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Cultural Imprinting, Institutions, and the Organization of New Firms

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Abstract. Do firm founders from nations with more predictable and transparent institutions allocate more autonomy to their employees? A cultural imprinting view suggests that institutions inculcate beliefs that operate beyond the environment in which those beliefs originate. We leverage data from a multiplayer online role-playing game, EVE Online, a setting where individuals can establish and run their own corporations. EVE players come from around the world, but all face the same institutional environment within the game. This setting allows us to disentangle, for the first time, cultural norms from the myriad other local factors that will influence organizational design choices across nations. Our main finding is that founders residing in nations with more predictable and transparent real world institutions delegate more authority within the virtual firms they create.

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Keywords: entrepreneurship • institutional theory • organizational design • organization and management theory

1. Introduction

Do firm founders from nations with more predictable and transparent institutions allocate more autonomy to their employees? The conventional view of cross-national organizing differences is that firms adopt structures that fit the institutional environment in which they operate. Thus, for instance, new firms operating in countries with weak property rights may centralize control to forestall theft. A more provocative view, which we label *cultural imprinting*, is that institutions inculcate beliefs that operate beyond the environment in which those beliefs originate. From this perspective, a founder raised in a country with strong property rights—and concomitantly strong cultural norms about respect for property rights—will reflexively delegate more authority in her organization than a founder from a nation where property is weakly protected. This pattern will persist, moreover, even when she relocates to a county with weaker property rights.

The question of the locus of control is arguably central to understanding the structure and capabilities of the firm (Chandler 1992, Lucas Jr. 1978). Control and coordination mechanisms have multiple facets, including the presence or absence of formal and professional structures (Beckman and Burton 2008, Assenova and Sorenson 2015) and the ability of managers to use technology to efficiently supervise employees (Bloom et al. 2014). For this paper we focus on the shape of the firm hierarchy, where a flatter structure indicates that employees have more autonomy (Sørensen and Sharkey 2014). To see why autonomy might matter for strategic behavior, consider the case where all decision-making authority is held by a dictator CEO. For certain well-defined problems where coordination is paramount, this arrangement is very efficient. However, when problems become more complicated, learning is more important, and knowledge more specialized, then hierarchical decision making becomes inefficient (Grant 1996, Bloom et al. 2012, Sorenson and Sørensen 2001). Scholars have recently begun to explicitly link the autonomy found in "flat" organizations to firm capabilities for opportunity recognition and exploitation (Foss et al. 2013, 2015; Bouquet et al. 2016). To reiterate, the goal of this paper is to explore whether a founder's institutional background marginally effects autonomy decisions.

The context for our study of the relationship between cultural norms and authority decentralization is the multiplayer online role-paying game EVE Online. EVE presents players with a virtual universe, which simulates the real world in that economic competition is a fundamental part of the game, and players have the option of both joining and founding player-run companies. Four features of EVE make it ideal for testing

the effects of cultural imprinting. First, all the roughly 6.5 million players in EVE, regardless of where they reside, operate in the same institutional setting within the game. Second, we have high variance on founder backgrounds for the 300,000 plus companies we analyze, as EVE founders come from more than 185 unique nations. Third, we have low sensitivity to survivor bias because all entrepreneurial actions in the period of study are observed. Fourth, we can precisely measure decision authority allocations, literally capturing the extent to which any given employee can loot company resources, as opposed to making inferences from job titles or relying on self-reporting.

Our main finding is that players residing in nations with more predictable and transparent institutions delegate more autonomy within the virtual firms they create. Empirically, the contribution of this work is that we have the first study to fully disentangle the founder's cultural imprinting institutions from the institutional environment in which the company is operating, while at the same time ruling out in this context the possibility that founders shop for a better home for the opportunity they wish to pursue. Our theoretical contribution comes in demonstrating that organizational autonomy preferences plausibly derive from systematic differences in home country institutions.

The rest of the paper proceeds as follows. In the next section we briefly discuss the literature on cultural influences on entrepreneurship in strategy and economics, the related literature on imprinting effects in sociology/organization theory (OT), and the difficulty of testing for cultural imprinting effects. We then describe the context of EVE Online in greater detail. Next we turn to description of the sample data, followed by the main statistical analysis and a series of robustness checks. Finally, we discuss limitations and extensions of our results.

2. Theory: Cultural Imprinting and Firm Structure

In this paper we elaborate on and test the proposition that organizational founders have cognitive templates for organizing that transcend local environmental conditions. Multiple streams of literature examine variants of this idea, and in each setting the theoretical arguments are quite similar: (1) entrepreneurs and other founders lack full information about how best to organize their efforts; and (2) systematic personal and environmental factors shape initial organizational design choices.[1] More specifically, we focus on the proposition that founders residing in nations with rigorous, transparent and impartial legal enforcement will themselves create organizations with more shared authority. As a shorthand, we call this process *cultural imprinting*.

We begin by briefly reviewing the disparate literatures on cultural imprinting and organizational forms. We then discuss the presumed link between cultural imprinting and authority delegation, as well as why employee autonomy theoretically is consequential to firm strategy. Last, we discuss the parallel theoretical challenge of understanding the underlying drivers of varying cultural imprints.

2.1. Literature

In sociology and OT, the concept of imprinting (if not the word) is mostly traced back to Stinchcombe (2000) and his argument that important functional characteristics of new organizations reflect a variety of social and historical influences. In their review and theoretical synthesis, Marquis and Tilcsik (2013) define imprinting as "...a process whereby, during a brief period of susceptibility, a focal entity develops characteristics that reflect prominent features of the environment, and these characteristics continue to persist despite significant environmental changes in subsequent periods" (p. 199). A variety of scholars have applied the imprinting lens to entrepreneurship, focusing on the relationship between the founders' prior experience and the organizational form of new ventures. For instance, there is evidence that, for new ventures, the prior experience of founders' influences administrative intensity (Baron et al. 1999b), administrative routines (Phillips 2005), functional role differentiation (Beckman and Burton 2008), and the firm's knowledge brokering and networking orientation (Hsu and Lim 2013, McEvily et al. 2011, Perkmann and Spicer 2014). In sum, there is a path dependency in organizational forms, such that individuals tend to replicate their formative experiences. Imprinting thus may be idiosyncratic in origin, in that two otherwise similar individuals may have quite different initial work experiences, but systematic in its effect.

