From unemployed to business owner: Exploring entrepreneurial opportunities

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Abstract

A growing literature has examined entrepreneurship through the lenses of experimentation, broadly understood as testing the viability of an idea to reduce uncertainty. Consistent with this view is the evidence that institutional settings providing tolerance for early failure facilitate experimentation in the form of higher entry into entrepreneurship. However, less is known about whether such settings also make entrepreneurs more inclined to experiment after they found a venture. This paper provides largescale evidence for the link between tolerance for failure and entrepreneurial experimental actions at the venture level. Using nationally representative data, we examine the entrepreneurial process in an institutional context that offers protection against early failure via unemployment insurance. We document higher levels of experimentation in ventures started by founders who transitioned into entrepreneurship from unemployment. These entrepreneurs engage in a greater number of both core and peripheral experimentation activities compared to other observationally equivalent entrepreneurs who do not benefit from the downside insurance provided by the unemployment insurance system. In response to the concern that a high-tolerance setting may stimulate experimentation in low quality ventures, we find that the differences in the level of experimentation hold among ventures founded by individuals with high quality human capital. To corroborate the main mechanism leading to experimentation, we turned to an alternative pathway towards entrepreneurship that offers insurance against failure— hybrid entrepreneurship—and found that this setting is also associated with higher levels of experimentation.

Keywords: experimentation, tolerance-for-failure, hybrid-entrepreneurship, unemployment

1. Introduction

Entrepreneurial prospects are fundamentally uncertain. It is now widely acknowledged that the resolution of this uncertainty requires entrepreneurs to engage in a "process of experimentation" — simply stated, to gain information, entrepreneurs need to put ideas to the test. The typical approach to experimentation involves trial-and-error changes in the business venture (Nicholls-Nixon et al. 2000) wherein entrepreneurs collect information through search heuristics (Nicholls-Nixon et al. 2000; Shepherd et al. 2012; McDonald and Eisenhardt 2019) or a more scientific approach which involves hypothesis testing and concrete decision rules (Camuffo et al. 2020; Koning et al. 2019).

Experimentation has undisputed benefits, as it enables entrepreneurs to collect feedback on the viability of their ideas and subsequently make better resource allocation and exit decisions (Kerr et al. 2014, Nanda and Rhodes-Kropf 2016). However, undertaking experimentation also entails costs (Ghemawat 1998, Gans et al. 2019, Contigiani and Levinthal 2019), both direct (e.g., upfront investments in information acquisition and idea testing), indirect (e.g., opportunity costs), and adaptation costs (e.g., efforts to redirect the venture and the team). These costs impose constraints on the ability of entrepreneurs to experiment, thereby delaying learning about business idea viability.

Given the trade-offs between the benefits and costs of experimentation, understanding the conditions that facilitate experimentation is a question of central interest to scholars and policymakers alike. One enabler of experimentation that is increasingly the focus of attention is "tolerance for failure" (Manso 2011), i.e. an environment that exhibits leniency towards early start-up failure by giving entrepreneurs an opportunity to try out alternative business ideas even if their initial entrepreneurial efforts were not successful. The extant literature has identified several institutional settings that are characterized by a tolerance towards failure such as unemployment insurance, job protected leave or tolerant bankruptcy laws. Furthermore, there is clear evidence that these failure-tolerant policy initiatives are associated with higher rates of venture founding (Armour and Cumming 2008, Manso 2011, Eberhart et al. 2017, Gottlieb et al. 2021, Hombert et al. 2020, Acharya et al. 2012).

While a higher rate of venture founding is an essential metric that suggests a greater number of ideas being tested at the economy level, this metric does not capture the experimentation process at the venture level. Looking at the process is important because it is through exploring different approaches and making business model adjustments that a viable basis for competing is established. Thus, at a fundamental level, the question remains whether a failure-tolerant context incentivizes entrepreneurs to test and modify their business ideas more actively.

We address this question by studying the post-entry behavior of entrepreneurs and their strategic change decisions in the context of the French unemployment insurance scheme. We use the scheme as an example of a failure tolerant context (Hombert et al. 2020), exploiting the fact that the unemployed in France may retain the rights to their unemployment benefits for up to three years after they launch a venture and, in case of a low entrepreneurial income, can supplement it with the unemployment allowance. In defining experimentation, we adopt the heuristic search perspective—

namely, that experimentation encompasses purposeful actions to gather new information and reduce uncertainty, but is not strictly limited to deliberate hypothesis testing—and use self-reported information from a large-scale survey to operationalize it. To study the link between tolerance for failure and experimentation, we apply coarsened exact matching and compare two observationally equivalent groups of entrepreneurs in the first five years after venture creation—unemployment scheme beneficiaries and those transitioning into entrepreneurship from employment.

We document that unemployment insurance recipients experiment more than their previously employed counterparts. Given that some aspects of a business model are costlier to modify than others, we next disaggregate our measure of experimentation into core and peripheral dimensions (Nicholls-Nixon et al. 2000). We observe that entrepreneurs who transition into self-employment from unemployment engage in a greater number of both core and peripheral experimentation activities. Next, we examine whether the high tolerance setting distinctively affects ventures with low and high human capital and show that entrepreneurs with superior human capital experiment more. The results are robust to a rich set of supplementary analyses that include alternative measures of experimentation and econometric specifications. Additionally, we exploit heterogeneity in how entrepreneurs transition into entrepreneurship. As shown by Folta et al. (2010), some entrepreneurs self-insure against failure by engaging in hybrid entrepreneurship, i.e. they launch a venture while being fully employed elsewhere. Therefore, hybrid entrepreneurship can be seen as an alternative context that exhibits tolerance for failure. We compare hybrid entrepreneurs and unemployment beneficiaries and find that both groups engage in similar levels of experimentation. These results indicate that tolerance for failure--either through policy intervention or when individuals "self-insure" via hybrid entrepreneurship--incentivizes experimentation, allowing entrepreneurs to discover the viability of their ideas.

This study makes three important contributions. First, we contribute to a growing empirical literature that seeks to understand the role of institutions in encouraging entrepreneurial experimentation (e.g., Samaniego 2006, Chava et al. 2013, Manso 2016, Gottlieb et al. 2021, Hombert et al. 2020). While prior work has established that higher tolerance for failure is associated with increased entry into entrepreneurship, we provide empirical evidence that tolerance for failure can also enable entrepreneurs to engage in unstructured experimentation. Notably, we find that entrepreneurs of higher quality undertake more experimentation which serves as indirect evidence that policies providing insurance for failure might be especially beneficial to ventures with superior human capital.

Relatedly, in defining experimentation, we go beyond documenting entry and exit patterns consistent with the experimentation view and provide complementary empirical insights on experimentation as a process. We look at early-stage entrepreneurial steps that founders take in order to reduce the uncertainties of opportunity exploitation. While most research that adopts the process view has relied on qualitative methods and field experiments, our study uses large-scale longitudinal evidence and thus minimizes external validity concerns.

Third, the paper also contributes to the literature on hybrid entrepreneurship (Folta 2010; Raffiee and Feng 2014). To our knowledge this paper is the first one to bring together two distinct pathways to full-time entrepreneurship—via unemployment insurance and hybrid entrepreneurship. We find that both pathways are associated with higher levels of experimentation and allow individuals to discover the viability of their ideas prior to making a full commitment to entrepreneurship.

2. Theoretical motivation and testable implications

Conceptual approaches to experimentation

Entrepreneurship is characterized by a high degree of uncertainty about the market prospects of a business idea and the knowledge required to succeed, and the resolution of this uncertainty requires entrepreneurs to engage in a "process of experimentation". Researchers have looked at experimentation and the associated learning in two ways—from the macro (economy-level) and micro (venture-level) perspective. At the macro level, experimentation is equated with entrepreneurial entry and exit. Underlying this perspective is the idea that the knowledge required to be a successful entrepreneur cannot be known without becoming an entrepreneur (Kerr et al. 2014). An example of a study that takes a macro approach is Manso (2016), in which he argues that entrepreneurial spells are manifestations of individuals' desire to experiment with new business ideas. In parallel, a different stream of research has adopted a micro (i.e. venture or individual) perspective, which conceptualizes experimentation as deliberate actions entrepreneurs take to reveal new information about the quality of venture ideas. This new knowledge then informs future decisions and helps rule out suboptimal outcomes ex ante (i.e., before incurring large costs).

Within this micro perspective on experimentation, scholars have discussed two broad pathways of getting information about the viability of an entrepreneurial idea. The first one is a scientific approach which assumes concrete decision rules and encourages entrepreneurs to undertake structured hypothesis-driven experiments (Camuffo et al. 2020, Novelli and Spina 2021). This approach is also at the core of the popular Lean Startup method, which advocates rapid iteration and timely feedback (Ries 2011). Although the scientific approach has great value creation potential in the long run, ventures need a solid knowledge base and other resources to come up with and carry out thoughtful scientific experiments (Felin et al. 2020, Novelli and Spina 2021). Hence, resource-constrained small ventures often use another pathway to gather information to guide their subsequent actions—the heuristic search approach.

