



# Case Study on Italy's Young Innovative Companies Program

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## List of abbreviations

DID	Difference-in-Difference
ISTAT	The Italian National Institute of Statistics
MISE	The Italian Ministry for Economic Development
OLS	Ordinary Least Squares
VC	Venture Capital
YICs	Young Innovative Companies

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## 1. Executive summary

Innovative entrepreneurship is considered of key importance to ensure the dynamic efficiency of an economic system and to enable the achievement of great macroeconomic performances both in terms of productive growth and job creation. In this respect, it is becoming increasingly evident that it is not only the number of new startups that matters for that goal, but also their intrinsic quality is of dramatic relevance (e.g. Shane, 2009). This report on the Italy's Young Innovative Companies (YICs) Program implemented in November 2012 investigates whether a specific institutional change (the Law no. 221/2012) directed towards the sustainment of this specific typology of firms, i.e. independently created companies aged less than 6 years old with highly innovative potential, can facilitate the transition from quantity toward quality of entrepreneurship. More specifically, we build on the idea that institutional changes that reduce different types of barriers to entrepreneurship (i.e. entry and growth barriers, in particular) impact not only the rate of new company creation in an economic system, but also their entrepreneurial quality in terms of the skills and competencies of the individuals who become founders.

Grounding on this perspective, we study how a reduction in different barriers impacts the human capital endowment of entrepreneurs, overall entrepreneurial performance, as well as their interaction – that is, if highly skilled founders can create higher quality ventures by leveraging the positive institutional change (both in terms of reduction of entry and growth barriers) that attracts them to become entrepreneurs in the first place. For this purpose, we exploit a quasi-natural experiment setting and analyze founders of 1,769 YICs founded before and after the Law no. 221/2012 reform, by breaking down the impact of lowering entry and growth barriers. In fact, the Law envisaged a wide bureaucratic and administrative simplification (typical barriers to entry), as well as some benefits as tax incentives, more flexible labor regulations (typical barriers to growth), lighter rules on insolvency and “fail fast” procedure. By exploiting the retroactive nature of the mechanisms, we are able to discern what impact this policy reform had on the quality of created firms in terms of founders' human capital and YICs' sales performances.

The empirical analysis is based on data collected through the means of a survey launched by the National Committee of the Italian Ministry for Economic Development on the “Monitoring and Evaluation of National policies for the Eco-system of Italian Innovative Start-ups” (of which one of the authors of this report is an academic member) and administered by the Italian National Institute of Statistics (ISTAT) in April and May 2016. The findings indicate: (a) that institutional change that reduces barriers to entrepreneurship increases propensity of high human capital individuals to become entrepreneurs; (b) that the instruments that reduce growth barriers in particular have a more significant impact than those directed to reduce entry barriers; and (c) that there is a super-additive effect of the reform and founders' high human capital on the performance of the created firms. Furthermore, we discovered that founders endowed with more specific rather than generic human capital are more reactive in this respect. By documenting the importance that formal rules have in determining who becomes an entrepreneur, and by deepening our understanding on which are the most effective specific measures for selecting the most promising entrepreneurs, the findings of this report stress the key role that public policy, even in the short-run, may play in this domain.

## 2. Introduction

Ever since the seminal work of Meyer and Rowan (1977), researchers have used an institutional approach to study organizations (e.g. Campbell, 2007; Greenwood and Suddaby, 2006; Hoffman, 1999; Kostova, Roth, and Dacin, 2008; Marano and Kostova, 2016). Despite evident pertinence and applicability of this view for understanding new venture creation process as well, most of the efforts were dedicated to established organizations, and the studies on how organizations are formed have been surprisingly sparse. This lack of attention for the foundation process of new organizations may be a consequence of the fact that institutional theory was rooted in sociology, which predominantly focused on formal structures and regulations as the main source of organizational efficiency (Tolbert, David, and Sine, 2011). These macro-level features are often absent from the early stage of organization's lifecycle.