In both economics and strategy, an emerging literature has focused on the relationship between a manager's or founder's national culture and organizational design choices. In a review of the economics literature, Alesina and Giuliano (2015) argue that culture, even while it is hard to distinguish from formal institutions, influences an actor's perceptions of the appropriateness and likely benefits from certain actions. They note that the most prominent manifestation proposed in this literature of the relationship between formal institutions and culture is trust. A stream of recent work (Knack and Keefer 1997, Aghion et al. 2014, Bloom and Van Reenen 2007, Bloom et al. 2012, van Hoorn 2014) has focused specifically on the relationship between trust and the decentralization of authority within firms. While devolving authority will arguably increase decision-making efficiency, Bloom et al. (2012) find that multinational firms headquartered in high-trust nations have greater decentralization.

Similar investigations relating cultural beliefs and firm structure are found in the strategy literature:

Calori et al. (1997) argue that national heritages inculcate beliefs about firm hierarchy; Greckhamer (2016) posits that CEO pay variance reflects national acceptance of power distance; Shinkle and Kriauciunas (2012) find that firms founded under Communist regimes are slow to adapt to transitioning economies; and at the subnational level, York and Lenox (2014) find that rates of new entrants into an industry are correlated with sociocultural beliefs. In sum, and as with the sociology/OT-based imprinting literature, individuals embedded within a cultural system tend to construct organizations consistent with those belief systems. Cultural imprinting is thus systematic in that everyone, founder or not, is exposed to the same influences, but also discernible only as an average effect across similarly situated individuals.

2.2. Cultural Imprinting and Autonomy

How, then, does culturing imprinting influence the delegation of autonomy in the firm? And does autonomy matter? Our first premise is that effective institutions impart expectations about the functionality of arms-length interactions, particularly with strangers and for complicated tasks. In other words, a founder from a system with poor transparency and effectiveness will tend to associate poor outcomes with relinquishing control. He will prefer a transaction with control, and when that is not possible will prefer situations and/or partners where behavior is more readily monitored. These last points will be important for our statistical analysis, as we need to calibrate grants of autonomy against compensating control mechanisms such as hiring friends or organizing around more well-defined task roles.

Our second premise is that founders will act *as if* autonomy matters for company operations. On the negative side, dispersing authority exposes the founder to free-riding and theft. On the positive side, decision-making autonomy is implicit in the idea that firms participating in the knowledge economy have deeply embedded capabilities. Likewise, autonomy theoretically enables a more nimble organization, and opens the company to a broader labor pool of talented individuals who may demand self-determination.

2.3. Testing Cultural Imprinting

Our final assessment is that, despite the broad body of work related to imprinting effects on entrepreneurial founding, theoretical progress in this area is hampered by difficulties in empirical testing. The main problem is that formal and informal institutions are conflated, or have reciprocal relationships. This problem is particularly apparent in comparing the imprinting/culture literature to the conceptually related literature on cross-national institutions (for a recent review, see Dorobantu et al. 2017), where much of the research involves detailing how firms adapt to legal and political environments (for example, Kogut et al. 2002, Oxley 1999, Taussig and Delios 2015, Zhou 2014). In other words, across nations, cultural norms and the legal and political institutions that presumably underpin those norms vary simultaneously. Therefore, for instance, in observing that an entrepreneur in country X creates a firm with highly centralized authority, it is problematic to conclude this happened because her trust norms are weak as opposed to because the country is an authoritarian regime. If the latter, then the entrepreneur is behaving rationally and presumably would behave differently elsewhere, whatever her privately held belief systems.

For these reasons, the most persuasive empirical work on cultural effects has looked at the effect of home country values in instances where formal institutional borders are crossed, such as the behavior of second generation immigrants (Fernandez and Fogli 2009, Alesina and Giuliano 2010) or the organization of subsidiaries from multinational firms (Bloom et al. 2012). The same problem is present in the sociology/OT literature in that a key assumption of the empirical analysis is that the researchers have properly controlled for all relevant differences in industry niche and strategy (Baron et al. 1999a). In this case, the tendency for individuals to replicate organizational forms may simply result from selecting into particular types of opportunities.

3. Empirical Setting: EVE Online

The empirical setting for this paper is a massively multiplayer online role playing game called EVE Online (EVE). EVE was created in 2003 by CCP Games and plays out in an interstellar backdrop where individuals mine resources, barter and trade, compete over territory, and wage large-scale conflicts. Since its inception, over 6.5 million players from 200 nations have played the game, and the current user base stands at approximately 500,000 individuals. In the game, users fly around a fictional galaxy in spaceships that are purchased and created by acquiring resources during game play. The game is stylistically modeled as a "sandbox," which is a game in which minimal limitations are placed on the user. This allows individuals to roam, interact, collaborate, cheat, trick, and shape the virtual universe. The key to EVE is that resources are required to gain capabilities.[2] Individuals acquire resources through mining asteroids and planets, manufacturing, trade, looting and stealing from fellow players, or computer-supplied missions. They then exchange these resources for the in-game currency (ISK), purchase ships and parts to construct more powerful equipment, and establish corporations to expand and accelerate all the above activities. CCP takes a laissez faire approach to regulating player interaction—it does not regulate transactions between players and

only limits player-on-player violence in a small portion of the virtual universe.

3.1. EVE: Player Companies

CCP Games facilitates player-to-player interaction in the game by enabling the establishment of player-run "corporations." The minimum requirements for creating a corporation are possession of the corporate management skill, which any player can purchase with 20,000 ISK and 1.6 million ISK or more in the character's personal wallet. Managing a corporation, however, is an involved and time-consuming task. For a new corporation to get off the ground, the founder must quit his or her present corporation and invest considerable time in recruiting and training new members, establishing clear goals and rules, and coordinating/engaging in activities that help build the corporation's assets. Corporations lacking a clear mission or responsive leadership quickly fold. Thus, managing a corporation requires a serious time commitment on the part of the founder.