This second approach is less structured and includes methods such as confirmatory search (Shepherd et al. 2012), effectuation (Sarasvathy 2001), parallel play (McDonald and Eisenhardt 2019) and adaptive learning via trial-and-error (Nicholls-Nixon et al. 2000, Bingham and Eisenhardt 2011). All these methods assume undertaking incremental changes along various business model dimensions. The process of making iterative changes, observing feedback from the market, and gleaning insights accelerates entrepreneurial learning.

Whether the experimentation is hypothesis-driven or is done through a heuristic search, it has benefits and costs. On the one hand, it allows an entrepreneur to further refine the business model in the event of positive signals or to exit in a timely fashion and minimize wasted resources when the signal is negative (Kerr et al. 2014; Nanda and Rhodes-Kropf 2016). Early experimentation is especially vital in some dynamic and competitive environments, where it can help ventures make rapid strategic adjustments (Koning et al. 2019). In such settings, the absence of experimentation can perpetuate the repetition of conventional business actions and threaten firm survival. At the same time, undertaking experimentation can be costly (Ghemawat 1998). The direct costs are associated with upfront investments in information acquisition and idea testing (Felin et al. 2020). The indirect costs include opportunity costs arising from making a commitment that forecloses certain strategic options (Gans et al. 2019), adaptation costs stemming from the resource adjustments required to redirect a business model (Contigiani and Levinthal 2019), appropriability costs emerging from the threat of imitation by competitors (Contigiani 2020), or the risk of reputation loss (Thomas 2019) and stigma of failure (Landier 2015). These costs typically constrain the ability of entrepreneurs to experiment, thereby limiting learning and leading to suboptimal outcomes.

Given the trade-offs between the benefits and costs involved, both scholars and policy-makers have started to investigate what regulatory frameworks can be put in place to reduce the frictions to experimentation.¹ At a general level, such policies need to ensure that experimentation does not come with severe and lasting penalties for entrepreneurs and businesses involved (Kerr et al. 2014). One institutional feature pervading several policy initiatives is "tolerance for failure", a regime that reduces the costs of experimentation by exhibiting tolerance towards exploratory actions that are taken early in the process of testing uncertain ideas, even if these actions result in poor performance initially (e.g., even if they yield a negative expected value or reveal dead-ends).

This paper focuses on a specific form of "tolerance for failure"- an unemployment insurance regime that provides downside insurance to unemployed individuals starting a business (Hombert et al. 2020)- and examines whether this high tolerance setting encourages entrepreneurs to experiment. Before turning to the empirical analysis, we explain the conceptual link between tolerance for failure and experimentation.

Tolerance for failure and experimentation

The innovation and entrepreneurship literature has a long tradition of looking at knowledge acquisition as an outcome of learning through experimentation (see Ederer and Manso 2011 for a review). In a recent theoretical contribution, Manso (2011) examines the incentive structure that

¹ While we focus here on large-scale policy interventions, prior research has documented targeted initiatives that act as a springboard to experimentation, such as creation of accelerators that institute rapid learning programs or entrepreneurial training programs where founders are taught to conduct rigorous tests of their hypotheses (Camuffo et al. 2020). Likewise, there is evidence that specific financial instruments such as early-stage financing intermediaries (Ewens et al. 2018) and risk-tolerant VC investors (Tian and Wang 2014) also enable startup experimentation and innovation.

motivates economic agents to experiment with untested approaches instead of pursuing known paths or incremental innovations. He shows that the optimal compensation scheme tolerates failure and rewards long-term success, with the conclusions of the model applying broadly to the exploration of new technologies and business ideas. Empirical work building on Manso's insights has linked this compensation scheme with scientific creativity (Azoulay et al. 2011) and the discovery of novel business strategies (Ederer and Manso 2013) at the individual level, with innovation at the firm level (Tian and Wang 2014, Atanassov 2016), and with entry into entrepreneurship at the economy level (Gottlieb et al. 2021). We build on this stream of research to examine experimentation processes within ventures.

The model lends itself to a straightforward analysis of how entrepreneurs experiment under different incentive schemes. Entrepreneurs do not know upfront what the venture success formula is and need to take purposeful actions along multiple dimensions of strategy (Nicholls et al. 2000) in order to discover a more profitable business model. During this search process, new information is revealed, which subsequently enables them to choose superior actions. However, entrepreneurs may not know ex ante whether untested actions will yield a positive payoff or will result in a financial loss. The risk of early losses and potential bankruptcy typically prompt individuals to repeat or fine-tune previously taken but not necessarily optimal steps. Manso (2011) shows that it is crucial to shield entrepreneurs from the negative consequences of failure by showing tolerance for failure. In such settings, minimal early losses from experimentation along with the prospects of long-term rewards encourage entrepreneurs to adjust plans, change course, and search for alternative, potentially superior, business models, even if the initial probability of success of each of these actions is low².

Implementing incentive schemes that show a tolerance for early failure coupled with rewards for long-term success can take a variety of forms, ranging from financial and employment contracts, to governance provisions and implicit organizational commitments (Ederer and Manso 2011). In the context of entrepreneurship, the focus has been on failure-tolerant regulatory schemes that shape economy-wide entrepreneurial activities. Two examples of high-tolerance settings examined in the literature are debtor-friendly bankruptcy laws and employment protection laws.

Debtor-friendly bankruptcy laws reduce the consequences of closing a firm (via exemptions and debt discharges), allow entrepreneurs to pursue a "fresh start" and thereby encourage greater exploration of different business ideas. As an example, Eberhart et al. (2017) looked at a bankruptcy reform in Japan and found that it spurred higher rates of entry into entrepreneurship. Likewise,

² Manso (2011) derives the optimal motivation scheme under the assumption that agents are risk-neutral, but results also hold when agents are risk-averse (Ederer and Manso 2013). One of the main ideas behind the model is that in the early startup phase, agents have a lower probability of success (in expectation) if they are pursuing new, untested directions, than if they are continuing with the same activities or merely fine-tuning them. The model derives the optimal incentive scheme under which agents are more likely to change course and try new things. Tolerance for failure is a sufficient condition for triggering experimentation. In addition, long-term rewards prevent agents from being complacent after early failure. This incentive scheme reduces some of the major frictions to experimentation, even if it cannot eliminate all (see our discussion of experimentation costs).

relaxation of employment protection laws increases the ability of firms to adjust their workforce rapidly and therefore facilitates experimentation (Autor et al. 2007). For example, Gottlieb et al. (2021) examined the Canadian reform that extended job-protected leave for women on maternity leave and found that the reform spurred venture creation, particularly in industries where experimentation has low costs and high benefits.

Most of the current entrepreneurship literature, including the examples above, has examined macro-level indicators of experimentation at the society level —more specifically, entrepreneurial entry and exit rates. The premise of this work is that the knowledge required to be a successful entrepreneur cannot be known without leaving employment and becoming an entrepreneur—it is only by starting a venture that an individual can get information about the likelihood of success and make the decision concerning whether to continue the endeavor (Manso 2016). While a higher entrepreneurship entry rate is an essential metric that suggests a greater number of ideas being tested at the economy level, there is surprisingly little empirical evidence of experimentation at the venture level i.e. the types of entrepreneurial actions a high-tolerant setting stimulates. This paper fills the gap by going beyond large-scale entry-exit patterns, embracing the micro level perspective on experimentation and studying a direct link between tolerance for failure and entrepreneurial actions.

Tolerance for failure in the form of unemployment insurance: Testable implications

We examine the entrepreneurial process induced by high tolerance for failure in the context of the unemployment insurance scheme in France (Hombert et al. 2020). We argue that this unemployment insurance scheme satisfies the main compensation conditions optimal for experimentation: early tolerance for failure- regardless of individual entrepreneurs' risk tolerance level- and long-term rewards. More specifically, the setting we examine offers entrepreneurs a promise of a long-term income stream while also providing them with a cushion in case of early business failure and thereby reducing both the direct and the indirect (i.e. opportunity) costs of unstructured experimentation.

