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A Typology of Organizational Behavior

and Its Application to Diversification

U.S. Venture Capital Firms, 1980–2004

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ABSTRACT

This paper proposes four forms of organizational behavior at the intersection of organizational ecology (inertia *vs.* change) and new institutionalism (normative *vs.* deviant): *innovative* (deviant change), *reformative* (normative change), *conservative* (normative inertia), and *reactionary* (deviant inertia) in the order of the life-course of an organizational form. Then, it further identifies decision-making strategy underlying each dimension of those forms: risk-aversion *vs.* risk-taking underlying inertia *vs.* change and certainty *vs.* uncertainty underlying normative *vs.* deviant. Simply speaking, the choice between inertia *vs.* change is a matter of experience whereas that between normative *vs.* deviant is a matter of information. This integration between organizational theories and decision-making theory leads to hypothesize various behavioral outcomes corresponding to various types of diversification in an application of the typology to venture capital (VC) industry. Analyzing U.S. VC firms' investments to target companies from 1980 through 2004, this paper finds three distinctive relationships between VC firms' investment-diversification and subsequent investment behaviors: First, target-diversification leads to *conservative* investments (decreasing both uncertainty and risk); Second, industry-diversification leads to *innovative* investments (increasing both uncertainty and risk); Third, stage-diversification leads to *reformative* investments (increasing risk but decreasing uncertainty).

Key Words: inertia, conformity, uncertainty, risk, innovation, reformative, diversification

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The emergence of diversification is a major transformation in the organizational form in the modern era, and has been paid considerable academic attention since Chandler (see Chandler 1962). The emergence of multidivisional, diversified firms since the late 19th century is the realization of managerial strategies in seek of economies of scale and scope and in cope with different market environments (Chandler 1977). This type of diversification driven by managerial capitalism (Chandler 1977), however, evolved to another level during the late 20th century: product-unrelated diversification (Fligstein 1991: 328). This new form of diversification arguably reflects a power shift toward financial capitalism (Fligstein 1987). Though there have been considerable studies about the causes of diversification (see Fligstein and Dauber 1989 for discussion) and its performance-related outcomes (e.g., Palepu 1985; Simmonds 1990), few studies have examined behavioral outcomes of diversification to my best knowledge. Are more diversified firms more likely to take risks or behave deviant? Is it true to both product-oriented and finance-oriented diversification?

If the forms of diversification evolve and become complicated in contemporary markets, its behavioral implications will be complicated in consequence. This study aims to identify and discriminate those complicated behavioral implications of various types of diversification through two research strategies: empirical one and theoretic one. (1) I choose venture capital (VC) industry as an empirical context to observe various types of diversification. Since VC investments require various abilities including financial risk assessment, technological knowledge and managerial skills, VC firms' investment-

diversification takes various routes such as financial risk diversification, technological diversification, and financed stage diversification. VC firms' investment data provide rich information on various types of diversification which in turn lead to distinctive organizational behaviors. (2) I propose a two-by-two typology of organizational behavior at the intersection of organizational ecology and new institutionalism, or at the intersection of risk and uncertainty. This typology will enable us to identify and discriminate each behavioral effect of each type of diversification. I will also discuss general applicability of the typology beyond VC industry.

TYPOLOGY OF ORGANIZATIONAL BEHAVIOR

Inertia and Conformity

In the field of contemporary organizational studies, two similar organizational behaviors have been studied according to two different theories: inertia (*vs.* change) in population ecology (e.g., Hannan and Freeman 1989; Miller and Chen 1994) and conformity (*vs.* deviance) in new institutionalism (e.g., Meyer and Rowan 1977; Phillips and Zuckerman 2001). Organizational inertia is acquired through the selection process in an organizational population (Hannan and Freeman 1989: 67-77). It is an analogy to biological inertia imprinted in the organic body, which hinders adaptation to environmental changes, results in the failure of survival through the changes and, ultimately, leads to an evolution to a new population (Hannan and Freeman 1977). In comparison, conformity is an adaptive behavior in pursuit of legitimacy, which is often ritually settled (Meyer and Rowan 1977) and achieves institutional isomorphism among different organizations (DiMaggio and Powell 1991).

Figure 1 shows four possible combinations of organizational behavior derived from a cross-table of the two theoretical approaches. Inertia and conformity (or, change and deviance) often overlap both theoretically and empirically though they are distinctive concepts. Hannan and Freeman (1989), in their theoretic elaboration to account for why selection favors inertia, provide legitimacy pressure as an important cause for inertia (p67-77), which clearly implies that inertia theoretically intersects with conformity. In addition, some empirical studies often combine organizational ecology and new institutionalism to explain organizational behaviors at the intersection (e.g., Haveman 1993; Dobrev 2005; Lune and Martinez 1999). Those intersecting behaviors will fall in the shaded diagonal positions in figure 1 (*i.e.*, normative inertia or deviant change).

FIGURE 1 ABOUT HERE

Then, how much attention have researchers been paying to the non-intersecting, or off-diagonal positions: deviant inertia or normative change? In fact, normative change has been a central research topic among new institutionalistic studies: any studies about institutionalization or about later adopters driven by legitimacy pressure, by definition, examine normative change (e.g., Hirsch 1986; Haveman 1993; Davis and Greve 1997; Tolbert and Zucker 1983). In comparison to normative change, deviant inertia has not been much studied. I will further elaborate later that deviant inertia is most likely to be observed in a disappearing population or in the process of deinstitutionalization which could be least observable or of least interest to both ecologists and new institutionalists.

In sum, most forms of organizational behavior in Figure 1 have been actively studied, but have not been theoretically clarified with respect to their differences, similarities, or relations. Inertia and conformity are often viewed indiscriminately. This paper attempts to provide a theoretic typology of the four forms of organizational behavior derived from the combination of organizational ecology and new institutionalism. I will show utilities of this typology later by (1) briefly applying the typology to the life-course of an organizational population/institution and (2) empirically identifying how various types of investment-diversification in VC industry associate to various behavioral outcomes. In order to develop the typology, we will first need to know two economic concepts are mutually related as much as inertia and conformity: they are risk and uncertainty.