While EVE corporations serve a social function, the game is designed to reward collaborative gameplay. Corporations give players the means to leverage common resources, share information and techniques, and engage in mutual support. For instance, a corporation specializing in mining can invest in higher-quality equipment and use it more efficiently by passing it among employees, widely collect information about market trends, and provide support activities such as logistics and security. At the grandest scale, alliances of corporations can take control of areas of space, giving them exclusive rights to the resources therein and the power to impose levies on others who wish to operate in that area.

3.2. Virtual Worlds as a Research Setting

EVE is interesting in its own right, but does studying virtual worlds produce generalizable knowledge? Recent work ranging from economics (Castronova and Falk 2009) to communications (Williams 2010) to sociology (Burt 2012) posits that games are useful behavioral laboratories. Foremost is the belief that these research settings offer extraordinarily detailed and complete data and a multitude of quasi-experimental moments. Burt (2012), for instance, examines the fine-grained social networking patterns of individual players in Everquest across multiple identities.

EVE certainly provides vast detailed data, and we exploit the unique research design feature of observing individuals from various institutional backgrounds interacting in a setting where present institutions are held constant. Our assessment, based on extensive research and interviews with game developers and players,[3] is that three additional components of the competitive logic of EVE make it a good analog for real-world behavior. First, the environment is market based, which requires players to take a strategic approach to resource accumulation. Second, the game rewards collaborative behavior that leverages shared resources and role specialization. Exactly how this collaboration occurs is left to the discretion of players. Third, the environment offers a realistic approximation of risk. Assets take time to acquire and can be permanently destroyed. Poor decisions, mismanagement, and bad luck can result in the loss of valuable resources.

In contrast, it is important to acknowledge several limitations for virtual-world research settings. First, even while in-game behavior is perfectly observed, attributes of the person behind the screen are not always reliably known. Most saliently in this case, we will inaccurately measure institutional background when the player is an immigrant in the country from which we record her playing or when she makes efforts to mask her location. Second, we have self-selected populations, and it is possible that the type of person playing EVE varies significantly from nation to nation. Third, the low stakes involved may mean that choices made in the game reflect very weakly held biases. Fourth, some players will approach virtual worlds as a role-playing opportunity and behave in a way fundamentally at odds with their real-world personas.

Our assessment is that these concerns are valid but unlikely to undermine our empirical analysis. Mismeasurement of player cultural imprinting will tend to work against finding a relationship between founder background and employee autonomy. CCP's internal research indicates that the player population is consistent across nations, and the most "typical" player everywhere is a 28-year-old male software engineer. While skewed on several dimensions, this is also a population with a high frequency of startup creation in the real world. The stakes in the game are lower than in the real world, but players are highly competitive and the shadow value of EVE assets is not trivial. For instance, in a recent widely publicized event, an EVE player looted the large corporation that employed him, resulting in an estimated loss of $60,000 USD to the corporation and its alliance partners (Jeffrey 2017). The influence of against-type role-playing is harder to assess, but unless this behavior is systematically related to player nation and entrepreneurial behavior, we see no obvious threat to generalizability. Still, the onus is on the researcher to select appropriate measures and consider alternative explanations, which brings us to the question of our empirical analysis.

4. Data

Our sample consists of all EVE player-run corporations founded between January 28, 2012—the date on which CCP Games began retaining some of our key behavioral variables—and July 5, 2016. The end date allows for six months of corporate activity before our initial

data collection in late December 2016. We exclude any corporations that had no activity in the six months following founding. This results in a sample of 310,562 unique companies.

For each company, we record founder attributes—the player's nation of residence based on IP address, self-reported age and gender, and prior in-game experience at the moment of company creation. All other variables are measured over a six-month (180-day) founding window. For instance, our company size variable is a count of all the unique players that join the corporation from founding to six months of age. The six-month measurement window is primarily a practical consideration—we need time to observe "founding stage" actions. Discussions with players and game developers indicated that six months was sufficient to observe behavioral patterns. Note also that while EVE allows players to operate multiple characters, all our personnel count variables are measured at the unique person level. For instance, a corporation comprised solely of one player with multiple characters from multiple accounts—all members of the same corporation—will show as employee size of one in our data set.

4.1. Variables

4.1.1. Dependent Variable: Autonomous Employees.

Our dependent variable, *Autonomous Employees*, accounts for the unique players given an authority role as a proportion of all employees of the corporation over the first six months after the corporation is founded. The variable takes on the value of 0 if the CEO does not delegate any autonomy to other players and a value of 1 if every employee is granted autonomy. Autonomy comes in two levels. Directors have access to a corporation's wallet(s) and/or hanger(s) and can extend the same rights to others. Below that are a variety of functional roles that have resource access but that cannot grant rights.[4]

It is important to note that the incentive to steal from the corporation is not trivial. In contrast to the real world, where theft is punished by a central authority, the rules of EVE do not prohibit within-game theft in any way, and there is no central authority that punishes theft. For instance, in the aforementioned theft, CCP did not punish the perpetrator. CCP did, however, ban from the game the CEO of the corporate victim, after the CEO threatened the real-world health of the thief (Jeffrey 2017). Retaliation within the game is permissible, but our interviews with gamers indicate that this effort is often not effective.

4.1.2. Independent Variables: V-Dem Institutional Coding.

Our theoretical contribution focuses on the proposition that institutional implementation, in addition to specific structure, likely imprints corporate founders. The implications of our argument suggest that many different formal institutions—those that share clarity and predictability of enforcement—likely imprint a founder's preferences in a similar way, and the same institution may have different effects across contexts where implementation quality varies. Specifically, we suggest that trust develops because of institutional clarity and predictability in implementation. Furthermore, we expect that an index of overall societal clarity and predictability in institutional implementation should better predict the development of trust than any one institutional indicator.

To capture our notion of clarity and predictability in implementation of orthogonal institutions as well as the overall collection of institutional structures in society, we turn to the Varieties of Democracy (V-Dem) data set, version 6.2.[5] V-Dem contains multidimensional annual (country-year) coding of the systems of rules in electoral democracies. The variables we use are coded by country experts who, according to the V-Dem codebook, typically are "a scholar or professional with deep knowledge of a country and perhaps of a particular political institution. Generally, that person is a citizen or resident of the country being coded. Multiple experts (usually five or more) code each variable" (Coppedge et al. 2016, p. 29). Mapping the V-Dem data onto the our sample of EVE corporations gives a total of 124 countries in the sample.