The French unemployment insurance system includes two important provisions affecting entrepreneurs. First, the unemployed who become entrepreneurs could retain their rights to the unemployment benefits if their entrepreneurial income is lower than the unemployment allowance they would otherwise get. Second, they automatically become reeligible for more benefits if their business fails. This regulation came into force in 2001 prior to which individuals starting a business would have lost all future claims to the insurance. The unemployment insurance reform was an important development that spurred entrepreneurship (Hombert et al. 2020)--for instance, the European Commission estimates that French businesses started by the previously unemployed represent almost 40% of all new businesses in the country (European Commission 2010). While the duration of this unemployment insurance scheme varies on a case-by-case basis, the majority of the unemployed are entitled to it for about two to three years. Some might argue that the unemployment insurance could encourage more experimentation by alleviating liquidity constraints instead of reducing opportunity costs. However, unemployment insurance only offers an opportunity for income replacement and thus does not represent a positive wealth shock (Gottlieb et al. 2021)—a conclusion that is confirmed empirically by Hombert et al. (2020). Therefore, both the theoretical arguments and empirical evidence indicate that the French unemployment insurance regime exhibit features of a setting that tolerates early failure and rewards long-term success.³

Taking advantage of a longitudinal large-scale survey, we use self-reported business model changes to start unpacking the link between the French unemployment insurance and venture level experimentation processes. First, we examine whether unemployment insurance beneficiaries (Unemployed Entrepreneurs) engage in more experimentation, relative to formerly employed entrepreneurs (*Employed Entrepreneurs*). Given that some aspects of a business model are costlier to modify than others, we next disaggregate our measure of experimentation into core and peripheral dimensions, based on the classification offered by Nicholls-Nixon et al. (2000). More specifically, we categorize actions that shape the identity of the venture and are thus susceptible to inertia and more difficult to change as "core" and actions that reposition the firm without changing its identity as "peripheral" (Scott 1981, Hannan and Freeman 1984, Nicholls-Nixon et al. 2000). Third, drawing on prior research that institutional contexts differentially affect specific individuals (Eberhart et al. 2017) and that reducing barriers to entrepreneurship might predominantly incentivize individuals with low human capital (Hombert et al. 2020), we investigate whether the high tolerance setting distinctively impacts experimentation in ventures with low and high human capital. Fourth, we exploit heterogeneity in how entrepreneurs transition into entrepreneurship. As shown by Folta et al. (2010), some entrepreneurs self-insure against failure by engaging in hybrid entrepreneurship, i.e. they launch a venture while being fully employed elsewhere (Hybrid Entrepreneurs). This setup also exhibits tolerance for failure-hybrid entrepreneurs use the income from their main job to test the entrepreneurial waters--and therefore can be seen as yet another context conducive to experimentation. We thus compare Hybrid Entrepreneurs and Unemployed Entrepreneurs in terms of the degree of experimentation that each group engages in.

3. Data, variables and model specification

3.1. Data

We use two main sources of data--a longitudinal entrepreneurial survey (SINE) and employeremployee files (DADS), both provided by the French Statistical Office (INSEE). Both data sources

³ In Manso (2011), the agent is incentivized to experiment via a compensation scheme provided by the principal. In our setting, the unemployment agency acts as a principal. There is no specific compensation (or what Manso refers to as "rewards for long term success") for the individuals transitioning into entrepreneurship from unemployment. However, there are no repayment or other hidden costs for formerly unemployment entrepreneurs after they are no longer under the unemployment benefits scheme (they capture the full value generated by the venture minus what is due via taxation, with some entrepreneurs even being eligible for tax exemptions). The long-term rewards come into play because entrepreneurs forego searching for paid work in anticipation of higher revenues from the venture. Taken together, the unemployment scheme has credible features of a setting that rewards long-term success, in addition to providing downside insurance against failure.

contain common company identifiers and therefore can be merged. The SINE survey is addressed to the main founder of the venture—namely, those individuals who have the legal authority to make major venture-related decisions such as what type of financing to get or whether to discontinue operations. The survey is administered by INSEE every four years and tracks every venture cohort over a five-year window, with a nationally representative group of founders interviewed in the first, third and fifth year after registering their business⁴. Given our focus on experimentation, we use the 2010 survey which contains a richer set of questions related to business processes compared to earlier years. The survey has several attractive features—it is large (about 40% of all French startups founded in 2010 are surveyed)⁵ and has a response rate above 85%. Furthermore, the longitudinal nature of the survey alleviates several issues associated with survey methods that cross-sectional surveys are especially prone to—common methods bias and worries about causal inference.

The first wave of the new business survey (administered in 2010) contains information on the entrepreneur's main sociodemographic characteristics (age, education, social background), and a range of qualitative questions that capture the conditions under which the business was started (initial investment, steps taken to launch the business and etc). All three waves (years 2010, 2013 and 2015) have information pertaining to the management and growth of the business and include such categories as entrepreneurial actions, subsequent investments, and changes to the business.

The second source of the data is the employer-employee (DADS) file which contains detailed information on all employees in France. For the purposes of this project, we mainly use the "contract" variable which allows us to see whether each employee was hired on a fixed-term (CDD) or a permanent (CDI) contract and thus to capture the variation in levels of commitment pertaining to human resources.

3.2. Variables

Measuring experimentation

In the operationalization of experimentation, we build on prior literature but also make a distinction between learning about the viability of an idea through trying out many versions (experimentation) and more general learning. We code as experimental only those activities that reveal new information about a business idea. For instance, when an entrepreneur engages in active client

⁴ The survey excludes the smallest sole-trader businesses (i.e. in 2010, those with a turnover of less than 80,300€) as the latter are covered in a separate survey specifically designed for microenterprises.

⁵ The 2010 wave of the survey was filled out by 52,053 entrepreneurs, with 37,024 (29,708) ventures still present in 2013 (2015). For our analysis, we maintained in the sample only those observations that are relevant to the question at hand. First, while the survey is filled out by entrepreneurs who created a new business from scratch, inherited one or bought one (a franchise), our project concerns new creations; therefore, our final sample only includes the "new creation" category. In addition, there is a small proportion of ventures that are started because entrepreneurship is the only way a founder can exercise their profession. We exclude such cases from the analysis. After the process of elimination, the final sample contains 36,439 ventures in the first wave (2010), with 25,553 (21,466) observations still present in 2013 (2015).

prospecting, the customer feedback she receives allows her to assess her idea more accurately. Hence, active prospecting is coded as an experimental action. On the other hand, learning about the administrative steps that need to be taken to set up a venture does not reveal new information about a particular business idea; therefore, it is not coded as an experimental action.

Broadly speaking, the experimental actions in the survey could be grouped into the following categories—product, pricing, logistics, clientele, marketing and organizational structure. We present these actions in more detail in Table 1. Our main measure of experimentation is an index that sums up all the experimental entrepreneurial activities that each founder reported (Camuffo et al. 2020) in the first and the second waves. While we do not know the exact date each entrepreneur loses unemployment benefits, most individuals have the unemployment insurance for two to three years which coincides with the first two waves of the survey. In our robustness checks, we also construct measures of experimentation separately for each survey wave.

(Insert Table 1 about here)

In addition to the main construct of experimentation, we also built an alternative measure. The process of experimentation is often characterized by delayed commitment i.e. an individual taking experimental actions has an objective to learn about the quality of their business idea before pledging more resources and making potentially costly mistakes. Entrepreneurial resource allocation decisions can take various forms (for instance, buying land, taking out equity, investing in R&D, and hiring staff). In this paper, we examine one such resource commitment decision—the types of employment contracts issued to employees—as it is a particularly important dimension of commitment for early ventures, across all types of businesses. While both fixed-term and permanent contracts are common in France, ventures engaging in experimentation are expected to initially restrain from offering permanent contracts as the latter require a higher level of resource commitment compared to fixed-term ones. Indeed, France had stringent employment protection laws in 2010, which included multiple substantive requirements for dismissal and severance payments (ILO 2015). This institutional feature made firing employees on permanent contracts highly costly. Therefore, we argue that offering permanent contracts entails a higher level of commitment from the venture. We operationalize this alternative measure of experimentation as a ratio of permanent to all contracts in a venture and conjecture that, since a higher tolerance for failure is associated with delayed commitment, ventures run by Unemployed *Entrepreneurs* extend fewer permanent contracts than those run by *Employed Entrepreneurs*.

Measuring other key variables

Unemployed Entrepreneur is the key predictor variable reflecting whether the founder came from unemployment and is a recipient of unemployment benefits. It takes on a value of '1' if the founder reports eligibility for the unemployment benefits scheme (and '0' otherwise).⁶

Next, we briefly describe the controls that can be seen as confounding the main results. The appendix includes definitions and operationalizations of all the other control variables reflecting venture and founder characteristics.

General learning—Entrepreneurs who undertake entrepreneurial training or receive entrepreneurial advice might be more likely to experiment if the training/advice makes them more aware of the benefits of experimentation and/or teaches them how to experiment effectively. In our survey, entrepreneurs reported whether they received voluntary entrepreneurial training or entrepreneurial advice on a 3-point scale (never (0), rarely (1) and often (2)). Our composite general learning measure is a sum of the two Likert scale values and ranges from 0 to 4.

Mandatory training—Certain entrepreneurs receiving unemployment benefits are also required by the unemployment agency to undergo training which could impact the experimental activities they undertake. We define a binary variable, mandatory training, as '1' if the founder was required to receive training and '0' otherwise.

Risk tolerance—Risk tolerance could also have an impact on experimentation because risk averse individuals are less likely to undertake activities the result of which is not known ahead of time. While we cannot observe entrepreneurs' risk tolerance directly, we use as a proxy the variable "amount of personal resources invested in the startup as a percentage of all startup investment". This variable is continuous and ranges from 0 to 100. Given the high startup failure rate, investing personal resources in a startup could be considered riskier than other funding options such as taking out government or bank loans and thus is an appropriate proxy for risk tolerance.

Initial investment—Because experimentation is costly, initial venture resources might impact both the overall level of experimentation, as well as the subsequent resource allocation decisions. We use an 8-category interval variable reflecting initial startup capital to capture the initial level of resources that a venture has at its disposal.