In parallel, the entrepreneurship literature has been studying elaborately characteristics of individuals to explain the process of entrepreneurial opportunity discovery, as well as outcomes of entrepreneurial activity. In particular, that wide literature puts forward the idea, for then documenting, that prior experience and personal characteristics of individuals play a significant role in entrepreneurial dynamics, and primarily entrepreneurial entry (DeTienne and Chandler, 2007; Douglas and Shepherd, 2002; Foo, 2011; Lévesque and Minniti, 2007; Shane, 2000; Waldinger, Aldrich, and Ward, 1990).

In spite of akin concepts they use and phenomena they study, institutional theory and entrepreneurship literature have sparsely been directly related. The rare exceptions have focused mostly on how institutions impact the rate of new venture creation, and not the characteristics and quality of individuals who found them (e.g. Kwon and Arenius, 2010; Lim et al., 2010; Peng, Yamakawa, and Lee, 2010; Stephan, Uhlaner, and Stride, 2015). While entrepreneurship is found to matter for both economic and social development (see for instance Audretsch, 1995; Audretsch, Keilbach, and Lehmann, 2006; Carree and Roy Thurik, 2003), that positive impact strongly depends on the inflow of high quality individuals into entrepreneurship (Beckman, Burton, and O'Reilly, 2007; Colombo and Grilli, 2005, 2010; Eisenhardt and Schoonhoven, 1990), and innovativeness of new ventures (Shane, 2009; Wong, Ho, and Autio, 2005). Thus, there is a salient need to understand also how institutional settings can create a more favorable environment that can increase not only the level of entrepreneurship, but more importantly its quality. The significance is even more relevant as institutions can be (to some extent) adjusted through policy measures.

Few studies try to enlarge this view and examine how an institutional change can impact different types of individuals to enter the entrepreneurship arena. Unlike the preceding stream that deals with barriers to entry (Dobbin and Dowd, 1997; Sine and David, 2003; Sine and Lee, 2009), which is inherently limited to observing founding rate as the outcome, these more recent studies emphasize the impact of lowering different barriers to entrepreneurship. Specifically, Eberhart, Eesley, and Eisenhardt (2016) investigate whether an institutional change that eases exit barriers enhances new venture growth. They study a sample of entrepreneurial ventures before and after a bankruptcy reform in Japan, and find that lowering barriers to exit increases not only the number of entrepreneurs, but more importantly the number of more capable ones, i.e., those who are more likely to launch high growth ventures. Eesley (2016), on the other hand, observes two institutional changes in China to understand how lowering barriers to growth encourages entrepreneurship by individuals endowed with high human capital. He focuses on alumni of a top Chinese university and shows that only a significant decrease of the growth barriers convinces highly skilled individuals to found a firm.

We build on the idea that institutional changes that reduce different types of barriers to entrepreneurship impact not only the quantity of entrepreneurs, but also their entrepreneurial quality in terms of the skills and competencies of the individuals who become founders. In doing so, this paper departs from the extant studies in several respects. First, this research endeavor integrates two different mechanisms through which institutional changes can influence creation of new ventures, i.e. we examine how reduction of entry and reduction of growth barriers impact entrepreneurship dynamics. While the effects of institutional change related to the entry barriers have been widely studied to date, institutional change that decreases barriers to growth has only recently been introduced as a theoretical mechanism (see Eesley, 2016). Nevertheless, the previous study tests the two mechanisms (reduction of different barriers) separately, which does not provide conclusive evidence on the relative importance of each of them. We instead confront their impact within the same institutional reform.

Second, the paper answers the call to extend the work on the relationship between entrepreneurial entry and high quality entrepreneurship (Acs, Åstebro, Audretsch, and Robinson, 2016; Shane, 2009). We do that by focusing on the human capital of founders – a key resource of new ventures (e.g. see Colombo and Grilli, 2005). In particular, we study how reduction in different barriers impacts the human capital endowment of entrepreneurs, overall entrepreneurial performance, as well as their interaction. That is, we study if highly skilled founders can create higher quality ventures by leveraging the positive institutional change (both in terms of reduction of entry and growth barriers) that attracts them to become entrepreneurs in the first place.