The first V-Dem institutional assessment variable we include is *Public Administration*. This variable focuses on "the extent to which public officials generally abide by the law and treat like cases alike, or conversely, the extent to which public administration is characterized by arbitrariness and biases (i.e., nepotism, cronyism, or discrimination)" (Coppedge et al. 2016, p. 212).[6]

The second V-Dem institutional assessment variable we include independently accounts for *Property Rights*. Specifically, the question here is whether citizens enjoy the right to private property.[7] This variable seems to tap into a very different dimension of clarity and predictability than the Public Administration variable does, as the two are only correlated at 0.283.

The composite index we use to capture overall societal clarity and predictability in institutional enforcement is what we are calling the *Law and Liberty* index. This index addresses the question of to what extent the laws are "transparent and rigorously enforced and public administration impartial, and to what extent do citizens enjoy access to justice, secure property rights, freedom from forced labor, freedom of movement, physical integrity rights and freedom of religion?" (Coppedge et al. 2016, p. 55).[8]

Finally, we are interested in how an assessment of the opposite process, opacity, and unpredictability in application of the law decreases willingness to grant others autonomy. Our final independent variable, *Corruption*, therefore measures the extent to which "public sector employees grant favors in exchange for bribes,

kickbacks, or other material inducements," in addition to how often they "steal, embezzle, or misappropriate public funds or other state resources for personal or family use" (Coppedge et al. 2016, p. 67).[9]

As noted, all measures are composed from ratings provided by multiple country experts. The V-Dems data then leverage a measurement model that "aggregates the ratings provided by multiple country experts and, taking disagreement and measurement error into account, produces a probability distribution over country-year scores on a standardized interval scale." The point estimates are the median values of these distributions for each country-year (Coppedge et al. 2016, p. 32). We then take the average value of each indicator for each country within the relevant time period (2012–2016). This provides a cross-sectional score for each country in the sample.[10]

4.1.3. Control Variables. We have two kinds of control variables. The first set of control variables accounts for founder background experience at the time of corporation founding. The second set accounts for activities that the corporation engages in during the first six months of its life. We describe each variable in greater detail below.

Included in our founder control variables are two measures of the founders' in-game experience: *Past Employment* is a count of the number of player corporations previously joined by the player, and *Past Foundings* is the count of the number of prior companies founded by the founding player. Both experience variables are intended to control variance in familiarity with the working of player corporations in EVE. We further include two self-reported player characteristics, *Player Age*[11] and player gender (*Female*),[12] which are intended to capture differentials in real-world personal experience.

The second set of control variables regards the issue that corporations are likely founded with divergent objectives. These objectives, which are unobservable at the time of company founding, may influence how/whether founders delegate authority. Therefore, we account for a number of corporate activity variables as reflected in the aggregate behavior of company members over the same initial six-month period during which we observe the dependent variable. These variables account for both the intensity and the type of gameplay by corporation members during the formative period.

Employees records the log number of employees in the corporation for the entire 180-day span. *Employees Online* accounts for the log of how many of these employees are actually online in the first 180 days. *Total Warps* is the log of the count of the total aggregate number of warps flown (a method for travelling between star systems in the game) by company members, presumably capturing how active the corporation is and the extent to which its activities are not localized. *Alliance* is a dichotomous variable measuring whether a corporation entered into an alliance with another corporation in its first six months of existence and may capture the propensity for the corporation to be drawn into aggressive conflict. *Total Combat Deaths* is the log of the count of total number of times corporation members are killed and may capture variance in the tendency to operate in risky space.[13] *Total Mining Ore* records the log of the aggregate total amount of commodity ore mined by each member of the corporation and corresponds with greater corporate investment in mining and trading.

4.2. Descriptive Statistics

Table 1 presents descriptive statistics pertaining to all our variables. It details the number of observations for each variable and its range along with a measure of central tendency and standard deviation.

Table 2 reports bivariate correlations among variables. The low correlation between our two primary independent variables, *Public Administration* and *Property Rights*, underscores the efforts made by the V-Dem coders to capture distinct constructs. The table also shows that both are more highly correlated with the *Law and Liberty* index than with each other, because the index is an overall societal measure of clarity and predictability in enforcement of the law. Furthermore, there is a strong negative correlation between the *Corruption* index, the *Law and Liberty* index, and the *Public Administration* measure and a negative but a much weaker correlation with *Property Rights*.

Table 1. Summary of Corporation-Level Data

Statistic	*N*	Mean	St. dev.	Min	Max
Autonomous employees	310,562	0.357	0.420	0.000	1.000
Hire employees	310,562	0.451	0.498	0	1
Public administration	310,562	2.329	1.514	−3.080	4.333
Property rights	310,562	0.872	0.066	0.196	0.945
Law and liberty	310,562	0.885	0.155	0.045	0.991
Corruption	310,562	0.168	0.281	0.005	0.958
Single player corporations	310,562	0.549	0.498	0	1
Past employment	310,562	5.853	16.126	0	628
Past foundings	310,562	1.712	10.206	0	292
Founder's age	310,562	31.898	11.636	10.000	80.000
Female	310,562	0.037	0.188	0	1
log employees	310,562	1.143	0.719	0.693	8.654
log employees online	310,562	1.065	0.742	0.000	8.614
log total warps	310,562	6.140	2.859	0.000	15.374
log total combat deaths	310,562	1.200	1.411	0.000	11.346
log total mining ore	310,562	7.327	7.418	0.000	21.472
High security	310,562	0.324	0.408	0.000	1.000
Alliance	310,562	0.086	0.280	0	1

Notes. All corporations from countries not in the V-Dems data are excluded. Logged values adjusted by a constant 1 to accommodate 0 values.

