering that firms may have difficulties accessing credit during times of depression), we highlight a different picture, with welfare implications and other notable public policy implications. As Barlevy (2003) points out, credit constraints can lead to an inefficient allocation of assets, especially in times of depression. Thus, from an empirical standpoint, firms with relatively high productivity can counter intuitively be forced out of the market, not because productivity is a bad thing, but because financial flexibility becomes temporarily more valuable. This phenomenon has been coined "the scarring effect of recessions" (Irons, 2009, Ouyang, 2007). Reduction in capacity will lead to reduced production capacity in the years to come, with overall negative welfare implications. Our study goes in the line of making important efforts, as policy makers, to avoid SSPM situations.

What does our study bring to strategic management practice?

Every now and then, some firms will emerge stronger from economic crises. Our study explains some factors behind this otherwise unlikely success. Conventionally, managers promote aggressive cost-cuttings to their operations and growth plans when immersed in economically turbulent contexts and usually hesitate to enter markets that may turn turbulent at some undefined point in the future (Dobbs, Karakolev, and Malige, 2001). All things equal, however, we suggest a rather unconventional strategy in that, if it pays to be an early mover in an industry, under SSPM it pays even more, such that firms should enter *more* not *less* quickly. Certainly this changes if SS events are to occur immediately, or are already under way. But even in this case, we point out that it is precisely during the ensuing PM phase, that a latecomer has a distinct source of advantage over financially stunned incumbents, who otherwise enjoy FMA benefits.

The implications of our study are quite unique for multinational firms entering emerging markets, insofar as their global footprint affords the diversification of financial risk and makes them naturally more flexible than local rivals. This is significant because, when subsidiaries are immersed in economically turbulent countries, a common impetus of foreign headquarters is to forfeit pledges to those markets, to avoid bad asset exposure (Carrera *et al.*, 2003). Yet, from a strategy view, our study shows a unique prospect. As shocks shift the bases of competitiveness, the global firm—an early entrant, or even a second mover to local homegrown champions—finds itself with a temporarily more potent weapon in its diversified cash access. Unconventionally then, they may instead stick through the storm, by deploying financial resources either to attack and upturn the incumbent's advantage or to defend its FMA lead. Danone gives us examples on both fronts. Having entered late into the Argentine bottled water industry, it lacked significant market space with retailers and buyers, vis-à-vis other foreigners, such as Nestlé, the Coca Cola Company, and PepsiCo. But during the 2002 shock, it decided to try a rather contrarian approach for a multinational in that country at the time. By investing heavily during the Phoenix Miracle (with grudging authorization from French headquarters) to preempt rivals into new price-sensitive market niches, as well as to develop new streamlined processes in its supply chain logistics, it upturned the rivals' former path-dependent asset advantages, precisely when these rivals were impeded by their respective headquarters to further invest in Argentina until the market recovered. Though all these multinationals can be said to have had comparable flexibility from global cash flows, Danone was the only one to continue to acquire assets and market space during the Phoenix Miracle and thus eventually emerged as the largest and most profitable firm in the local industry. Using an analogous approach, Danone also defended its early-entry advantages in the Argentine fresh dairy industry, but this time against local, financially inflexible rivals who struggled with a stunning cash paralysis (Fragueiro and Vassolo, 2009). Analogous competitive dynamics also unfolded for Hyundai, against General Motors and Chrysler in the 2009 United States recession. Although capital markets were still comparatively stable (e.g., vis-à-vis that of Argentina 2002), the two locals were officially bankrupt and thus equivalently (vis-à-vis Danone's rivals) paralyzed in financial terms. Only the U.S. government cash intervention was able to stop liquidation of the locals (Chung, 2010). In sum, managers capable of balancing awareness of their

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firm's own market leadership, with the timing and magnitude of a possible shock along industry life, will be able to position their firms strategically in the SSPM aftermath and establish a lasting advantage in turbulent markets in ways not possible in stable settings.

The strategy a laggard can leverage to catch up to an early entrant will then differ across contexts. In stable settings, challengers will hope for careless incumbents, so as to gain the race for newer markets, or technologies. Pepsi's initiatives with retail channel preemption in mid-20th century for instance, are accounted to have helped it strive closer to Coke in the U.S. market (Yoffie, 2010); while Heinz's assertive foreign entries have helped it reduce Campbell's lead, in the global wet soup industry (Sutton, 1991: 207-211). Yet, when challengers face economic shocks, they will instead pursue and leverage flexibility advantages over incumbents. In this case, Pepsi's and Heinsz' approaches give way to Hyundai's and Danone's, described above. In sum, in stable contexts, a late mover will possibly catch up if it is significantly faster in growing. In turn, under SSPM, a late mover will possibly catch up if it has notable flexibility advantages.

Future research

Our study certainly faces scope trade-offs, so it creates opportunities for future research. FMA research reviews point to both supply- and demand-side isolating mechanisms (Mueller, 1997). Yet, to keep our model mechanics consistent, we focus on supply-side processes. Our Cournot model requires product homogeneity, so we assume away endogenous uncertainties of *product* rivalry early in industry life (see Klepper, 1997; Jovanovic and MacDonald, 1994, for a similar approach). New studies on the effects of SSPM onto FMA along industry life can expand our knowledge by focusing on demand-side mechanisms, and earlier industry periods. Also, other forms of exogenous shocks may be considered (see the recent competent study by Li and Tallman (2011), for example), such as social, political, and technological shifts.

Our study is especially relevant to weak capital markets, which tend to dry up much more drastically under SSPM. Yet, in some areas with developed capital markets (e.g., the U.S., the U.K.), loss of cash fluidity may be shorter, thus possibly buffering the effects modeled here. Certainly this is not to say that our study is relevant only in weak capital market contexts. The case of Hyundai against bankrupt GM and Chrysler in the United States automobile industry discussed earlier highlights how relevant our study is even for developed markets. The essential feature of the model is financial inflexibility of the firm, not fluid capital markets, although we recognize the latter may have, in some occasions, a dampening effect on the former. Surely even mild GDP drops may asymmetrically disrupt different industries, with a 15 percent demand loss to some or a 2 percent loss to others. Future research can then examine the scope of our findings across industries in developed and emerging markets.

Concluding remarks

German philosopher Friedrich Nietzsche (1889) once stated, "From life's school to war: what does not kill me makes me stronger". The quote, we believe, highlights the essence of strategy in economically turbulent contexts. By juxtaposing endogenous and exogenous forces associated to entry order and competition, we hope to inspire further research on the subject.

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