Risk and Uncertainty

There are also two economic concepts concerning the outcome of economic behavior that are distinctive but often confounded: risk and uncertainty. The difference or relation between the two concepts is best summarized by March and his colleagues from an organizational perspective. High-risk behavior implies high variance in the distribution of its outcome (e.g., March and Shapira 1987; March 1988) whereas high uncertainty implies an unknown distribution of the outcome (March and Simon 1970: 93). Therefore, we cannot properly assess risk of a certain behavior under high uncertainty because the variance of a distribution cannot be calculated if the distribution itself is not known. This is why risk-taking is a rational behavior given the perfect information of alternative

outcomes, whereas uncertainty or imperfect information enforces “search” for “satisficing” behavior (March and Simon 1970: 93-102).

In sum, certainty is a prerequisite to the choice between risk-taking and risk-averse behavior. Without certainty, discussing the risk of a behavior is not meaningful. But, if we limit the definition of uncertainty to unknown mean of an outcome in combination with its known variance, different levels of risk are conceivable under uncertainty. Under this limited uncertainty, a decision-maker knows that the outcome of a risk-averse behavior, for example, will be close around a mean outcome wherever the mean outcome is. In sum, there are four possible combinations of economic behavior with different levels of risk under different levels of uncertainty, as is drawn in Figure 2. Again, the shaded two combinations in the diagonal are likely to be empirically associated and confounded. However, off-diagonal forms like risk-aversion under high uncertainty or risk-taking under low uncertainty are also likely and meaningful, assuming the limited uncertainty only about a mean outcome.

FIGURE 2 ABOUT HERE

Conservative, Innovative, Reformative, and Reactionary Behavior

This paper defines four forms of organizational behavior in a market by overlapping organizational behavior (Figure 1) and economic behavior (Figure 2). Figure 3 shows how the two figures are overlapped. The two key features of the overlap are (1) the

matching between normative *versus* deviant behavior and low *versus* high uncertainty and (2) the matching between inertia *versus* change and low *versus* high risk.

FIGURE 3 ABOUT HERE

First, normative behavior implies statistically modal (*i.e.*, frequent) behavior by definition because the norm is kept or followed by the majority of a society. Therefore, the outcome distribution of a normative behavior will be known better than that of deviant behavior because of its larger number of observations, whether the distribution has large or small variance.¹ It is, in other words, a matter of information concerning what a specific behavior results in: normative behavior reduces levels of uncertainty and deviant behavior suffers high uncertainty.

Second, inertia *vs.* change corresponds to low *vs.* high risk. Doing what has been done (inertia) increases “accountability” of processes and “reliability” of an outcome (Hannan and Freeman 1989: 72-3). Reliability means low variance by definition: inertia guarantees smaller variance in outcome or lower levels of risk than does change. In addition, accountability of inertia implies that the decision-maker comes to know why a specific behavior results in a specific outcome by repeated, fine-tuned trials. This accountability, in combination with reliability, requires that “organizational structures be highly reproducible (Hannan and Freeman 1989: 75).” In summary, inertia *vs.* change is a matter of experience or a matter of reproduction with accountability and reliability.

¹ In fact, the outcome of normative behavior is not necessarily more predictable (*i.e.*, of smaller variance) than deviant behavior. In other words, decision-makers do not exactly know what beneficial effect the norm brings. They simply follow norms for the sake of legitimacy (Meyer 1977; Meyer and Rowan 1977).

Informed by these matches between conformity and certainty and between inertia and low risk, I will name four forms of organizational behavior in market. When an organization changes its behavior following others' frequent behavior, it does not know exactly how far its own outcome will surpass or fall short of the average outcome if the organization has never tried it before or did it too long ago. This behavior represents normative change or "*reformative*" behavior in Figure 3. It is reformative because it tries something new but is not truly innovative because it follows known paths whose outcome is reasonably predictable with some variance. It is deviant change that can be named "*innovative*" behavior whose outcome is, with few precedents, truly unknown. At the diagonal opposite to innovative behavior, normative inertia or "*conservative*" behavior represents constant staying with the majority, whose outcome is most certain with least variability. At the diagonal opposite to reformative behavior, deviant inertia or "*reactionary*" behavior is positioned.

In order to understand reactionary behavior better, let's conceive market value of a product as an outcome in the product market. In addition, imagine many producers leaving the market because the market is not seen as lucrative anymore. A producer sticking to its production is not sure about its expected outcome or market value due to increased environmental uncertainty (e.g., more scarce but less popular product now). In other words, the producer is under high uncertainty. Its realized market value, however, will be close around a new average value, whatever the average value is, because the organization has been routinely producing the product with reliable quality whether the quality has been high or low. In sum, the producer is risk-averse but under limited

uncertainty. I name deviant inertia reactionary because the behavior sticks to an old way when most others choose to change.

An Application: The Life-course of an Organizational Form

An instant implication of the typology to organizational ecology or new institutionalism is the life-course of an organizational form. The life-course starts as an innovative behavior. When innovative organizations turn out to be successful, innovative behavior's uncertainty is lowered and the behavior is diffused to and formalized in reformative followers. When the formalization is finely tuned by repeated trials in order to achieve reliable outcomes, the behavior is established as a conservative organizational form. If the form's effectiveness declines due to environmental changes or increased uncertainty, the form will remain or die as reactionary inertia. In Figure 3, the life-course starts at *innovative*, rotates counterclockwise to *reformative* and then to *conservative*, and finally ends at *reactionary*.