Table 2. Correlations Between Variables

	Autonomous	Admin.	Property	Liberty	Corruption	Employment	Foundings
Public administration	0.046						
Property rights	0.048	0.152					
Law and liberty	0.054	0.894	0.44				
Corruption	−0.046	−0.888	−0.286	−0.9			
Past employment	0.04	0.018	−0.003	0.051	−0.022		
Past foundings	0.022	0.008	−0.018	0.031	−0.002	0.861	
Player age	0.009	−0.019	−0.05	−0.03	0.025	0.068	0.113
Female	−0.01	−0.029	−0.052	−0.046	0.032	−0.028	−0.02
log employees	0.052	−0.012	0.004	−0.01	0.011	0.016	0.005
log employees online	0.054	−0.009	0.003	−0.008	0.008	0.015	0.004
log total warps	0.12	−0.034	−0.013	−0.037	0.039	0.009	−0.001
Alliance	0.151	0.028	0.022	0.03	−0.033	0.071	0.031
log total combat deaths	0.025	−0.006	0.001	−0.006	0.005	0.005	−0.001
log total mining ore	0.139	−0.02	0.018	−0.017	0.027	0.005	0.006
	Female	Employees	Online	Warps	Alliance	Deaths	
log employees	0.003						
log employees online	0.002	0.995					
log total warps	0.01	0.803	0.809				
Alliance	0.013	0.215	0.214	0.275			
log total combat deaths	−0.002	0.801	0.815	0.751	0.121		
log total mining ore	0.009	0.237	0.238	0.353	0.146	0.081	

The in-game variables are generally orthogonal, with a few exceptions. The number of *Employees* in a corporation is positively correlated with how active the group is (*Total Warps*, *Total Combat Deaths*, and *Total Mining Ore*). In addition, the number of *Employees* is highly correlated with the number of *Employees Online*. Last, *Past Employment* and *Past Founding* experience are correlated, unsurprisingly indicating that both forms of experience increase simultaneously.

Table 3 offers a breakdown of the data sorted by the number of corporations located in each country. We only provide the top 30 countries to ensure privacy. The table displays the total number of corporations and average value and standard deviation of

Table 3. Country Averages of Key Variables

Country	*N*	Percentage of data	Autonomous (ave)	Autonomous (sd)	Employees (log ave)	Public administration	Property rights	Law and liberty	Corruption
United States	109,283	35	0.364	0.419	4.252	2.433	0.896	0.916	0.02
Russia	34,186	10.9	0.317	0.405	4.716	−0.667	0.873	0.579	0.831
United Kingdom	33,679	10.8	0.355	0.419	4.084	4.333	0.794	0.991	0.031
Germany	26,208	8.4	0.405	0.435	3.612	3.74	0.922	0.987	0.033
Canada	15,582	5	0.365	0.423	4.19	3.332	0.921	0.974	0.01
Australia	9,961	3.2	0.384	0.428	3.803	3.458	0.859	0.986	0.01
France	6,496	2.1	0.378	0.427	4.103	3.575	0.786	0.987	0.068
Ukraine	6,242	2	0.324	0.405	4.901	−0.711	0.817	0.519	0.704
Netherlands	5,920	1.9	0.36	0.426	3.96	2.056	0.897	0.959	0.09
Sweden	4,355	1.4	0.378	0.425	4.62	3.25	0.928	0.984	0.012
Denmark	4,037	1.3	0.374	0.427	3.601	3.578	0.9	0.979	0.005
China	3,953	1.3	0.186	0.354	2.731	−0.091	0.48	0.307	0.659
Poland	3,759	1.2	0.304	0.406	3.488	1.329	0.918	0.932	0.223
South Korea	3,454	1.1	0.204	0.36	3.127	1.781	0.808	0.947	0.118
Japan	3,150	1	0.371	0.443	3.152	2.613	0.931	0.985	0.015
Romania	2,957	0.9	0.472	0.427	5.574	0.197	0.882	0.855	0.445
Norway	2,727	0.9	0.39	0.435	3.306	3.552	0.919	0.982	0.011
Austria	2,418	0.8	0.391	0.434	3.157	2.251	0.927	0.979	0.207
Finland	2,325	0.7	0.332	0.421	3.494	2.199	0.852	0.974	0.026
Spain	2,201	0.7	0.352	0.421	3.813	2.709	0.926	0.976	0.087
Belgium	2,189	0.7	0.339	0.418	3.579	3.658	0.939	0.982	0.034
Belarus	1,703	0.5	0.314	0.406	5.136	−0.603	0.772	0.554	0.451
Switzerland	1,649	0.5	0.408	0.442	3.125	3.78	0.888	0.988	0.02
Italy	1,632	0.5	0.351	0.424	3.521	1.832	0.844	0.964	0.226
South Africa	1,507	0.5	0.389	0.42	4.077	0.959	0.771	0.883	0.433
New Zealand	1,503	0.5	0.357	0.426	3.675	3.239	0.909	0.965	0.014
Hungary	1,346	0.4	0.347	0.412	4.161	1.573	0.878	0.946	0.401
Czech Republic	1,256	0.4	0.33	0.414	3.467	1.452	0.945	0.966	0.358
Ireland	1,246	0.4	0.32	0.415	3.743	2.733	0.836	0.98	0.04
Brazil	1,236	0.4	0.354	0.429	3.371	1.214	0.813	0.803	0.263

Notes. Countries are ordered by number of respective corporations. Due to privacy concerns, we don't report descriptive statistics by nations for any lower-frequency nations.

Autonomous Employees, *Employees*, and the means of all four institutional variables by country. The table shows that even while players from the United States are heavily represented in the game—35% of the total sample—company founders in EVE are broadly distributed geographically. Another thing that is apparent in Table 3 is that, even while there is variance within the sets of Developed and Developing Nations, the bulk of the variance on most variables comes from the contrast between high- and low-GDP/capita Nations. For instance, Germany has high values on both *Autonomous Employees* and *Law and Liberty*, while China has low values on those variables.