Competitive environment—Prior work has shown that the venture's competitive environment partially dictates what actions entrepreneurs take and compels entrepreneurs to take fewer or more entrepreneurial actions (Nicholls-Nixon et al. 2000). Therefore, a higher level of experimental activity

⁶ While the survey also has a variable indicating whether a person was unemployed prior to transitioning into selfemployment, the variables *Unemployment* and *Unemployed Entrepreneur* are not used interchangeably. This is due to the fact that not every unemployed person is eligible for the unemployment benefits and can use them to supplement their income if necessary. In this dataset, about 80% of people who indicate they are unemployed are eligible for unemployment benefits while the other 20% are not. Hence, we rely on the unemployment benefits measure when assigning entrepreneurs into one of two groups—*Unemployed Entrepreneur* vs *Employed Entrepreneur*. Technically, the survey does not contain information on the amount of allowance that each individual is eligible for or whether or not they use it to supplement their income from entrepreneurship. However, the amount they could tap into is not expected to influence the level of experimentation (other than via its correlation with human capital quality, which we control for).

could be a response to the intensity of competition and not necessarily a proactive choice of the entrepreneur to experiment. In order to account for the level of competition and therefore better isolate the choice to experiment (vs. necessity to make changes), we use a variable reflecting the entrepreneur's perception about the change in competition over the previous time period (with '1' indicating a decrease in competition, '2' indicating stable competition level and '3' indicating an increase in competition).

Method

The dependent variable *Experimentation* is a count variable and is slightly over dispersed in the data. Thus, we used a negative binomial regression for our main analysis and a Poisson regression as a robustness check. For the alternative constructs of experimentation, we used linear regression analysis. An important concern pertains to potential endogeneity: *Unemployed Entrepreneurs* and *Employed Entrepreneurs* might be different in some way—for instance, they might systematically sort into different types of ventures that might require *Unemployed Entrepreneurs* to experiment more, which would result in a spurious relationship between the entrepreneur type and experimentation. We attempted to mitigate the influence of confounders by using coarsened exact matching (CEM) together with the inclusion of a variety of controls and a battery of robustness checks (Iacus et al., 2012). Specifically, we created a matched sample of "treatment" (in this case, *Unemployed Entrepreneurs*) and "control" (*Employed Entrepreneurs*) observations that are similar in terms of a rich set of observable characteristics: demographic characteristics, education, prior experience, and industry dimensions. Covariates are balanced between the treatment and control groups which confirms the conditional independence assumption of CEM. Unless stated otherwise, all regressions are run on matched *Unemployed Entrepreneurs* observations ⁷.

4. Empirical results

4.1. Descriptive statistics

Table 2 shows descriptive statistics for the key variables used to predict the level of experimentation. To gain more insight, the results are presented separately for the two types of entrepreneurs—on the left side of the table, the *Employed Entrepreneurs*, and on the right side, the *Unemployed Entrepreneurs*.

⁷ This methodological approach allows us to compare observationally equivalent founders, but there can be further concerns regarding a possible selection bias in the sample. Two aspects require more clarity. First, one may be concerned that the unemployment scheme might disproportionally incentivize individuals of low quality to become entrepreneurs. In this case, controlling for the observed quality of founders may still leave open the possibility that ventures formed by *Unemployed Entrepreneurs* are of lower quality and require more changes, leading to a spurious relationship between unemployment status and experimentation. However, it is important to emphasize that in their extensive study of the reform, Hombert et al. (2020) did not find evidence of adverse selection in the quality of entrepreneurial cohorts entering immediately post-reform. The second concern is that individuals, particularly those more inclined to experiment, might be "gaming the system" to become unemployed first and then start a business. However, dismissal legislation in France is very strict and given the dismissal costs for both the employers to become unemployed in order take advantage of the unemployment insurance. We thus assume that unemployment is involuntary (or at least independent of the intention to experiment).

(Insert Table 2 about here)

This table shows that, contrary to a commonly held view that the unemployed are low-skilled individuals, the two groups are rather similar in terms of university degree attainment, relevant prior experience and initial investment amount. The relatively high level of human capital among the unemployed serves as evidence that a large portion of *Unemployed Entrepreneurs* do not fit the description of need-based entrepreneurs (Fairlie and Fossen 2018)⁸. On the other hand, the table also highlights some dimensions on which the two groups have marked differences. For instance, *Unemployed Entrepreneurs* are significantly younger, have less top management experience and seem to be less risk tolerant than *Employed Entrepreneurs*. In addition, most *Unemployed Entrepreneurs* are first-time entrepreneurs while a sizeable proportion of *Employed Entrepreneurs* have prior entrepreneurial experience. This pattern is consistent with the fact that the unemployed use the unemployment insurance to test their business ability and ideas. Furthermore, Table 3 reveals that the two groups of entrepreneurs are also rather similar in terms of industries they select into. Table 4 presents pairwise correlations between the key explanatory variables and indicates that there is little evidence of collinearity among them.

(Insert Table 3 about here) (Insert Table 4 about here)

4.2. Multivariate analysis

Amount of experimentation

We first examine whether the unemployment allowance is associated with higher levels of experimentation. Table 5 reports the results.

(Insert Table 5 about here)

Columns 1, 2 and 3 show that the coefficient on *Employed Entrepreneur* is positive and statistically significant in years 1-3. The results hold for the unmatched negative binomial (column 1), linear (column 2) and CEM negative binomial (column 3) regressions. The CEM model in column 3 indicates that the *Unemployed Entrepreneurs* engage in about 10% more experimentation than *Employed Entrepreneurs*. This corresponds to *Unemployed Entrepreneurs* making between one and two additional business model changes. Columns 4 and 5 reveal that the differences in the level of experimentation between the two groups of entrepreneurs are significant in the first (year 1) wave (column 4) and remain significant in the second (years 2-3) wave (column 5). In the third wave though (years 4-5), the coefficient on *Unemployed Entrepreneurs* is much smaller than in the other columns and is only marginally statistically significant (column 6). These results suggest that once

⁸ A survey question related to entrepreneurial motivation also supports this idea--36.36% of *Unemployed Entrepreneurs* indicated "I was unemployed and chose entrepreneurship" as the primary motivation for starting their venture vs only 5% of *Unemployed Entrepreneurs* who indicated "I was unemployed and was forced into entrepreneurship" (the latter reflecting the notion of necessity entrepreneurship i.e. entrepreneurs being pushed into self-employment).

unemployment benefits run out, the two groups of entrepreneurs converge in terms of the amount of experimentation they engage in⁹.

Core and peripheral experimentation

The index that we have constructed to measure experimentation gives equal weights to every modification mentioned in the survey. However, it is likely the case that some adjustments are costlier to implement than others. While we cannot assess the cost associated with the implementation of each modification, we can use prior literature to categorize each adjustment as either a core or a peripheral activity (Nicholls-Nixon et al. 2000). The core dimension changes are more reflective of efforts to shape the core identity of the venture and are thus costlier to implement, while the peripheral activities are more indicative of efforts to learn about the competitive environment and do not incur as high of a cost (Nicholls-Nixon et al. 2000). Accordingly, we proceed to disaggregate our measure of experimentation into two separate dimensions—core experimentation which encompasses changes in the product, production/ distribution processes and organizational structure; and peripheral experimentation which includes modifications related to pricing, advertising, and location.

Table 6 presents the results and shows the differences in experimentation between *Employed* and *Unemployed Entrepreneurs* are significant in both instances The CEM model in column 1 indicates that, compared to *Employed Entrepreneurs*, *Unemployed Entrepreneurs* engage in about 8 percent more experimentation on core dimensions. The coefficient on *Unemployed Entrepreneurs* in column 2 indicates that they make about 12 percent more peripheral changes than *Employed Entrepreneurs*.

(Insert Table 6 about here)

High human capital and experimentation

A consistent concern regarding entrepreneurial policies is that they mostly benefit entrepreneurs with low human capital while not having a real impact on more capable individuals (Eberhart et al. 2017, Hombert et al. 2020). In this section, we isolate entrepreneurs with high human capital and investigate how well this subgroup takes advantage of the insurance against failure scheme. We use three alternative ways to assess the impact of human capital quality on experimentation namely, we operationalize founder's human capital quality based on whether the entrepreneur has: a) venture growth ambitions; b) a business idea upon entering entrepreneurship; c) top managerial experience. In this analysis, we continue to match *Unemployed Entrepreneurs* and *Employed Entrepreneurs* on all other dimensions used in the main analysis and also continue to include the same controls. The results are presented in Table 7 and support the idea that the differences in the degree of experimentation among high quality *Unemployed Entrepreneurs* and *Employed Entrepreneurs* are particularly sizable, compared to the results on the full sample in Table 5. While the coefficient on

⁹ Interestingly, even though the two groups of entrepreneurs converge in terms of experimentation levels by year 5, both groups continue to undertake some changes in the business model. This evidence corroborates our implicit assumption that experimentation is important throughout the life of a venture and not just in the initial stages.

Unemployed Entrepreneurs in all three columns is positive and statistically significant, the largest differences in the level of experimentation between Unemployed Entrepreneurs and Employed Entrepreneurs of high quality are observed among those individuals who have a business idea when entering entrepreneurship and those who have top managerial experience.