An organizational form can be either a defining characteristic of an organizational population or an institutional practice in an organization field. The life-course of an organizational form, correspondingly, can reflect either the growth and decline of a population or the course of institutionalization and deinstitutionalization. In either case, the life-course perspective suggested by the proposed typology helps to revive the dynamism of the original theories: the evolutionism of organizational ecology, and the birth and death of legitimacy pressure. I suspect such dynamism is the key mechanism of both theories but often lacks in empirical studies. For example, studies on founding or disbanding rates within a population seem to be limited to the equilibrium stage or

conservative stage of a population, which must be contrary to Hannan and Freeman's vision (see Hannan and Freeman 1989, preface). The determinants of birth and death at early stages or later stages may be different and worth to examine. More importantly, transitions from one stage to the next or from one population to another need more research. Similarly, institutional studies on diffusion tend to be limited to *reformative* stage when legitimacy pressure is most growing. I believe it is also important to know why some innovations fail while others settle as institutions; or how institutions finally lose their legitimacy. Without those mechanisms, existing institutions will perpetuate themselves by legitimacy pressure.

The typology of organizational behavior can give more insights or research agendas to its theoretic sources like organizational ecology and new institutionalism. However, it can help other important research topics independent of these theoretic sources. Hereafter, I will explain various types of diversification in the contemporary VC industry, and will show how the typology can discriminate different behavioral implications of respective types of diversification. For this topic, we will be mainly helped by the other side of theoretic sources of the typology: risk and uncertainty in decision-making theory.

DIVERSIFICATION IN VC FIRMS

Two Criteria for Identifying VC Firm's Behavior: Technology and Finance

The VC market is between product market and the financial market. A venture company is the combination of finance (the investing VC firm or firms) and technology (the target company in which VC firms invest). Based on this key feature of VC investment, this

study looks at which stage (finance) and which industry (technology) a VC firm focuses on, in order to identify investment behavior. I use five categories for financing stages (the startup/seed, early, expansion, later, and buyout/acquisition stages) and ten categories for industries.² Then, I define the focus stage or industry of a VC firm at year t as the most frequently invested stage or industry in terms of the number of financed rounds by the firm during the year.³ After identify VC firms' behavior by focus stage and focus industry at year t , our next step is to identify normative behavior (vs. deviant) and inertia (vs. change) among VC firms, which enables us to assign VC firms' behavior to the proposed typology of organizational behavior.

We can define firm i 's degree of normativeness at t in relation to $t-1$. Let N_{it-1} be the number of VC firms whose focus stage and industry were the same with those of firm i at $t-1$. Among those firms, let f_{it} be the number of VC firms that still share focus stage and industry with firm i at t . Then, the degree of firm i 's normativeness at t is:

$$Normativeness_{it} = \frac{f_{it}}{N_{it-1}} \quad (1)$$

where the sum of f_{it} across all stages and industries is equal to N_{it-1} . This measure calculates the proportion of VC firms using the same strategy as firm i at t among those at $t-1$. Thus, the measure quantifies how frequent firm i 's strategic behavior is, given its past behavior. More important, $Normativeness_{it}$ has a high value even when firm i changes its focus stage or industry from $t-1$, as long as many other firms make the same change (*i.e.*,

2 These ten industry categories are: Communications and Media, Computer Hardware, Computer Software and Services, Internet-Specific, Semiconductors/Other Electronics, Biotechnology, Medical/Health, Consumer-Related, Industrial/Energy, and Other Products.

3 If two stages or industries are tied in the number of financed rounds, I compare the numbers of rounds invested in by all VC firms during the year at the two stages or in the two industries and choose for the focus stage or industry the one that is less frequently invested in by all VC firms. In other words, the focus stage or industry of a firm is the one in which the firm invested relatively more than other VC firms did.

innovative behavior). By contrast, it has a low value when the focal firm keeps focusing on the same stage or industry if others move out of that stage or industry (*i.e.*, reactionary behavior). Therefore, the measure really represents a continuum between deviant and normative investment behavior, without confounding inertia with modality or change with deviation. In comparison to this operational definition of normativeness, that of inertia is very straightforward: Firm i 's behavior at t is inert when its focus industry and focus stage are the same as those at $t-1$. The behavior is change otherwise.

Since we have identified normative behavior or inert behavior in terms of focused industry and stage, we are now able to map VC firms' investment behavior to the two-by-two typology of organizational behavior. As a next step, we will finally identify various types of investment diversification among VC firms and predict which diversification causally leads to which behavior in the typology.

Three Lines of Diversification in VC: Target, Industry, and Stage

VC firms in reality are financially oriented investors rather than committed helpers to realize entrepreneurs' technology (see Zider 1998; Nanda 2001). Their basic risk management, much like typical financial investments, is making a portfolio of multiple investments, or spreading capital to multiple targets (Zider 1998: 135). For a simple illustration, think about a target company from which the expected return has a mean μ and variance σ^2 . By equally dividing one's total capital to n independent targets of the same mean and variance, the expected return has a smaller one- n th variance σ^2/n though its expected mean is still the same by Central Limit Theorem (Rice 1995: 169-73).

A prerequisite for this risk-averse strategy is the certainty or information about the outcome distribution such as mean and variance. Target-diversification also implies coinvestment or syndicate with other VC firms, which enables information-sharing with other firms. The information-sharing is the key effort to lower uncertainty (Bygrave 1988) and arguably a more important function of target-diversification than risk-management in highly uncertain VC markets (Bygrave 1987). In terms of investment behavior, target-diversified firms will make normative investment for the sake of certainty and will stay in their focus industry and stage in order for reliable returns:

Hypothesis 1: The more target-diversified, the more normative and inert or the more conservative as opposed to innovative.