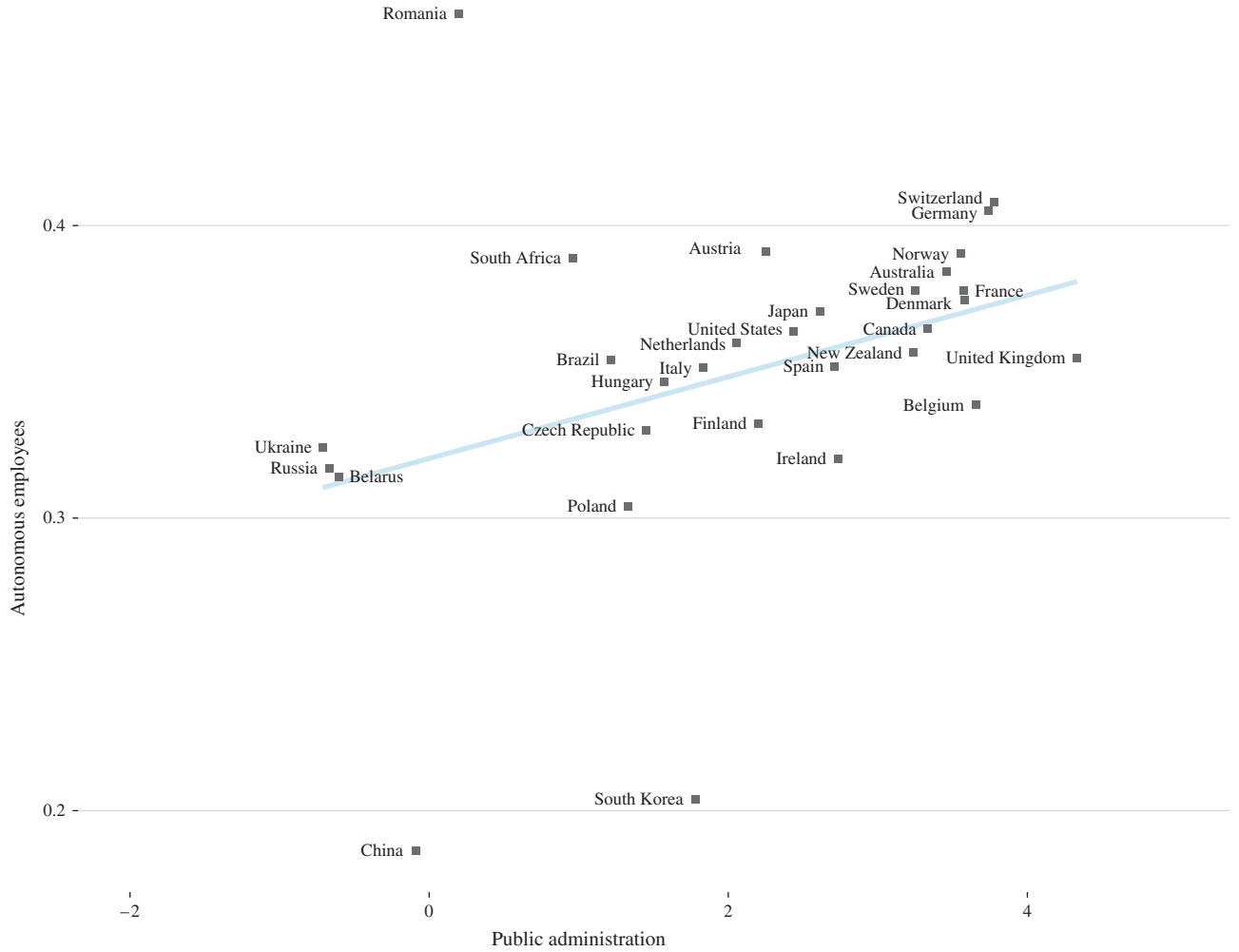
5. Results

Figure 1 shows, for each nation in the data set with at least 1,000 corporations, a scatter-plot of the *Public Administration* index—arguably our most relevant institutional measure—against the mean value of *Autonomous Employees*. We also draw a fitted line. Romania, South Korea, and China are outliers in this figure, but otherwise the pattern is clear: companies from nations with more transparent and effective institutions are more likely to grant autonomy to employees.[14]

Table 4 presents multivariate models of the relationship between our institutional variables and autonomy. We use ordinary least squares with robust standard errors clustered by country to account for country-specific heterogeneity between players. All models include the full suite of control variables.[15] The four key institutional variables are then entered separately in each model.

Starting with the control variables, we see that the experience of the founder and the behavior of the company are statistically significant with respect to company structure. For instance, in all specifications increasing *Player Age* is associated with greater employee autonomy, while founders that report they are *Female* distribute less autonomy. Likewise, companies where *Employees Online* is greater have less autonomy, while those with greater travel via *Total Warps* have more autonomy.

Figure 1. (Color online) Scatterplot of Average Proportion Autonomous Employees by Country on Public Administration



Note. Only countries containing 1,000 or more corporations are reported.

Table 4. Ordinary Least Squares Regression of Institutional Clarity and Predictability Measures on the Allocation of Autonomous Positions

	Dependent variable			
	Autonomous Employees			
	(1)	(2)	(3)	(4)
Public administration	0.016***			
	(0.003)			
Property rights		0.263***		
		(0.091)		
Law and liberty			0.171***	
			(0.021)	
Corruption				−0.087***
				(0.011)
Past employment	0.016***	0.017***	0.016***	0.016***
	(0.005)	(0.005)	(0.005)	(0.005)
Past foundings	−0.007	−0.007	−0.007	−0.007
	(0.012)	(0.012)	(0.011)	(0.012)
Founder age	0.004**	0.004**	0.004**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
Founder female	−0.016	−0.015	−0.014	−0.016
	(0.013)	(0.010)	(0.011)	(0.013)
Employees (ln)	0.109***	0.105***	0.110***	0.110***
	(0.013)	(0.011)	(0.013)	(0.013)
Employees online (ln)	−0.111***	−0.106***	−0.112***	−0.112***
	(0.010)	(0.009)	(0.010)	(0.010)
Total warps (ln)	0.045***	0.045***	0.046***	0.046***
	(0.002)	(0.002)	(0.002)	(0.003)
Total combat deaths (ln)	0.003	0.002	0.003*	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Total mining ore (ln)	0.009***	0.009***	0.009***	0.009***
	(0.0004)	(0.0002)	(0.0003)	(0.0004)
Alliance	0.083***	0.085***	0.083***	0.082***
	(0.004)	(0.006)	(0.004)	(0.005)
Constant	−0.061***	−0.252***	−0.176***	−0.010
	(0.009)	(0.080)	(0.017)	(0.011)
Observations	310,562	310,562	310,562	310,562
R^2	0.182	0.180	0.182	0.182
Adjusted R^2	0.182	0.180	0.182	0.182
Residual std. error (df = 310,550)	0.380	0.381	0.380	0.380
F statistic (df = 11; 310,550)	6,276.155***	6,208.089***	6,300.762***	6,276.557***

Note. Standard errors clustered by country.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

The independent variables of interest all behave as expected. Greater values of *Public Administration*, *Property Rights*, and the *Law and Liberty* index all correspond to a higher percentage of *Autonomous Employees*. Greater values of *Corruption* decrease delegation. In terms of overall fit, each of the models is comparable, with the more comprehensive *Law and Liberty* index slightly more predictive than the others.