(Insert Table 7 about here)

5. Additional validation of the mechanism: hybrid entrepreneurship

To validate the mechanism that it is the high tolerance for failure that encourages more experimentation, we compare unemployment benefits beneficiaries to hybrid entrepreneurs, with the latter being defined as individuals who engage in self-employment activity while simultaneously holding a primary job (Folta 2010). While hybrid entrepreneurship is not always viable (such as when there are non-compete agreements, when starting a business clashes with other norms- i.e. "science for the sake of science", or when testing the viability of an idea entails a significant time investment), there are many instances when hybrid entrepreneurship can be a path to full-time self-employment (Folta 2010). We aim to understand if entrepreneurs who use the hybrid entrepreneurship path as a means to transition into self-employment (Raffiee and Feng 2014) engage in greater levels of experimentation relative to Employed Entrepreneurs. We expect hybrid entrepreneurs to actively engage in experimentation for two reasons. First, a full-time work arrangement allows individuals to retain their salary, therefore reducing the cost of taking potentially inferior entrepreneurial actions and thus creating an environment of high tolerance for failure. Second, unlike those entrepreneurs who see hybrid activity as a path to supplementary income or nonpecuniary benefits (Folta 2010), those who see it as a pathway to self-employment need to test the viability of their business idea and therefore have a greater incentive to engage in experimentation prior to fully committing to entrepreneurship. We operationalized Hybrid Entrepreneurs by identifying a subset of entrepreneurs who met two conditions: a. those who reported having a full-time job when starting a venture; b. those who reported "having an idea" as the main reason for entering entrepreneurship.

The results are presented in Table 8. Column 1 shows that *Hybrid Entrepreneurs* tend to engage in more experimentation than *Employed Entrepreneurs*. However, when we compare *Hybrid Entrepreneurs* with *Unemployed Entrepreneurs* (column 2), we find that the levels of experimentation of both groups are comparable. These findings are consistent with the view that both the unemployment scheme and hybrid entrepreneurship provide insurance against failure and are thus conducive to experimentation.

(Insert Table 8 about here)

6. Robustness checks

6.1. Alternative measure of experimentation

The findings that *Unemployed Entrepreneurs* engage in more experimentation are robust to our alternative measure of experimentation which captures human capital decisions as opposed to changes

in the business model. The regression analysis includes all controls used in the main analysis, but also some additional variables that mitigate potential concerns about alternative factors that could explain the choice of contract types. Indeed, while a delay in resource commitment might be an indicator of testing entrepreneurial waters, it could also be a function of personal resource constraints; therefore, we need to control for the latter. We do not have a pre-founding income variable, but the survey has a question pertaining to pre-founding social welfare benefits which allows us to categorize entrepreneurs into two groups—those with and without high liquidity constraints. We code this variable as '1' if an entrepreneur was receiving social welfare benefits prior to founding a venture (high liquidity constraints), '0' otherwise (low liquidity constraints). In addition, human capital decisions might be affected by whether the founders receive help from family members. We account for this by including a *family help* control which captures the number of family members who assisted the main founder in some way during the founding stage.

We find that startups founded by *Unemployed Entrepreneurs* have a lower proportion of employees on permanent contracts up to year 3. In line with the expectation that the unemployment insurance effects would peter off over time, the differences between the two types of ventures disappear starting in 2013 (year 3).

(Insert Table 9 about here)

6.2. Accounting for attrition

We built our main experimentation construct by summing up all the business model changes that entrepreneurs report in the first and second waves of the survey. The rationale for combining the two waves was to get a three-year time frame—a period that coincides with the duration of the unemployment benefits program. However, even if our results are based on a CEM approach in which *Unemployed Entrepreneurs* and *Employed Entrepreneurs* are matched along multiple observable attributes, our estimates might be subject to attrition bias if *Unemployed Entrepreneurs* who exited the sample would have had significantly lower experimentation levels (had they stayed in the sample), relative to those *Unemployed Entrepreneurs* who remained in the sample¹⁰. We use two ways to account for the attrition.

Inverse probability weighting

Our first approach employs the inverse-probability-weighted regression adjustment (IPWRA) method. This method assumes that after controlling for the observed characteristics of entrepreneurs who exit the sample between year 1 and year 3, the probability of not observing their experimentation levels in year 3 is independent of the true level of experimentation. The method computes weighted averages of experimentation levels in both the ventures that survived and the ventures that did not, where the weights are the estimated inverse probabilities of surviving. To implement this method, we first modelled the probability of survival for each venture in the sample and used the estimated

¹⁰ 71.5% (68.3%) of Employed (Unemployed) Entrepreneurs survive past year 3.

probabilities to compute inverse-probability weights. We used a rich set of variables to model the probability of survival: venture-level characteristics (e.g., industry, the breadth of the geographical market niche, competitive environment, and initial investment), socio-demographic characteristics of founders (age, gender, nationality, and risk tolerance) and a wide range of characteristics related to founder human capital (relevant prior experience, top managerial experience, entrepreneurship experience, venture growth ambitions, entrepreneurial role models and entrepreneurial training received). Ventures that are less likely to survive until year 3 were given more weight in the computation of predicted experimentation levels. In the next step, we used the reweighted data to re-examine the relationship between unemployment allowance and experimentation.

We find that, on average, the predicted experimentation levels of the ventures that stayed in the sample until year 3 are not significantly different from the predicted experimentation levels of the ventures that exited in the first three years of founding. In the IPWRA method, surviving plays the role of a "treatment", and Table 10a (Step 1) indicates that the average treatment effect (ATE) of surviving on the predicted levels of experimentation is statistically null. The table shows the predicted levels of experimentation in the ventures that survived and those that did not, as well as the difference between them (the ATE). We show this information first for the full sample (all ventures combined, irrespective of who founded them), and then separately for the subgroups of *Unemployed* and *Employed Entrepreneurs*.

(Insert Table 10a about here)

Table 10b (Step 2) shows the results of the inverse-probability-weighted regression adjustment. This is the main regression of interest, in which we regress the weighted experimentation levels of the ventures that survived past year 3 on the *Unemployed Entrepreneurs* variable and all other controls included previously in the regressions predicting experimentation level (Table 5). The *Unemployed Entrepreneurs* dummy continues to remain positive and significant, a finding that reinforces the validity of our previous findings.

(Insert Table 10b about here)

Nonetheless, we cannot be entirely sure that the factors that cause ventures to exit the sample before the second survey wave are unrelated, or only weakly related, to the estimated effect of tolerancefor-failure on experimentation. If this condition does not hold, IPWRA is subject to the same potential attrition bias as the main analysis. Below, we explain a different approach.

Instrumental variable approach

Our second approach to dealing with sample attrition involves predicting the probability of survival with an instrument and subsequently using the predicted values in the second stage to estimate the relationship between unemployment allowance and experimentation. An instrument is valid if it explains the probability of venture survival, but not the level of venture experimentation, except through its effect on venture survival. The instrument we used is based on the following survey question asked

in wave 1: "How long do you anticipate being an entrepreneur?" There are two possible responses ("I anticipate being an entrepreneur short-term" and "I anticipate being an entrepreneur long-term"). We find that our instrument is a significant predictor of whether or not a venture survives past the first three years. However, because the F-statistic is slightly lower (6.99) than the value associated with the 10% maximal IV relative bias, we cannot rule out that our instrument is weak and proceed to use Moreira's conditional likelihood ratio--a testing procedure that is robust to weak instruments (Moreira and Poi 2003, Bascle 2008). The results of the second stage are presented in Table 11.

(Insert Table 11 about here)

Next, we look at Moreira's conditional likelihood ratio (Table 12) which confirms the results from the 2SLS estimation in Table 11. Because the value of the 2SLS estimator of Survival, years 1-3 (14.42) is within the interval, we can conclude that even after accounting for attrition, *Unemployed Entrepreneurs* engage in more experimentation, compared to *Employed Entrepreneurs*.

(Insert Table 12 about here)

7. Post-hoc Analysis: Experimentation and learning

The main purpose of experimenting is to learn. While our data does not permit us to directly observe and measure the entrepreneurial learning that takes place, one of the survey questions is indicative of learning and allows us to make an indirect link with experimentation. In the first and in the third year, entrepreneurs are asked about their future plans for the venture. Possible responses include the following: a. develop the venture, b. maintain status quo, c. address a difficult situation, d. I don't know. If experimentation indeed helps reduce uncertainty by speeding up learning, we should expect fewer *Unemployed Entrepreneurs* to feel uncertain about the future. We run a probit regression predicting the probability of an entrepreneur expressing uncertainty about the future and find that the *Unemployed Entrepreneurs* are indeed less likely to say "I do not know", relative to *Employed Entrepreneurs* (Table 13, columns 1-3). The results are robust to all three different operationalizations of human capital quality (high quality being defined as entrepreneurs who have a clear business idea prior to entering entrepreneurship, those who have growth ambitions, or those who have prior top managerial experience) and is congruent with the view that experimentation improves learning.