The high uncertainty in VC markets originates from technological uncertainty. It is not easy to assess the likelihood of a target company's successful public debut. Owing to this high technological uncertainty inherent in the VC market, VC firms tend to focus on specific industries for investment, which runs counter to the diversification strategy for risk management in typical financial markets (Norton and Tenenbaum 1993). In other words, the argued effect of target-diversification by Hypothesis 1 would be attenuated to the degree that target-diversification is confounded with industry-diversification because industry-diversification will have the opposite effect of target behavior: Industry-diversified VC firms are more likely to be true innovators who do not follow peers' or competitors' investment pattern (*i.e.*, less normative) because they are willing to take technological uncertainty in search for a big hit. In this sense, they are explorers who are

willing to take first-mover advantage (Saloner, Shepard and Podolny 2001: 93-118). Their preference for a big fortune will also allow them to take more risks or opportunistically switch their investment focus between the diversified industries (*i.e.*, less inert). In sum, the effect of target-diversification will be better estimated by controlling for that of industry-diversification whose effect is expected to be exactly opposite.

Hypothesis 2: The more industry-diversified, the less normative and inert or the more innovative as opposed to conservative.

The last type of diversification under examination in this paper is with respect to financed stages of development. Stage-diversification is not expected to bear as much uncertainty as industry-diversification. Different stages, however, clearly requires different experiences and information (Schilit and Willig 1996: 28-42): Start-up stage requires industry-specific experience and information for risk-assessment; Later stages requires general management and marketing skills; And buyout/acquisition stages will require more financial skills than technology-specific or management-related experiences. A clear behavioral implication from stage-diversification is that stage-diversified VC firms are financial risk-takers across the diversified stages as much as industry-diversified firms are technological risk-takers. They are more likely to change focused stages or to take risks than stage-specialized firms:

Hypothesis 3: The more stage-diversified, the less inert or the more reformative/innovative as opposed to conservative/reactionary.

Note that Hypothesis 3 is a weaker prediction than Hypotheses 1 and 2 because it does not hypothesize the effect of stage-diversification on uncertainty-related behavior. Also note that the hypothesized effect of each type of diversification is valid when the other two types are controlled in empirical contexts because the three types of diversification tend to go together empirically. More precisely, all the three types of diversification are correlated to the size of a VC firm: Larger firms will be more diversified in all respects. Therefore, firm-size should be controlled in empirical tests in the following section.

EMPIRICAL TEST

Data and Model

The VC market has attracted the attention of economic sociologists (Podolny 2001; Sorenson and Stuart 2001; Bothner, Meadow and Ozdemir 2004). All the studies utilized the VentureXpert database assembled by Thomson Financial which has been aiming to collect the entire population of U.S. VC firms. This study, sharing the same data source, analyzes 3,966 U.S. VC firms over twenty-five years from 1980 through 2004, which sums to 19,942 firm-year observations. In order to test the proposed three hypotheses, we will see the effects of three types of diversification at year t , along with other control variables at t , on normativeness and change at year $t+1$.

It was already specified how to measure $normativeness_t$ and $change_t$ in the previous section. It is also straightforward how to measure target-diversification: I count how many target companies have been invested by a VC firm i during year t . For industry-diversification or stage-diversification, I use Shannon index or entropy measure:

$$\sum_j p_{ijt} \log \frac{1}{p_{ijt}}$$

where p_{ijt} is the proportion of firm i 's invested rounds to industry or stage j to i 's total invested rounds during year t . By summing across all the industries or stages, the index reflects how *equally* across how *many* industries or stages a firm distributes its investments.

Given these basic variables, the statistical models we will use for empirical tests are the fixed-effect regressions of the form:

$$\begin{aligned} \ln(normativeness_{it+1} + 1) = & \alpha_i + \rho \cdot \ln(normativeness_{it} + 1) \\ & + \theta_1 \ln(targets + 1) + \theta_2 \cdot industries + \theta_3 \cdot stages \\ & + \beta X_t + \gamma Z_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

$$\begin{aligned} \ln\left(\frac{\Pr(change_{it+1} = 1)}{1 - \Pr(change_{it+1} = 1)}\right) = & \alpha_i + \rho \cdot change_{it} \\ & + \delta_1 \ln(targets + 1) + \delta_2 \cdot industries + \delta_3 \cdot stages \\ & + \beta X_t + \gamma Z_{it} + \varepsilon_{it} \end{aligned} \quad (3)$$

The first form is for a continuous dependent variable, or $normativeness$, and the second form is fixed-effect logit for a dichotomous variable, $change$. Note that I take log-transformation of $normativeness$ and target diversification whose lower bound is zero and whose distributions are skewed. I will take the same transformation for some control variables of the same properties.

Hypothesis 1 predicts $\theta_1 > 0$ and $\delta_1 < 0$ because target-diversification, as a typical risk-management, is hypothesized to lead to more normative and inert investment behavior. By contrast, industry-diversification, as an indicator of innovative and exploratory investment in the VC market, is expected to show the opposite effect ($\theta_2 < 0$ and $\delta_2 > 0$) as was stated in Hypothesis 2. With regard to stage-diversification, no specific prediction was made for *normativeness* or for θ_3 . Hypothesis 3 only predicts that more risk-taking will follow stage-diversification ($\delta_3 > 0$).

I used both focus industry and focus stage in defining *normativeness* or change in VC investment. In order to conduct more detailed examination, I will also run models of additional dependent variables: partial *normativeness* and partial change, which only use focus industry or focus stage. In this way, we will be able to see whether normative investment following target-diversification, for example, is due to normative investment over industries or that over stages, or equally attributable to both. Similarly, we could see whether the change following stage-diversification, if confirmed, mainly occur over stages or over industries.

Variables Controlled

In the fixed-effect form, α_i is a firm-fixed effect. α_i controls any unobserved firm-specific heterogeneity. Therefore, any estimated coefficient should be interpreted as the marginal change of the dependent variable in response to a unit change of a predictor “for any given firm” rather than interpreted as the difference between two firms distinguished by a unit difference of the predictor. These properties are common across the fixed-effect

regression or equation (2), and the fixed-effect logit or equation (3). α_i in fixed-effect logit, however, is not estimated but just assumed for the sake of consistent estimation (Chamberlain 1980; Greene 2004) whereas α_i in fixed-effect regression is in fact estimable. ρ estimates the effect of lagged dependent variable, which is commonly assumed to control temporal correlation of the dependent variable. X_t consists of dummies for each of the twenty-four years because VC investments are sensitive to changes in the overall economy from year to year. Thus, X_t aims to control year-specific heterogeneity.