The third set of advantages pertains to the nature of our data. We focus on an unexplored, yet extremely relevant institutional context – Italy, that likewise most European countries, suffers a gap towards U.S. in the capacity to generate viable and successful startups in knowledge-intensive industries (Grilli and Murtinu, 2014), and it is characterized by a structurally weak national innovation system (Nuvolari and Vasta, 2015). The prior studies on the topic mainly deal with the institutional changes that happened in the Far East in the recent decades (Eberhart et al., 2016; Eesley, 2016). Moreover, we are able to distinguish between different types of human capital (specific vs. generic, see Becker, 1975), which has shown to be critical for understanding the role of human capital in entrepreneurship (Colombo and Grilli, 2005, 2010). Finally, we have collected data on complete founding teams and not just the principal founder (differently from other recent studies, see e.g. Hmieleski, Corbett, and Baron, 2013; Rauch and Rijdsdijk, 2013) in knowledge-intensive sectors, which are found to contribute to the economic development the most (Audretsch and Fritsch, 2003; Spence and Hlatshwayo, 2012). Besides, in these sectors, opportunity identification and exploitation are particularly influenced by the human capital of entrepreneurs (Shane, 2000).

We conduct our research by relying on the Italian Law no. 221/2012 that was implemented in 2012 to facilitate the creation of high quality companies in the Italian economy. The Law envisaged a wide bureaucratic and administrative simplification (typical barriers to entry), as well as some benefits as tax incentives, more flexible labor regulations (typical barriers to growth), lighter rules on insolvency and “fail fast” procedure. By exploiting the retroactive nature of the mechanisms, we are able to perform a quasi-natural experiment to discern what impact this policy reform had on the quality of created firms in terms of founders’ human capital and YICs’ innovation strategy. Furthermore the impact of the Law is studied in relation to the performance of the startup, including the same variables related to human capital and strategy as control variables.



The rest of the paper is organized as follows. We first provide the theoretical foundation related to institutional change, human capital and performance in entrepreneurship. After developing the hypotheses, we briefly explain the complex institutional change we take advantage of to test them. Then we present and discuss the results, and conclude with implications for theory and public policy.

### 3. Theoretical background

Institutional theory has been a diffused research lens for analyzing social and economic activities (e.g. Acemoglu, Johnson, and Robinson, 2002; DiMaggio and Powell, 1983). The seminal works describe institutions as regulatory, cognitive and normative frameworks within which economic actors operate (Scott, 1995). These institutional dimensions define formal and informal sets of rules that organizations are expected to follow (North, 1990). As extensive research on the topic has shown, the institutional environment can thus impact competitiveness and firm behavior on an industry level (e.g. Berrone et al., 2013; Chung and Beamish, 2005; Delmas, Russo, and Montes-Sancho, 2007). For instance, Bertrand, Schoar, and Thesmar (2007) present how the shift in regulations of the banking industry in France during the 1980s improved market competitiveness and allocative efficiency of the system by incentivizing the process of Schumpeterian “creative destruction”. More specifically, a more recent stream has brought up the argument that institutional change, primarily stemming from the changes in regulations, is a significant factor in shaping entry barriers and hence new firm creation dynamics (Djankov et al., 2002; Klapper, Laeven, and Rajan, 2006; Sine and David, 2010). For example, Kaplan, Piedra, and Seira (2011) show that simplification of company registration procedures in Mexico, though mostly temporarily, increased the rate of new ventures by about 5% per month in targeted industries. In the same vein, by analyzing a natural experiment based on the unification of East and West Germany in 1990, Prantl (2012) found that stricter entry regulation depresses promising entrants and their long term performance. However, rarely have these studies looked beyond the industry and the organizational level, or rather the rate of new business formation.<sup>1</sup>

Another stream of literature focused on entrepreneurship has vastly studied micro-determinants of entrepreneurial opportunity discovery, business opportunity exploitation through entrepreneurial actions, and outcomes of entrepreneurial activity related to characteristics of the individuals (Ardichvili, Cardozo, and Ray, 2003; Choi and Shepherd, 2004; Colombo and Grilli, 2005). There is a plethora of evidence that previous experience (e.g. Ardichvili, Cardozo, and Ray, 2003; Shane, 2000), demographic (ethnicity, gender, income level and so on) and personal (ambition, risk propensity, motivation and so forth) traits of individuals play a significant role too (e.g. DeTienne and Chandler, 2007; Douglas and Shepherd, 2002; Foo, 2011; Lévesque and Minniti, 2007; van Praag and Cramer, 2001; Waldinger, Aldrich, and Ward, 1990). Nonetheless, studies in this stream have typically not taken into account how changes in the institutional environment may impact the relationship between characteristics of individuals and their decisions to become entrepreneurs.