(Insert Table 13 about here)

In addition, we look at whether there is a difference between *Unemployed Entrepreneurs* and *Employed Entrepreneurs* in terms of tempering ambitions between years 1 and 3. If engaging in experimentation accelerates learning and helps individuals to assess a business opportunity sooner than what would have been possible otherwise, then we would expect *Unemployed Entrepreneurs* with poor business ideas to receive negative signals faster than *Employed Entrepreneurs* do. Even though the data does not allow us to directly assess the speed of receiving negative signals, we can use the responses to the question about the future of the venture to compare *Unemployed Entrepreneurs* and *Employed Entrepreneurs* in terms of growth ambition adjustments between years 1 and 3. Because of the

accelerated learning that experimentation provides, we expect that, relative to *Employed Entrepreneurs*, a greater number of *Unemployed Entrepreneurs* with poor business ideas will downgrade their growth aspirations. While we have no direct way to capture the quality of business ideas, we proceed under the assumption that the quality of ideas is positively correlated with the quality of human capital. Hence, we expect that the differences between *Unemployed* and *Employed Entrepreneurs* in downward growth revisions will be especially large among founders with low human capital.

We next run a series of regressions capturing the probability of entrepreneurs lowering their growth ambitions between years 1 and 3 (Table 13, columns 4-6). We find that *Unemployed Entrepreneurs* are indeed more likely to downgrade their growth ambitions compared to *Employed Entrepreneurs*. The differences between the two groups are larger among individuals with low human capital, especially when the latter is defined as having low growth ambitions or little top managerial experience¹¹ (columns 5 and 6, respectively). Therefore, this set of results is also consistent with the idea that engaging in experimentation accelerates learning.

8. Conclusions

The academic literature has a long history of studying ways entrepreneurs engage in learning and reduce the uncertainty surrounding their business idea. The majority of work in this area has relied on qualitative methods and field experiments. These empirical approaches shed light on the process of acquiring information, but cannot be generalized beyond the specific setting where the study takes place. On the other hand, there is also a smaller literature that uses large-scale data to look at how entrepreneurs test their ideas but treats entrepreneurial entry and exit as proxies for experimentation without delving into the actual process entrepreneurs undertake to reduce uncertainty. We add to the experimentation literature by bringing these two streams together.

We use large scale administrative data to examine the experimentation process that entrepreneurs undertake to test the viability of their ideas. We compare two groups of entrepreneurs who benefit from different institutional opportunities—unemployment insurance beneficiaries and individuals who transition into entrepreneurship from employment. Our study reveals that, in spite of the predominant tendency to equate unemployed founders with necessity entrepreneurship (ILO, 2012), a large number of unemployed founders are highly qualified and see entrepreneurship as a choice. These characteristics make them more similar to opportunity entrepreneurs—an observation that is consistent with Nikiforou (2019).

In the French context that we study here, unemployment insurance recipients can use their unemployment insurance to supplement their entrepreneurial income in case of poor venture performance. Thus, their costs of experimentation are lower, relative to the costs incurred by their previously employed counterparts.

¹¹ As a reminder, we defined high human capital quality in 3 ways—having growth ambitions, having top managerial experience, and having a business idea prior to entering entrepreneurship.

In line with the theoretical predictions, we find that *Unemployed Entrepreneurs* engage in greater levels of experimentation, compared to *Employed Entrepreneurs*. These differences between the two groups hold even when we disaggregate our construct of experimentation and look at core and peripheral activities separately. Moreover, the differences in experimentation levels become magnified among entrepreneurs with superior human capital.

In addition to providing large-scale evidence on experimentation, we also contribute to the hybrid entrepreneurship literature. We compare unemployment insurance beneficiaries and hybrid entrepreneurs and find that both groups engage in similarly high levels of experimentation. This finding is consistent with the idea that both the unemployment insurance and hybrid entrepreneurship are settings characterized by downside insurance against failure—a condition that encourages experimentation (Manso 2011).

Despite these contributions, the study has a number of limitations. While qualitative studies are often able to assess the magnitude of business model changes, our data does not allow us to do so. We use prior work to group each change in the business model as either a core element signifying more substantive changes or a peripheral element denoting less essential changes. Future work is needed to go beyond this binary construct of experimentation and replicate our results with a more nuanced measure.

Second, our data does not contain sequential information about entrepreneurial choices to engage in experimentation which means we cannot capture feedback loops and interdependencies among business model modifications. The main experimentation measure used in our analyses assumed, by construction, that higher levels of experimentation in the second wave of the survey were independent of the experimentation feedback received initially. However, we find that the two groups of entrepreneurs have differences in experimentation levels even after just one year of operations (i.e. before the outcomes from those experimental activities are known). We hope that future research will be able to look at the interplay between the role of institutional settings and experimentation while also taking into consideration the role of experimentation feedback.

Third, despite our efforts to make the two groups as observationally equivalent as possible via matching entrepreneurs on a rich set of attributes, we cannot exclude the possibility that there are differences between the formerly employed and the formerly unemployed that make the latter more inclined to make changes in the business model. While there are strong theoretical reasons to believe that tolerance for failure is the mechanism driving the empirical results, we cannot ascertain causal identification.

Given the lack of large-scale studies on experimentation, we hope the empirical patterns in this work serve as initial evidence that institutional contexts can shape entrepreneurial actions by enabling experimentation. Additionally, while we find that experimentation has implications for learning, this current work also raises interesting questions regarding the effect of experimentation on other organizational outcomes. Future research linking experimentation and venture performance seems especially relevant.

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Table 1. Survey questions about experimental activities

Product

Have you introduced new products/services^{1,2,3}; have you experienced significant modifications concerning the nature of clientele offerings?^{2,3}

Pricing

Have you experienced significant modifications concerning the pricing?^{2,3}

Logistics

Have you introduced new manufacturing processes/logistics methods?^{1,2,3}

Clientele and partnerships

Have you experienced significant modifications concerning the nature of the clientele?^{2,3}; the location of the clientele?^{2,3} Have you engaged in active client prospecting?^{2,3} Have you signed new agreements with other enterprises?^{2,3}

Marketing

Have you introduced new marketing methods (distribution, new methods of selling, design, packaging...)?^{1,2,3}

Organizational structure

Have you introduced new methods related to venture structure/resource management (HR, work organization, partnerships, outsourcing)?^{1,2,3}

Note. Subscript numbers refer to the wave in which the survey question was asked. We grouped the questions by category, therefore, their order does not match the order in the survey.

Table	2.	Descri	ntive	statistics
1 4010		Deseri		Statistics

	Key Ei	v descriptive sta mployed Entrep	Key descriptive statistics for Unemployed Entrepreneurs					
		n=13,114			n=9,896			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Experimentation, years 1-3	2.26	1.94	0	12	2.51	1.99	0	13
Experimentation, year 1	0.73	1.02	0	4	0.81	1.06	0	4
Experimentation, years 2-3	1.53	1.55	0	9	1.69	1.57	0	9
Experimentation, years 4-5	1.24	1.44	0	9	1.33	1.50	0	10
Age category	2.66	1.00	1	4	2.30	0.95	1	4
University diploma	0.44	0.50	0	1	0.38	0.49	0	1
Top managerial experience	0.25	0.43	0	1	0.09	0.29	0	1
Female	0.26	0.44	0	1	0.27	0.45	0	1
Entrepreneurial experience	0.44	0.50	0	1	0.17	0.38	0	1
French nationality	0.92	0.27	0	1	0.95	0.22	0	1
Relevant prior experience	0.62	0.49	0	1	0.65	0.48	0	1
Mandatory training	0.16	0.37	0	1	0.28	0.45	0	1
Entrepreneurial role model	0.71	0.45	0	1	0.73	0.45	0	1
Initial venture investment	3.98	2.20	1	8	3.98	1.86	1	8
General learning	0.83	0.92	0	4	0.90	0.91	0	4
Risk tolerance	68.00	40.37	0	100	59.43	40.68	0	100
Competitive environment	2.36	0.56	1	3	2.37	0.55	1	3
Hybrid entrepreneur	0.13	0.33	0	1	0.02	0.15	0	1
Entrepreneurial duration	0.89	0.31	0	1	0.93	0.25	0	1
Client geography	1.73	0.94	1	4	1.61	0.86	1	4
Core experimentation, years 1-3	1.25	1.25	0	7	1.36	1.28	0	7
Peripheral experimentation, years 1-3	1.01	1.09	0	7	1.15	1.13	0	7
Survival, years 1-3	0.98	0.13	0	1	0.98	0.14	0	1
# of family members helping	0.05	0.25	0	6	0.03	0.20	0	4
More ambitious	0.19	0.39	0	1	0.17	0.37	0	1
Less ambitious	0.30	0.46	0	1	0.34	0.47	0	1
Don't know	0.24	0.43	0	1	0.20	0.40	0	1
Had an idea	0.17	0.38	0	1	0.15	0.36	0	1
Growth ambition	0.41	0.49	0	1	0.32	0.46	0	1
Social benefits	0.15	0.35	0	1	0.76	0.43	0	1

Note. Analysis sample includes all ventures for which strategic changes were observed in the first and second waves.

Table 3.	The nu	mber o	of <i>Emple</i>	oved and	Unemple	oved Entre	preneurs l	by industry	v
				<i></i>	. •	<i>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</i>	p. ee	<i>y</i>	J .