Z_{it} includes various time-varying characteristics for each firm i . First of all, I control VC firms' network-based status, which has been widely proven to affect VC firms' performance and behavior (Podolny 2001; Sorenson and Stuart 2001; Bothner, Meadow and Ozdemir 2004). In those studies, VC firms' status has been measured by Bonacich's (1987) centrality, based on coinvestment relations. One's status according to Bonacich's centrality is defined by those with whom one is interacting or coinvesting. In short, status emerges from social interactions and mutual deference through transactions. I call this status *partnership status*.

To measure this partnership status, we first obtain a coinvestment matrix among VC firms for a given year t , say R_t , whose (i, j) -th element, R_{ij} , is the number of targets in which firm i and firm j coinvested during year t . In other words, R_{ij} represents the strength of i 's coinvestment with j , and Bonacich's centrality for ego's status reflects coinvesting alters' status weighted by the strength of coinvestment over each of those alters.

Formally, a VC firm i 's partnership status at year t is given by:

$$c_{it} = \sum_j (\alpha + \beta c_{jt}) R_{ijt}$$

where α is a standardizing parameter such that $\sum_{j=1}^{N(t)} c_{jt}^2 = N(t)$ and $N(t)$ is the total number of VC firms at year t , or the size of matrix. The selection of β determines the discount ratio for indirect connections through alters (Bonacich 1987: 1171-3). For our study, centrality values are not much sensitive to the choice of β , and we chose

$$\beta = \frac{3}{4} \left(\frac{1}{\max_k \lambda_k} \right) \text{ where } \lambda_k \text{ are eigenvalues of } R_t, \text{ following a conventional choice}$$

(Podolny 2001; Sorenson and Stuart 2001).

This Bonacich's centrality is extremely skewed to the top status, and scores for high-status firms are likely to be exaggerated. To correct this possible inflation, specific cut-points (0, 0.2, 1, 2, 5) are applied to make the partnership status into six dummies for control variables. I expect those dummies' positive effects on normativeness and negative effects on change because (1) high-status firms are norm-leaders and (2) successful firms are inert (March 1988; Lant, Milliken and Batra 1992; Miller and Chen 1994). In general, good performance leads to normative and inert organizational behavior and I expect two other performance-related variables in Z_{it} (a proxy for the sum of invested capital and the sum of initial public offering (IPO) during year t) show the same effects.⁴ Lastly, Z_{it} includes focus stage and focus industry of firm i at t as dummy variables. Those firms focusing on specific stages or industries may be more normative or inert. These dummies are important control variables because we identify investment behavior and dependent

⁴ The data source for this study, VentureXpert, does not provide longitudinal information on capital under management for each firm, but allows a good proxy for it: total capital raised for each round of investment. Even though we do not know what proportion of the total capital each firm invested in a round for a target, we can reasonably assume that a firm's total capital under management at year t is roughly proportional to the sum of total capital invested in the rounds in which the firm participated during year t .

variables by focus stage and industry. Table 1 sets forth basic statistics of all the variables in the analysis.

TABLE 1 ABOUT HERE

Results

Estimation results of statistical models are presented in Table 2. Model 1 is a fixed-effect regression of normativeness in terms of focus industry and focus stage. The next two models are those of partial normativeness: Model 2 in terms of focus industry and Model 3 of focus stage. In the same fashion, Model 4 is a fixed-effect logit of change in both focus industry and focus stage, followed by Model 5 for change in focus industry only and lastly Model 6 for change in focus stage only. Model 1 and Model 4 provide overall results for hypothesis-tests and other models provide detailed information on investment behavior over industries and stages.

TABLE 2 ABOUT HERE

Before hypothesis-testing, examining estimated effects of control variables will show if our dependent variables validly measure normative or inert investment behavior. First, lagged dependent variables (Y_t) across six models show significant, negative effects. The lagged terms were positive and significant when firm-specific fixed effects were not controlled: more normative firms at t are still normative at $t+1$. The inclusion of firm-

fixed effects, however, changes estimates and interpretations from “between-firm comparisons” to “within-firm changes.” For a given firm, the degree of normative or inert investment is cyclic rather than monotonically increasing or decreasing, others staying equal. Dummies for partnership status do not show clear-cut patterns but two variables for performance (invested capital and IPO amount) show expected directions in their effects: larger (i.e., more invested capital) or more profitable (i.e., larger IPO) firms are either more normative or ineter. In sum, successful firms are conservative as oppose to innovative.

Comparing estimates for dummies for focus industry reveals that focusing on internet-specific industry or biotechnology industry shows the highest degree of normative inertia (*i.e.*, most normative and least changing). I speculate different reasons for the strong normative inertia in each industry. For internet-specific industry, many firms were simply sticking to the same thing altogether during internet-bubble. Model 5 implies that those firms are more likely to move out of the internet-industry than do VC firms investing in biotechnology (-0.1469 vs. -0.2508). For biotechnology, its technological uncertainty and long period to IPO make firms to reduce uncertainty by normative behavior and stick to the same industry until liquidation. Model 2 and Model 5 together show that their level of normative inertia in terms of *industry* is the highest among various focus industries.

If we finally move to hypothesis-tests, target-diversification shows the strongest effect among the three types of diversification in the sense that its significance is 1% level across all the six models to the expected directions in Hypothesis 1. Model 1 and Model 4 confirms Hypothesis 1 by showing a positive effect on normativeness and

negative on change. Model 2 and Model 3 reveal that increased target-diversification leads to more normative investment over both industries and stages. Model 5 and Model 6 likewise tells that target-diversification increases inertia sticking to current focus industry and stage.