This disconnection between the two literature streams has left a research gap. The effects of large-scale institutional change on individual reactions have still not been addressed (Hoskisson et al., 2000; Tolbert et al., 2011). A few research endeavors have been made in this direction recently. These studies focus on how different modifications in regulations impact the heterogeneity of

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<sup>1</sup> A few exceptions do study how institutional change impacts individuals (see for instance Colyvas, 2007), yet not related to entrepreneurial activity.

individuals that become entrepreneurs. More particularly, they examine how decreasing different types of barriers impacts the quality of new founders and the performance of created companies. Specifically, Eberhart et al. (2016) study a sample of entrepreneurial ventures before and after a bankruptcy reform in Japan, and find that lowering barriers to exit encourages not only an increasing number of individuals to become entrepreneurs, but most importantly, it affects the number of capable ones, i.e., those who are more likely to launch high growth ventures. Eesley (2016) observes two institutional changes in China and shows that only a significant decrease in the growth barriers impacts highly skilled founders and the outcomes of their ventures. While these two studies make a significant step forward, they also open avenues for further analyses. First, the focus of the two studies is on interesting yet rather specific institutional settings of Far East (Japan and China). While both works offer reasonable discussion about generalizability of the findings, replication of the analysis in different institutional arrangements is necessary to confirm or complement the implications. Second, Eberhart et al. (2016) and Eesley (2016) test the reduction of one type of barriers (exit and growth, respectively) while embodied in separate institutional changes. Another interesting aspect would be to gauge the relative importance of the decrease in more than one type of barrier within the same institutional reform. Third, both studies are forced to deal with sample selection issues which limit the breadth of implications we can draw from them and reinforce the need of replication in other institutional contexts with the use of different samples. Namely, Eesley (2016) focuses on the alumni of one of the top Chinese university (Tsinghua University). His survey-based approach (that we also pursue in our analysis) does offer advantages in the given context in which from official and archival data it is hard to discern private firms from state-owned ones. However, the focus on elite individuals does not offer complete heterogeneity of the sampled individuals. Eberhart et al. (2016) use a sample based on a database from a commercial credit rating firm (Teikoku Databank) that has information only on the firms that got investigated by Teikoku Databank. While this source might be considered to provide a sufficiently good representation for commercial firms in general, innovative entrepreneurial ventures are typically less eligible for debt loans and prefer (or are forced to resort to) other types of financing (e.g. “family, fools and friends” or equity financing, see Hall, 2002) and hence their credit risk would not commonly be evaluated. Having in mind that, the database might not be a representative pool of the universe of new ventures in the country, especially for what concerns the more innovative ones. Finally, measures of human capital that the two studies utilize leave some room for improvement with respect to the state-of-the-art literature in the field. Eesley (2016) proxies human capital of individuals as a single index based on education level, promotion experience and student leader experience. Eberhart et al. (2016) use an even more straightforward binary measure. In fact, they define elite founders, i.e. highly skilled entrepreneurs, as individuals who graduated from one of the top ten Japanese universities. Since human capital is a multifaceted dimension, as its different aspects have distinctive impacts on entrepreneurial behavior (Colombo and Grilli, 2005, 2010; Feeser and Willard, 1990), more fine-grained operationalizations could improve our understanding about the role of institutional change on the human capital endowment of entrepreneurs.

Therefore, in this study we try to complement these works, and shed more light on how institutional change may impact entry of high-quality entrepreneurs and support them in creating high-quality firms. To that end, in the following section, we develop a set of testable hypotheses based on relevant theoretical foundations.