Entrepreneur type	1	2	3	4	5	6	7	8	9
Employed	1,419	1,978	3,515	535	328	686	2,310	1,363	980
	10.82%	15.08%	26.8%	4.08%	2.5%	5.23%	17.61%	10.39%	7.47%
Unemployed	872	1,722	2,921	445	213	437	1,774	552	960
	8.81%	17.4%	29.52%	4.5%	2.15%	4.42%	17.93%	5.58%	9.7%

Note. The industry labels refer to : 1—manufacturing; 2—construction; 3—commerce; transport; hospitality; 4—information and communication; 5—financial and insurance activities; 6—real estate; 7—scientific and technical activities; administrative services; 8—public administration; health; education; 9—other service activities

Table 4. Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Experimentation, years 1-3	1.000																		
(2) Age category	-0.024	1.000																	
(3) University diploma	0.027	-0.036	1.000																
(4) Top mgmt experience	0.002	0.145	0.229	1.000															
(5) Female	-0.021	-0.080	0.107	-0.081	1.000														
(6) Serial entrepreneur	-0.001	0.262	0.005	0.133	-0.089	1.000													
(7) French	-0.006	0.003	0.044	0.033	0.028	0.025	1.000												
(8) Relevant prior experience	-0.031	-0.107	-0.017	-0.028	-0.028	-0.033	-0.015	1.000											
(9) Mandatory training	-0.017	-0.146	-0.199	-0.156	-0.023	-0.155	-0.031	0.049	1.000										
(10) Entr. entourage	0.035	-0.053	0.058	0.030	0.003	0.045	0.078	0.006	-0.003	1.000									
(11) Initial investment	0.085	0.056	-0.008	0.066	-0.057	0.046	0.054	-0.140	0.043	0.064	1.000								
(12) Learning	0.191	-0.060	0.064	-0.013	0.056	-0.019	0.023	0.038	0.034	0.030	0.006	1.000							
(13) Risk tolerance	-0.038	0.046	0.063	0.027	-0.001	0.033	-0.079	0.050	-0.090	-0.038	-0.450	-0.016	1.000						
(14) Competitive environment	0.092	-0.007	-0.011	-0.029	-0.003	0.003	-0.027	0.013	0.011	-0.001	0.000	0.033	0.021	1.000					
(15) Hybrid entrepreneur	-0.015	0.055	0.060	0.210	-0.043	0.136	0.025	-0.124	-0.081	0.014	0.059	-0.028	-0.011	-0.012	1.000				
(16) Entrepreneurial duration	0.017	-0.131	0.005	-0.025	0.005	-0.044	0.007	0.049	0.049	0.043	0.070	0.025	-0.047	0.007	-0.021	1.000			
(17) Become less ambitious	0.071	-0.041	0.028	0.016	0.013	-0.009	0.010	-0.052	0.015	0.045	0.109	-0.019	-0.055	0.018	-0.002	0.105	1.000		
(18) Uncertainty about future	-0.079	0.030	-0.035	-0.004	0.005	0.016	-0.043	-0.038	-0.029	-0.061	-0.074	-0.072	0.054	0.022	0.019	-0.092	-0.199	1.000	
(19) New idea	0.135	0.036	0.072	0.073	-0.015	0.071	0.031	-0.123	-0.082	0.043	0.109	0.003	-0.037	0.000	0.125	0.005	0.105	-0.019	1.000
(20) Ambition to grow	0.123	-0.010	0.007	0.120	-0.066	0.061	-0.017	-0.092	-0.011	0.040	0.205	0.008	-0.068	0.000	0.167	0.028	0.173	-0.041	0.131

Variables	NegBin	Linear	NegBin	NegBin	NegBin	NegBin
	Not matched	CEM	CEM	CEM	CEM	CEM
	years 1-3	years 1-3	years 1-3	year 1	years 2-3	years 4-5
Unemployed Ent	1.12***	1.22***	1.09***	1.15***	1.09***	1.03
1 2	(0.01)	(0.03)	(0.01)	(0.02)	(0.02)	(0.02)
Age category	0.99**	-0.04**	0.98***	0.97***	0.98	0.99
0 0 0	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
University degree	1.05***	0.14***	1.06***	1.08***	1.08	1.03
	(0.01)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)
Managerial	0.99	0.10*	1.06**	1.09**	1.02	1.05
experience	(0.02)	(0.06)	(0.03)	(0.04)	(0.03)	(0.04)
Female	0.95***	-0.06	0.99	0.99	0.99	0.98
	(0.01)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)
Serial entrepreneur	1.02	0.10**	1.05***	1.05	1.05	1.04
	(0.01)	(0.04)	(0.02)	(0.03)	(0.02)	(0.03)
French nationality	0.97	-0.03	1.00	1.01	1.00***	0.99
	(0.02)	(0.08)	(0.04)	(0.07)	(0.05)	(0.05)
Relevant prior	0.98	0.03	1.02	0.99	1.03	0.98
experience	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Entrepreneurial role	1.05***	0.09***	1.05***	1.18***	1.01***	1.06***
model	(0.01)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)
Initial investment	1.02***	0.06***	1.02***	1.04***	1.02***	1.01***
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Growth objective	1.24***	0.51***	1.22***	1.56***	1.11***	1.17***
	(0.01)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)
General learning	1.19***	0.43***	1.19***	n/a	n/a	1.37***
	(0.01)	0.02	(0.01)			(0.01)
Mandatory training	0.96***	-0.12***	0.95***	0.96	0.96**	0.95**
	(0.01)	(0.04)	(0.02)	(0.03)	(0.02)	(0.02)
Risk tolerance	1.00	0.00	1.00	1.00	1.00	1.00
~	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Commercial problem	1.10***	0.22***	1.10***	n/a	n/a	1.17
	(0.01)	(0.03)	(0.01)			(0.02)
Industry dummies	Y	Y	Y	Y	Y	Y
Constant	1 2/***	0.98	1 30***	0 47***	1 35***	0.59
Constant	(0.01)	(0.13)	(0.08)	(0.04)	(0.09)	(0.05)
Observations	22.010	10.13)	17 517	17 517	17 515	16 72 4
Observations	23,010	18,089	1/,31/	17,317	17,313	10,/34

Notes. Results shown as *incident rate ratios*. Analysis sample includes all ventures for which strategic changes were observed in the first and second waves. Columns 1 –experimentation in years 1-3 with no matching; column 2—experimentation in years 1-3 on a matched sample, using linear regression; column 3— experimentation in years 1-3 on a matched sample, using CEM; column 4—experimentation in year 1 on a matched sample, using CEM; column 5—experimentation in years 2-3 on a matched sample, using CEM; column 6—experimentation in years 4-5 on a matched sample, using CEM. Standard errors are in parentheses.

P-value levels: ** p < 0.05, *** p < 0.01.

Variables	Years 1-3 (core)	Years 1-3
	CEM	(peripheral) CEM
Unemployed Entrepreneur	1.08***	1.12***
	(0.02)	(0.02)
Age category	0.97***	0.99
	(0.01)	(0.01)
University degree	1.05***	1.06**
	(0.02)	(0.02)
Managerial experience	1.07**	1.02
	(0.03)	(0.03)
Female	0.99	0.96**
	(0.02)	(0.02)
Serial entrepreneur	1.06***	1.02
	(0.02)	(0.02)
French nationality	0.95	1.05
	(0.04)	(0.05)
Relevant prior experience	1.02	1.00
	(0.02)	(0.02)
Entrepreneurial role model	1.06***	1.02
	(0.02)	(0.02)
Initial investment	1.04***	1.01***
	(0.00)	(0.01)
Growth objective	1.31***	1.14***
	(0.02)	(0.02)
General learning	1.20***	1.18***
	(0.01)	(0.01)
Mandatory training	0.97	0.93***
	(0.02)	(0.02)
Risk tolerance	1.00	1.00**
	(0.00)	(0.00)
Commercial problem	1.01	1.21***
	(0.02)	(0.02)
Industry dummies	Y	Y
~		
Constant	0.87	0.45***
	(0.06)	(0.03)
Observations	18,126	18,126

Table 6. Negative binomial prediction of core and peripheral experimentation levels

Notes. Results shown as *incident rate ratios*. Standard errors are in parentheses. P-value levels: ** p < 0.05, *** p < 0.01

Variables	Years 1-3 (CEM)	Years 1-3 CEM)	Years 1-3 (CEM)
	Growth ambition	Business idea	Top mgmt. experience
Unemployed entrepreneur	1.12***	1.18***	1.25***
	(0.02)	(0.04)	(0.05)
Age	0.98	0.97	0.94***
-	(0.01)	(0.02)	(0.02)
University degree	1.06***	1.00	1.06
	(0.02)	(0.04)	(0.05)
Managerial experience	0.98	1.05	n/a
	(0.03)	(0.06)	
Female	0.94**	0.97	0.86***
	(0.02)	(0.04)	(0.04)
Serial entrepreneur	1.00	1.07	0.99
	(0.03)	(0.04)	(0.05)
French nationality	0.98	1.20	0.66
	(0.06)	(0.39)	(0.12)
Relevant prior experience	1.01	1.07	0.90***
	(0.02)	(0.04)	(0.04)
Entrepreneurial role model	0.98	1.06	1.01
	(0.02)	(0.05)	(0.05)
Initial investment	1.03***	1.02	1.01
	(0.01)	(0.01)	(0.01)
Growth objective	n/a	1.23***	1.15***
		(0.04)	(0.04)
General learning	1.17***	1.18***	1.18***
	(0.01)	(0.02)	(0.02)
Mandatory training	0.95	1.02	0.76***
	(0.02)	(0.06)	(0.07)
Risk tolerance	1.000	1.00	1.00**
	(0.000)	(0.00)	(0.00)
Commercial problem	1.08***	1.05	1.15***
	(0.02)	(0.03)	(0.04)
Industry dummies	Y	Y	Y
Constant	1.73***	1.29	2.22***
	(0.15)	(0.456)	(0.56)
Observations	6,142	1,742	2,067

Table 7. Negative binomial prediction of experimentation among individuals with high human capital

Notes. Results shown as *incident rate ratios*. Standard errors are in parentheses. P-value levels: ** p < 0.05, *** p < 0.01.