The effects of industry-diversification in Model 1 and Model 4 are exactly opposite to those of target-diversification and confirm Hypothesis 2: Industry-diversification is followed by more deviant (or less normative in Model 1) and less inert (or more changing in Model 4) investment. It is a strong predictor for innovative investment as opposed to conservative investment. In addition, the effects of industry-diversification are not significant in Models 3 and 6 for stage, in contrast to their significance in Models 2 and 5 for industry. In other words, industry-diversification, not surprisingly, leads to exploration over various industries or technologies, but not over different financing stages. Industry-diversification is independent of stage-related behavior.

Findings about stage-diversification are more intriguing. Models 4 to 6 confirm Hypothesis 3 that stage-diversification predicts more risk-taking by changing focus stages across diversified stages. Stage-diversification bears no implication on changes over different industries as is shown in Model 5. Model 3 also shows that stage-diversified firms tend to spread over different stages rather than behave together (i.e., a negative effect on normativeness). Interesting findings, which was not elaborated in hypotheses, come from Models 1 and 2 regarding normative investment over industries. Model 1 and Models 2 jointly tells that stage-diversification is followed by normative investment over industries, but not over stages. This suggests that stage-diversification is an indicator for

Careful financial risk-taking, rather than for financial exploration. It is already explained that technology is a major source of uncertainty (see how normative biotechnology investment is). Quality information is a necessary condition for financial risk-taking, which must be acquired by lowering technological uncertainty in VC industry, which again should be acquired through normative investment over industries.

DISCUSSION

I proposed two-by-two combinations of organizational behavior by intersecting two behavioral forms from two different organizational theories: inertia from organizational ecology and conformity from new institutionalism. I then matched these two behavioral forms respectively to two different concerns in decision-making process: inertia to experience or risk and normativeness to information or uncertainty. By this matching, I completed a typology of organizational behavior as is shown in Figure 3. Then by examining the VC industry, we saw how the typology of organizational behavior helps to discriminate different behavioral implications derived from different types of diversification. Figure 4 graphically summarizes the effects of three types of diversification in VC investments.

FIGURE 4 ABOUT HERE

Target-diversification and industry-diversification, though positively correlated in the real world, pull organizational behavior to the opposite direction, controlling for the other: the former to conservative and the latter to innovative direction. I suspect that the stronger effect of target-diversification than that of industry-diversification mainly comes

from two size-effects: network-size-effect toward normativeness and firm-size-effect toward inertia. First, more targets, others being equal, implies more coinvestments or more network ties to other firms. This larger network-size will exercise stronger normative pressure on a focal firm. The firm cannot easily deviate from partners in its future investments. Second, larger firms show stronger inertia (Hannan and Freeman 1989). A target-diversified VC firm will not be able to switch its focus of investment unless many of its targets go public and it liquidates considerable amount of invested capital at once. These two size-effects are structural forces toward conservative behavior regardless of strategic decision-making.

Stage-diversification leads to financial risk-taking conditioned on technological certainty. I would like to highlight two implications from this observation, one for general organizational studies and the other for VC-specific studies. First, this is a good example to show that risk-aversion and uncertainty-aversion are theoretically distinctive concepts and should not be confused. More often than not, uncertainty-aversion is a necessary condition of risk-taking as is observed on stage-diversification. Second, the effect of stage-diversification, much like the emergence of purely financial stages such as Mezzanine financing and leveraged buyout (see Schilit and Willig 1996: 28-42), is consistent with a redefined image of contemporary VC firms: they are not truly venturesome but conservatively seeking financial benefits (Zider 1998). The long-term contributions to VC industry or to entire economy resulting from stage-diversification may be an important practical question.

I think the application of the typology outside organizational behavior to human behavior is a promising extension. There is no reason not to apply the typology to human

behavior or conduct as long as a certain outcome of the behavior is relevant to the actor's utility so that the actor should care about the behavior. In fact, the names of the four forms of behavior (conservative, innovative, reformatory, and reactionary) are analogies from human actions. However, it should be noted that value-oriented usage of those names can be misleading. For the example of VC industry, an ideal VC firm might be a reactionary one (*i.e.*, deviant inertia) who sticks to a startup stage (*i.e.*, inertia) and helps to realize brilliant ideas other firms dare not invest in (*i.e.*, deviance). Subject to the value-neutral application of the typology, many types of human behavior such as a fashion style or a social movement may be understood by a life-course starting from innovative, to reformatory, to conservative, and ending at reactionary stage.

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Table 1. Correlations and Descriptive Statistics for Variables in Analysis (N=19,942)

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
[1] ln(Normativeness _{t+1})	1												
[2] ln(Industry normativeness _{t+1})	0.7398	1											
[3] ln(Stage normativeness _{t+1})	0.5775	0.2066	1										
[4] Focus change	-0.4452	-0.4965	-0.4515	1									
[5] Focus industry change	-0.5323	-0.7363	-0.1603	0.6567	1								
[6] Focus stage change	-0.335	-0.1363	-0.571	0.7052	0.1706	1							
[7] ln(Number of target companies+1)	0.2692	0.2441	0.2678	-0.3166	-0.222	-0.2807	1						
[8] Industry diversification (Shannon)	0.1401	0.0782	0.2064	-0.2351	-0.097	-0.2416	0.8614	1					
[9] Stage diversification (Shannon)	0.1545	0.1844	0.0904	-0.2262	-0.1792	-0.1592	0.8264	0.8098	1				
[10] coinvestment centrality	0.2098	0.1844	0.2166	-0.2247	-0.1558	-0.2199	0.7108	0.5142	0.4858	1			
[11] ln(Sum of invested capital)	0.1659	0.1637	0.2122	-0.2099	-0.1446	-0.1805	0.6048	0.5287	0.5225	0.444	1		
[12] ln(sum of IPO in million \$+1)	0.2102	0.1702	0.1645	-0.1776	-0.1233	-0.1628	0.484	0.3902	0.3855	0.4308	0.3182	1	
[13] Year	-0.0353	0.0062	0.0978	-0.0665	-0.0399	-0.0666	0.0025	-0.0459	-0.0557	-0.0086	0.2467	-0.0562	1
Mean	0.1207	0.2234	0.3013	0.4739	0.6762	0.6443	1.5673	0.7188	0.6213	0.5186	9.6167	1.104	1994.4
Standard Deviation	0.1003	0.1439	0.1498	0.4993	0.4679	0.4787	0.8559	0.6373	0.5485	0.9639	2.4269	1.8906	6.828
Min	0.0012	0.0041	0.0054	0	0	0	0.6931	0	0	0	0	0	1980
Max	0.6061	0.6931	0.6931	1	1	1	5.6312	2.2624	1.7743	17.587	16.12	8.4141	2003