## 4. Hypotheses development

As previously elaborated, there is a vast literature on how lowering entry barriers by shifting regulations induces higher rates of new venture creation (e.g. Demircuc-Kunt, Love, and Maksimovic, 2006; Klapper et al., 2006; Sine and Lee, 2009). Instead, we pose a different, equally interesting but less investigated question. We enquire whether reducing barriers to entrepreneurship facilitates a more attractive entrepreneurial environment and hence increases the relative presence of highly qualified founders, who do have lucrative alternatives apart from entrepreneurship. The relevance of this research question resides in the evidence that the promise of entrepreneurial activity as an engine of economic and social development (e.g. Audretsch, 1995) strongly depends on the quality of involved individuals (Beckman et al., 2007; Colombo and Grilli, 2005, 2010; Eisenhardt and Schoonhoven, 1990).

Following an economically sound logic, an individual would decide to pursue a business opportunity by creating a new venture if the difference between benefits and costs of entrepreneurial activity overweight the net benefit of alternatives (Shane, 2009). Assuming that the main alternative is employment, we can define a simple economic framework to infer when an entrepreneurial career choice will be pursued (for a similar approach see Eesley, 2016). On the one hand, if an individual chooses to enter (or to stay in) the labor market, she will bear no entry cost for setting up a new venture, i.e. initial investment ( $Cost_{entry}$ ), and will be able to gain the wage ( $Wage_{employment}$ ). Hence, the net present value of being employed equals the predicted wage. On the other hand, if an individual opts for becoming an entrepreneur, she will need to bear the cost of overcoming the entry barriers (e.g. bureaucratic and financial investment), while the potential value of the business idea inherited by the created venture ( $Potential Value_{startup}$ ) will be scaled by the cost of overcoming the growth barriers ( $Cost_{growth}$ , e.g. structural lack of complementary assets such as infrastructure, or the presence of hindering regulations that favor public, established or foreign firms, or again difficulties and imperfections experienced in accessing the labor and capital markets). Similarly to Eesley (2016), our conceptual framework can therefore be synthesized by the following equation:

$$Wage_{employment} < \frac{1}{Cost_{growth}} \cdot Potential Value_{startup} - Cost_{entry} \quad (1)$$

Following this line of reasoning, one can deduce that if an individual wants to maximize her returns, the choice of becoming an entrepreneur should account for an opportunity cost that equals her predicted wage as an employee (Carree et al., 2002). That is, the total returns of switching to entrepreneurship is equal to the potential value of the startup reduced for the entry and growth costs, as well as an opportunity costs of being an employee.

As noted by Eesley (2016), it is worthwhile to recognize that in equation (1) above, there is a different dynamic and degree to which each of the arguments can be influenced. On the one hand, “for a particular individual, the potential return in the labor market (i.e., opportunity cost) does not change easily” (Eesley, 2016, p. 3). In other terms,  $Wage_{employment}$  is rather stable in the short- and medium- terms for most individuals. Likewise, the potential value of the business idea on which the startup is based ( $Potential Value_{startup}$ ) is by definition idiosyncratic for each startup and consequently, on average, hardly influenced by policy making, at least in the short-run. On the contrary, costs related to entry ( $Cost_{entry}$ ) and growth ( $Cost_{growth}$ ) of startups can be influenced

and can change in a relatively short period of time. For instance, deregulating entry can make the founding process more cost efficient (see the example of Portugal where Branstetter et al., 2014 found a significant impact of deregulation on founding rates within next two years). More importantly, regulation too can decrease the growth barriers, and they can do so in a fairly quick manner. In fact, industrial policy can stimulate growth of new firms by putting them in an advantageous market position, by providing them financial or other incentives, or by partially deregulating their activity in the early and growth stages of their life cycle.