Variables	Years 1-3	Years 1-3 Hybrid vs
	Hybrid vs Employed Ent.	Unemployed Ent.
Hybrid entrepreneur	1.14***	1.06
	(0.06)	(0.05)
Age category	0.98***	0.99
	(0.01)	(0.01)
University degree	1.03	1.07***
	(0.02)	(0.02)
Managerial experience	0.97	1.08***
	(0.02)	(0.03)
Female	0.94***	0.97*
	(0.02)	(0.02)
Serial entrepreneur	1.02	1.02
-	(0.02)	(0.02)
French nationality	0.95	1.02
-	(0.03)	(0.04)
Relevant prior experience	0.99	0.98
	(0.02)	(0.02)
Entrepreneurial role model	1.02	1.07***
-	(0.02)	(0.02)
Initial investment	1.02***	1.03***
	(0.00)	(0.01)
Growth objective	1.23***	1.25***
	(0.02)	(0.02)
General learning	1.20***	1.18***
	(0.01)	(0.01)
Mandatory training	0.99	0.94***
	(0.02)	(0.02)
Risk tolerance	1.00	1.00
	(0.00)	(0.00)
Commercial problem	1.13***	1.07***
	(0.02)	(0.02)
Industry dummies	Y	Y
Constant	1.24***	1.08***
	(0.07)	(0.02)
Observations	13,128	10,145

 Table 8. Negative binomial prediction of experimentation among Unemployed, Employed and Hybrid Entrepreneurs

Notes. Results shown as *incident rate ratios*. Standard errors are in parentheses.

P-value levels: ** p < 0.05, *** p < 0.01.

Table 9.	Alternative m	easure of expe	erimentation: o	employment	contract ty	pes, mat	ched sample
				• •/	•/		

	2011	2012	2013	2014	2015	2016
Unemployed	-3.57***	-2.41***	-1.31	-1.49	0.28	0.15
Ent.	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Controls	Y	Y	Y	Y	Y	Y
Observations	4,851	4,510	4,174	3,868	3,603	3,356

Notes. Permanent contracts are taken as a *percent* of all contracts. The data on employment contract type is taken from the matched employer-employee database—a data source that includes all ventures with at least one employee. Hence, these regressions include only ventures that have at least one employee (therefore, the sample size is smaller than the number of ventures in SINE). Standard errors are in parentheses.

P-value levels: ** p < 0.05, *** p < 0.01

Table 10. Inverse probability weighted regression adjustment

	Full sample	Unemployed Ent sample	Employed Ent sample
Ventures that survived past	2.349	2.486	2.246
wave two Ventures that exited prior to wave two	2.340	2.486	2.193
Estimated ATE	0.009	0.000	0.053

10a. Estimated values of the weighted experimentation levels

Note. The coefficients reflect the predicted levels of experimentation in ventures that survived vs. those that did not. The differences between ventures that survived vs. those did not in terms of experimentation levels (i.e. ATE effects) are insignificant.

10b. IPWRA: The impact of *Unemployed Entrepreneur* on the weight-adjusted experimentation levels

Variables

Unemployed Ent.	0.11***
	(0.01)
Age category	-0.01**
	(0.01)
University degree	0.05***
	(0.01)
Managerial experience	-0.01**
	(0.01)
Female	-0.05***
	(0.01)
Serial entrepreneur	0.02
	(0.01)
French nationality	-0.04
	(0.02)
Relevant prior experience	-0.02
	(0.01)
Entrepreneurial role model	0.06***
	(0.01)
Initial investment	0.03***
	(0.00)
Growth objective	0.22***
	(0.01)
General learning	0.17***
	(0.01)
Mandatory training	-0.04***
	(0.01)
Risk tolerance	0.00
	(0.00)
Commercial problem	0.10***
	(0.01)
Industry dummies	Y
Constant	0.20***
	(0.04)
Observations	24 995

Notes. This equation was estimated together with a survival equation via IPWRA. Results are presented as Poisson regression coefficients and are therefore not directly comparable to the results in Tables 5-8. Standard errors are in parentheses.

P-value levels: ** p < 0.05, *** p < 0.01.

Table	11.	Instrumental	variable	analysis.	Second	stage	(2SLS)
1 ant	11.	moti unicitai	variabic	analy 515,	Scona	stage	

Variables

Notes: We follow Angrist's approach and use linear 2SLS to deal with the count dependent variable measuring experimentation steps. Standard errors are in parentheses. P-value levels: ** p < 0.05, *** p < 0.01.

Table 12. Moreira's conditional likelihood ratio

Coverage-corrected confidence set and p-value for Ho: $b[survival, years 1-3] = 0$			
LIML estimate of b [survival, years 1-3] = 14.41986			
Test	Confidence Set	p-value	
Conditional LR	[3.83209, 64.90352]	0.0054	

Variables	Uncertain	Uncertain	Uncertain	Less	Less	Less ambitious
	(1)	(2)	(3)	ambitious	ambitious (2)	(3)
				(1)		
Unemployed Ent	-0.17***	-0.16***	-0.23***	0.09*	0.23***	0.23***
	(0.02)	(0.03)	(0.05)	(0.05)	(0.03)	(0.06)
High quality	-0.09***	-0.18***	-0.03	0.31**	0.38***	0.05
	(0.03)	(0.02)	(0.03)	(0.04)	(0.03)	(0.03)
Unempl Ent *High	0.08*	0.06*	0.15***	0.01	-0.14***	-0.16***
quality	(0.05)	(0.03)	(0.05)	(0.06)	(0.04)	(0.06)
Controls	Y	Y	Y	Y	Y	Y
Constant	-0.38***	-0.33***	-0.40***	-0.75***	-0.85***	-0.70***
	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)
Observations	34,392	34,392	34,392	18,606	18,606	18,606

 Table 13. Level of uncertainty and venture ambition in Employed Entrepreneurs and

 Unemployed Entrepreneurs

Notes. High human capital captured as: (1) having a business idea prior to entering entrepreneurship (Columns 1 and 4); (2) having growth ambition (Columns 2 and 5); (3) having top managerial experience (Columns 3 and 6). Standard errors are in parentheses. Each regression uses *Unemployed Entrepreneurs* and *Employed Entrepreneurs* and *Employed Entrepreneurs* matched on all characteristics.

P-value levels: *p<0.1; ** p < 0.05, *** p < 0.01.

Appendix. Names and definitions of control variables

Serial entrepreneur	Equal to 1 if entrepreneur has founded at least one other venture prior to this venture
University diploma	Equal to 1 if entrepreneur has a university diploma, zero if not
French nationality	Equal to 1 if entrepreneur is French, zero if foreigner
Age category	Equal to 1 if entrepreneur is 20-29; 2 if 30-39; 3 if 40-49; 4 if 50 or over
Entrepreneurial role model	Equal to 1 if entrepreneur indicated that an entrepreneurial role model influenced them to start a venture, zero otherwise
Main objective	1 if venture growth, 0 if self employment
Motivation : new idea	Equal to 1 if answered "yes" to the question "Was your main motivation a new business idea?"
Relevant prior expertise	Equal to 1 when entrepreneur has previous experience in the industry in which they are setting up a venture, 0 if no previous experience
Gender	1 if female, 0 if male
Social welfare recipient	1 if entrepreneur was receiving social welfare benefits prior to founding venture, 0 if not
Initial investment	An interval variable with 8 categories
Family help	Number of family members helping with the venture
Anticipated duration	1 if entrepreneur is envisioning being an entrepreneur long-term, 0 if short-term
Mandatory training	1 if entrepreneur is required to undergo training as a condition for their unemployment allowance, 0 otherwise
General learning	A composite measure calculated as a sum of the two dimensions, training and advice, both of which take on one of three values—often (2), rarely (1) and never (0). The resulting measure ranges from 0 to 4.
Top managerial experience	1 if entrepreneur has top managerial experience; 0 otherwise
Permanent contract ratio	A percentage of permanent (CDI) contracts as a percentage of all (permanent and fixed-term) contracts
Risk tolerance	A variable ranging from 0 to 100 capturing the amount of personal funds committed to the venture (as a percentage of all initial financing)
Level of competition	1 if entrepreneur indicated that the level of competition in the previous time period has decreased, 2 if stayed the same, 3 if increased