Table 2. Firm-Fixed Effect Regressions Predicting Normativeness and Change at $t+1$

	(1)	(2)	(3)	(4)	(5)	(6)
$Y_{t+1} =$	<u>ln(Conformity_{t+1}+1)</u>			<u>Focus Change_{t+1}</u>		
< Predictors >	Both	Industry	Stage	Both	Industry	Stage
Y_t	-0.0800 (8.95)**	-0.0677 (8.08)**	-0.0850 (7.97)**	-0.4112 (10.71)**	-0.2664 (7.05)**	-0.4448 (11.49)**
<u>Diversification</u>						
ln(No. of target companies+1)	0.0273 (8.29)**	0.0514 (11.48)**	0.0366 (7.77)**	-1.1230 (14.25)**	-1.0873 (14.91)**	-0.7050 (9.70)**
Industry diversification (Shannon)	-0.0186 (5.89)**	-0.0504 (11.68)**	-0.0026 (0.58)	0.7167 (9.89)**	1.1922 (16.92)**	0.0327 (0.47)
Stage diversification (Shannon)	0.0105 (3.37)**	0.0138 (3.28)**	-0.0146 (3.27)**	0.3414 (4.90)**	-0.1053 (1.55)	0.6050 (8.80)**
<u>Average Centrality</u>						
Lower-lower (=0)	0	0	0	0	0	0
Upper-lower (<.2)	-0.0009 (0.26)	0.0027 (0.55)	-0.0057 (1.09)	0.0836 (1.03)	0.0534 (0.66)	0.0979 (1.16)
Lower-middle (<1)	-0.0100 (2.27)*	0.0011 (0.19)	-0.0153 (2.40)*	0.1276 (1.31)	0.0372 (0.38)	0.1870 (1.86)
Upper-middle (<2)	-0.0132 (2.24)*	0.0009 (0.11)	-0.0060 (0.70)	0.1104 (0.84)	0.0983 (0.77)	0.1297 (1.00)
Lower-upper (<5)	-0.0031 (0.43)	-0.0006 (0.06)	0.0118 (1.12)	0.0566 (0.33)	0.3236 (2.06)*	0.0626 (0.39)
Upper-upper (≥ 5)	0.0174 (1.39)	-0.0033 (0.19)	0.0289 (1.60)	0.1813 (0.50)	0.7693 (2.92)**	0.1113 (0.39)
<u>Performance Controls</u>						
ln(Sum of invested capital)	0.0007 (1.15)	0.0008 (1.05)	0.0026 (3.21)**	-0.0443 (3.40)**	-0.0287 (2.21)*	-0.0246 (1.84)
ln(sum of IPO in million \$+1)	0.0022 (4.11)**	0.0020 (2.81)**	0.0008 (1.10)	0.0041 (0.34)	0.0016 (0.14)	0.0072 (0.62)
<u>Focus Stage</u>						
Buyout/acquisition	0	0	0	0	0	0
Early stage	-0.0507 (12.88)**	-0.0368 (6.92)**	-0.0645 (11.38)**	0.6285 (7.53)**	0.0534 (0.61)	1.0477 (12.03)**
Expansion	-0.0678 (18.91)**	-0.0540 (11.11)**	-0.0691 (13.00)**	-0.0184 (0.24)	0.0904 (1.13)	-0.1617 (2.12)*
Later stage	-0.0322 (7.90)**	-0.0224 (4.07)**	-0.0593 (10.03)**	0.5357 (6.22)**	0.0179 (0.20)	0.8142 (9.10)**
Startup/seed	-0.0270 (6.20)**	-0.0015 (0.26)	-0.0606 (9.65)**	0.4673 (5.08)**	-0.1051 (1.10)	1.0739 (11.00)**
Others	0.1610 (22.16)**	0.1184 (12.05)**	0.0867 (8.21)**	1.1653 (7.23)**	0.4246 (2.49)*	1.5860 (7.67)**
<u>Focus Industry</u>						
Communications and media	0	0	0	0	0	0
Computer hardware	0.0085 (2.12)*	0.0199 (3.64)**	0.0029 (0.51)	0.0233 (0.27)	-0.1259 (1.42)	0.0330 (0.37)
Computer software & services	0.0014 (0.40)	0.0007 (0.16)	-0.0020 (0.40)	0.0070 (0.09)	-0.1666 (2.22)*	0.0314 (0.42)