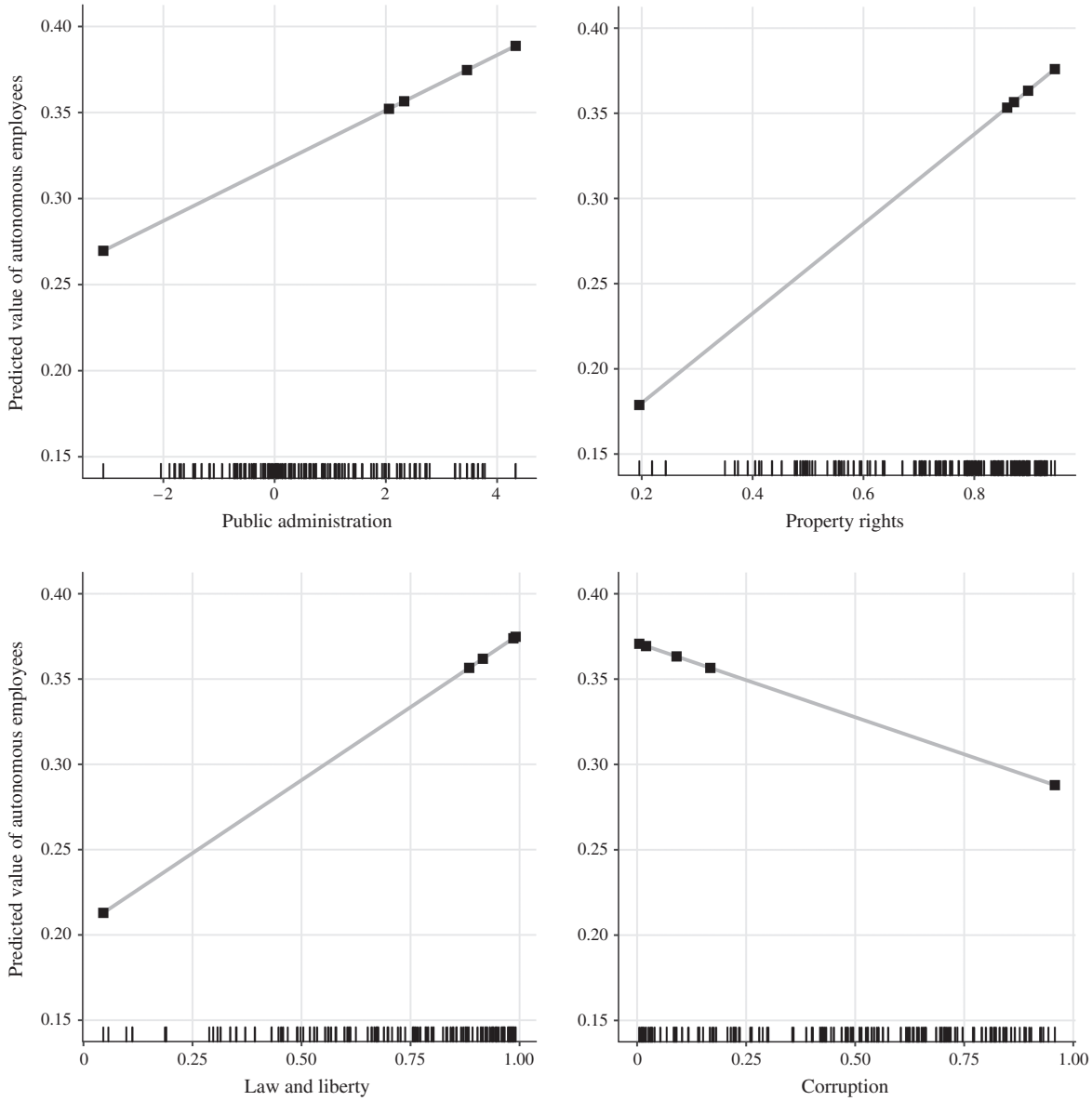
The differences in magnitudes of the effects are not directly discernible from the table because three of the institutional measures (*Public Administration*, *Property Rights*, and *Corruption*) are fit to a probability scale and the *Law and Liberty* index leverages a Bayesian item response scale. To better understand the magnitude of the effect, we plot the four key independent variables on the predicted values of the model.

Figure 2 compares the mean magnitude of the effects of each institutional variable accounting for predictability and transparency while holding all other variables at their observed values. The effects of the institutional variables are substantively important. Moving from the minimum of the distribution to the maximum on the *Public Administration* results in a 12% increase in the allocation of autonomy positions. Likewise, similar movements along the distribution for *Property Rights* result in a 20% increase, for *Law and Liberty* a 16% increase, and for *Corruption* a 8% decrease.

5.1. Robustness Checks

We conducted an extensive set of additional analyses to support our interpretation that cultural imprinting influences the founder's trust in arms-length

Figure 2. Linear Fits of the Predicted Values Along the Key Institutional Variables



Notes. The black boxes on correspond with the minimum, first-quartile, mean, third-quartile, and maximum values, respectively. Rug plots describe the distribution of the institutional measure.

interactions with strangers. We reran the analysis at the employee/employee dyadic level, examined the dependent variable of hiring any employees, looked at the dependent variable of number of employees hired, divided the samples by founder age cohorts (less than 25, 25–45, 45 plus), analyzed a subset of 10 companies randomly drawn from each of 81 nations, analyzed a subset of 100 companies randomly drawn from each of 53 nations, and tested two alternative institutional measures from *Polity* and the *World Values Survey*. These results support our interpretation of the main analysis, although there are some interesting extensions. For instance, in the regressions with *Employee Size* as the dependent variable, institutional variables change sign and are mostly statistically significant, seemingly indicating that there is a trade-off between autonomy and the span of supervisory control. All of these tables are available in the online appendix.

In the interest of transparency and enabling others to test and extend this work, we have also released a replication data set based on Table A9 in the online appendix, the sample of 100 companies from each of 53 nations. Due to privacy concerns, CCP Games placed some limitations on the publicly released data: the replication data do not include founder sex, founder age, founder past foundings, or founder prior employment, and all remaining variables incorporate random

noise. Still, the main results hold and these data are available to others without restriction.

6. Conclusion

The regression results strongly support the idea that the implementation of formal institutions in a founder's home nation is associated with subsequent organizational design choices. Organizational founders appear to carry cognitive templates for how authority should be distributed within the firms they create. Moreover, these imprinting effects persist beyond the environment in which they originate. While we argue that this manuscript makes a contribution to understanding the process of new firm organization, several elaborations are in order.

First, the link between specific cultural priors and specific firm design choices remains uncertain. Our premise is that employee autonomy relates to expectations about the utility of arms-length interactions within the firm. Even so, the comprehensive institutional index measure (*Law and Liberty*) and the more specific measures (*Public Administration*, *Property Rights*, and *Corruption*) have essentially the same predictive power for explaining authority decentralization. Whether these measures are noisy or just capture the same general underlying preference is an interesting question for future explorations.

Second, we suggest that in their endogenous relationship with culture/norms, formal institutions likely have two distinct roles that relate to preferences. The first is a straightforward translation of the preference for a given type of institution. For instance, individuals who hail from countries where state ownership of industry predominates may harbor a corresponding preference for rigid control. The second type of endogenous association is of the type discussed in the economics literature, where a particular type of institution engenders general cultural norms such as trust, the best known example here being Putnam et al. (1994)'s institutions of a "free" medieval Italian city predicting current social capital (in turn predicting success or failure of current institutions). Our analytical focus and theoretical contribution is here—highlighting the fact that an endogenous association between institutions and norms may develop less in relation to a particular institution and more as a preference associated with implementation of several divergent types of institutions.

Third, the link between organizational design and strategy is not fully specified. The question of professionalization of management has appeared in various guises in recent literature (Bloom and Van Reenen 2007, Beckman and Burton 2008, Assenova and Sorenson 2017, for example). With some exceptions, however, the connection between autonomy and firm culture is not articulated in the literature on the strategic capabilities and resources of firms (Foss et al. 2015, Grant 1996, for example). We posit that this gap is important, because speculations about processes embedded deeply within firms have clear implications for the locus of decision making, and vice versa. At the same time, our results point out that firm cultures may have a nonfunctional relationship to performance, particularly if organizations vary on the extent to which employees view the firm as an extension to their social life.

Last, we can see several extensions to this work that exploit the rich data found in EVE. For one, we have the ability to observe, across an extremely broad sample of nations, variation in the propensity to found and/or join new ventures. We can likewise observe in great detail the behavior of serial founders. With respect to institutional norms, EVE allows us to observe whether norms can be informally maintained via patterns of voluntary association. For instance, while Becker (1971) postulated that market discipline should drive out nonfunctional biases, an alternative is that taste-based discrimination is maintained by like-minded individuals choosing to cluster together. There are also obvious extensions here to questions about performance outcomes and adaptability. We leave these and other questions for future work.

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Endnotes

[1] These literatures also often posit that these initial organizational attributes, which may or may not represent optimal choices, will then tend to persist within the organization. We do not examine persistence in the present study.

[2] CCP Games recently provided avenues for players to purchase skills ("skill injections") and resources via the purchase of "PLEX"—monthly subscriptions that can be traded in market for in-game currency—which cost approximately $20 USD. Though this is a possibility, it is not common. Moreover, it underscores the real-world worth of the market-based environment that underpins EVE.

[3] Interviews conducted by authors at CCP headquarters in Reykjavík in 2013 and 2016 and at and after the EVE annual Fanfest Reykjavík 2016.

[4] We decomposed the autonomy measure in an unreported robustness check and found similar results.

[5] https://www.v-dem.net/en/.

[6] (v2clrspct) 0 = laws are not respected by local officials, 4 = laws are fully respected by local officials. This variable is representative of a suite of variables that account for clarity and predictability in implementation. Similar variables include, for example, transparent laws with predictable enforcement. Some of the variables highly correlated with this variable include several measures accounting for freedom of civil society.

[7] (v2xcl_prpty), 0=Virtually no private property rights, 45=all citizens enjoy it.

[8] (v2xcl_rol) in the V-Dem data called the "Equality before the law and individual liberty index.[...] This index is formed by taking the point estimates from a Bayesian factor analysis model of the indicators for rigorous and impartial public administration (vc2clrspct), transparent laws with predictable enforcement (v2cltrnslw), access to justice for men/women (v2clacjstm, v2clacjstw), property rights for men/women (v2clprptym.v2clprptyw), freedom from torture (v2cltort), freedom from political killings (v2clkill), from forced labor for men/women (v2clslavem, v2clslavef), freedom of religion (v2clrelig), freedom of foreign movement (v2clfmove), and freedom of domestic movement for men/women (v2cldmovem, v2cldmovew)" (Coppedge et al. 2016, p. 55).

[9] (v2x_execorr) The index is formed by taking the average of the point estimates from a Bayesian factor analysis model of the indicators for executive bribery (v2exbribe) and executive embezzlement (v2exembez).

[10] Given insufficient yearly coverage for each country-year for the countries in our sample, we opt to collapse the time series for the period of interest. The average amounts sufficiently capture the institutional concepts at play in this paper, as these measures are sticky and do not vary substantially within a four-year period.

[11] A player's age is self-reported. For ages that are not reported, we impute using the mean value. In addition, we adjust extreme ages (for example, 3 years old or 113 years old) by capping age at 10 years old (minimum) and 80 years old (maximum). We ran the models reported below on the original and adjusted versions of the age control and found no meaningful difference.

[12] The variable is coded as 1 if the player self-reports being female, 0 otherwise.

[13] Players are always reincarnated after a death but lose resources.

[14] In Table 3 the standard deviation of *Autonomous Employees* is very similar across all countries, with the notable exceptions of South Korea and China. Thus, while means vary across nations, we see no evidence that the range of deviance varies.

[15] We rescale *Past Employment* and *Past Foundings* by 10 to magnify the effect of their respective coefficients.

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