Internet-specific	0.0281 (7.27)**	0.0234 (4.46)**	0.0241 (4.37)**	-0.0569 (0.68)	-0.1469 (1.75)	-0.0581 (0.69)
Semiconductors/other elect.	0.0078 (1.93)	0.0047 (0.87)	-0.0024 (0.41)	0.0273 (0.32)	-0.0108 (0.12)	0.0409 (0.46)
Biotechnology	0.0246 (5.50)**	0.0385 (6.35)**	-0.0030 (0.46)	-0.0761 (0.80)	-0.2508 (2.55)*	0.0310 (0.32)
Medical/health	-0.0000 (0.01)	0.0061 (1.14)	-0.0103 (1.81)	0.0451 (0.53)	-0.0659 (0.76)	0.0264 (0.30)
Consumer related	0.0110 (2.52)*	0.0039 (0.67)	0.0212 (3.37)**	-0.0766 (0.81)	-0.0447 (0.46)	-0.0858 (0.89)
Industrial/energy	0.0076 (1.71)	0.0038 (0.63)	-0.0006 (0.09)	0.0158 (0.17)	0.0456 (0.45)	-0.0329 (0.34)
Other products	-0.0000 (0.01)	0.0038 (0.65)	0.0028 (0.46)	-0.0120 (0.13)	-0.1447 (1.51)	-0.0408 (0.43)
<u>Year Dummies</u>						
1980	0	0	0	0	0	0
1981	-0.0137 (1.56)	-0.0108 (0.90)	-0.0271 (2.13)*	0.2044 (1.07)	0.1632 (0.85)	0.2275 (1.12)
1982	-0.0208 (2.42)*	-0.0282 (2.42)*	-0.0063 (0.51)	0.0803 (0.43)	0.1262 (0.68)	0.0939 (0.48)
1983	-0.0555 (6.63)**	-0.0727 (6.40)**	-0.0287 (2.39)*	0.1518 (0.84)	0.3395 (1.88)	0.0011 (0.01)
1984	-0.0761 (9.26)**	-0.1061 (9.53)**	-0.0362 (3.06)**	0.2620 (1.48)	0.4721 (2.65)**	0.0764 (0.41)
1985	-0.0765 (9.32)**	-0.1048 (9.42)**	-0.0365 (3.10)**	0.2192 (1.24)	0.3864 (2.18)*	0.1224 (0.66)
1986	-0.0753 (9.18)**	-0.1115 (10.04)**	-0.0197 (1.68)	0.1096 (0.62)	0.5089 (2.86)**	-0.1668 (0.90)
1987	-0.0656 (7.94)**	-0.1086 (9.70)**	-0.0111 (0.94)	0.1777 (1.00)	0.4373 (2.44)*	-0.0658 (0.35)
1988	-0.0655 (7.92)**	-0.1070 (9.54)**	-0.0103 (0.87)	0.1623 (0.91)	0.4255 (2.37)*	-0.1416 (0.76)
1989	-0.0605 (7.27)**	-0.0981 (8.69)**	-0.0145 (1.21)	0.4020 (2.24)*	0.6463 (3.54)**	0.1050 (0.56)
1990	-0.0341 (3.98)**	-0.0674 (5.80)**	-0.0040 (0.32)	0.2300 (1.25)	0.2694 (1.46)	0.1991 (1.03)
1991	-0.0341 (3.86)**	-0.0490 (4.09)**	-0.0120 (0.95)	0.0634 (0.33)	0.0807 (0.43)	-0.0118 (0.06)
1992	-0.0340 (3.91)**	-0.0624 (5.29)**	-0.0010 (0.08)	-0.0302 (0.16)	0.1613 (0.86)	-0.0825 (0.42)
1993	-0.0615 (6.96)**	-0.0744 (6.21)**	-0.0544 (4.28)**	0.2945 (1.55)	0.2123 (1.12)	0.3951 (1.96)
1994	-0.0634 (7.33)**	-0.0926 (7.90)**	-0.0468 (3.76)**	0.2989 (1.61)	0.4369 (2.33)*	0.1213 (0.62)
1995	-0.0645 (7.72)**	-0.0758 (6.69)**	-0.0324 (2.70)**	0.3125 (1.74)	0.3660 (2.02)*	0.2775 (1.46)
1996	-0.0658 (7.97)**	-0.0860 (7.70)**	-0.0189 (1.60)	0.0675 (0.38)	0.2692 (1.51)	-0.0261 (0.14)
1997	-0.0834	-0.1019	-0.0268	0.1631	0.4065	0.0184

	(10.26)**	(9.25)**	(2.30)*	(0.93)	(2.30)*	(0.10)
1998	-0.0509	-0.0624	0.0142	0.1138	0.4150	-0.0257
	(6.33)**	(5.73)**	(1.23)	(0.65)	(2.37)*	(0.14)
1999	-0.0405	-0.0553	0.0322	-0.0799	0.2787	-0.1253
	(4.97)**	(5.01)**	(2.75)**	(0.45)	(1.57)	(0.68)
2000	-0.0894	-0.1240	0.0015	0.3045	0.7882	0.0700
	(10.85)**	(11.10)**	(0.13)	(1.70)	(4.37)**	(0.37)
2001	-0.0823	-0.1200	0.0096	0.1343	0.5873	-0.1029
	(10.13)**	(10.91)**	(0.82)	(0.76)	(3.32)**	(0.56)
2002	-0.0845	-0.1074	-0.0030	0.0257	0.4372	-0.0393
	(10.38)**	(9.74)**	(0.26)	(0.14)	(2.47)*	(0.21)
2003	-0.0822	-0.0950	-0.0109	-0.0947	0.2531	-0.1423
	(9.95)**	(8.49)**	(0.92)	(0.52)	(1.41)	(0.76)
Observations	19942	19942	19942	16340	16356	16702
Number of firms	3966	3966	3966	2239	2218	2299

Absolute value of t statistics in parentheses

* significant at 5%; ** significant at 1% (two-tailed tests)

FIGURES

Figure 1. Four Forms of Organizational Behavior

		Population ecology	
		Inertia	Change
New institutionalism	Normative	(1)	(3)
	Deviant	(4)	(2)

Figure 2. Four Forms of Economic Behavior

(1)	(3)	Low	Uncertainty
(4)	(2)	High	
Low	High		
Risk			

Figure 3. Typology of Organizational Behavior in Market.

		<u>Matter of Experience</u>				
		Inertia	Change			
<u>Matter of Information</u>	Normative	Conservative	Reformative	Low	Uncertainty	
	Deviant	Reactionary	Innovative	High		
			Low	High		
	Risk					

Figure 4. The Effects of Different Types of Diversification on the Space of 2-by-2 Organizational Behavior.