We argue that the combination of the two mechanisms, i.e. reduction of barriers to entry and barriers to growth, will have a particularly profound impact on highly qualified (prospective) entrepreneurs, who have a high opportunity cost (relatively high wages as employees) and might otherwise not consider the entrepreneurial path. In fact, individuals characterized by low levels of human capital have lower opportunity costs in pursuing the entrepreneurial career ( $Wage_{employment}$  is low). That means that the left side of (1) is more likely to be exceeded with an ordinary business idea ( $Potential Value_{startup}$  does not need to be high to induce the entrepreneurial career choice) and a small-scale startup (the realized net present value of the startup, i.e. the right side of (1), does not need to be high neither). In this respect, lowering entry and growth barriers is not expected to play such a big difference. On the contrary, individuals characterized by high human capital command a high salary in the labor market (see e.g. Amit, Muller, and Cockburn, 1995; Buera, 2009), thus they have a higher opportunity cost in choosing the entrepreneurial path. In order to convince these individuals to become entrepreneurs, the realized gains from the startup have to be high. In other terms, in order to induce a highly-skilled individual to pursue the entrepreneurial career she should be *ex-ante* convinced that all the relevant institutional conditions are met so that the newly founded startup could realize all its high potential. Accordingly, lowering entry and growth barriers in this case should have a much more profound effect. Thus, we posit the following hypothesis:

***Hypothesis (1): The introduced institutional reform (The Startup Act) increases the propensity of individuals endowed with high human capital to found a new venture.***

The two sets of instruments of an institutional change, i.e. reduction of entry versus reduction of growth barriers, influence the choice of potential entrepreneurs in different ways. Namely, referring to equation (1), lowering only the cost of entry ( $Cost_{entry}$ ) should have a stronger impact on low-qualified individuals as it only eases the foundation and not the scale up, which might be sufficient for them, who have less lucrative alternatives and therefore face relatively lower opportunity cost to entrepreneurship. On the contrary, the decrease of this one-time cost might not provide sufficiently high incentives for individuals with high human capital, who have a high opportunity cost and relatively high ambitions. Instead, we hypothesize that what the highly skilled group of prospective entrepreneurs could benefit more from is lowering the cost of growth ( $Cost_{growth}$ ). Namely, as the potential of entrepreneurs with high human capital to grow their ventures is higher (e.g. see Feaser and Willard, 1990; Eisenhardt and Schoonhoven, 1990; Colombo and Grilli, 2005), so is the potential value of their startups ( $Potential Value_{startup}$ ). In turn, as this value of the startup is scaled down by the growth costs (see equation (1)), structurally lowering this typology of costs can benefit more, in relative terms, the individuals that have higher growth potential in the first place. Hence, we posit that lowering barriers to growth will have a stronger effect on attracting individuals with high human capital to entrepreneurship than lowering barriers to entry.

***Hypothesis (2):** The growth rather than the entry barrier removal engendered by the institutional reform (The Startup Act) increases the propensity of individuals endowed with high human capital to found a firm.*

We additionally argue that not only will reduction in growth barriers lead to entry of more entrepreneurs with higher human capital, but performance of their ventures will be enhanced by the institutional change too. The reduction allows high human capital founders to better fulfill the potential of their own entrepreneurial aptitude, as they are relatively more constrained by the strong barriers to growth. In other words, we propose that there might be a super additive effect of high human capital and reduction of barriers to growth on the performance of new ventures. If a reform were only helpful to draw more high human capital individuals into entrepreneurship, then, one would expect that the ventures of highly qualified entrepreneurs would perform similarly before and after the reform. Moreover, the gap between performance of startups founded by lower and higher human capital entrepreneurs should be comparable before and after the reform too. However, if there is an additional benefit of a reform that helps high human capital founders grow their businesses, the difference in venture performance between high human capital individuals before and after the reform will arise, and consequently, the gap between venture performance of lower and higher human capital founders will increase after the reform.

We argue that this super additive effect could be in place due to several factors that relate to the high human capital of entrepreneurs. First, founders with high human capital can recognize better, higher potential growth business opportunities in the first place (Dimov, 2010; Marvel and Lumpkin, 2007). What a reform contributes is that it lowers barriers to growth that compound with the inherently risky and uncertain side of high-potential opportunities, and consequently makes the high human capital founders more prone to pursue them. In that environment, founders can follow their most creative and ambitious ideas knowing that important institutional obstacles have been removed and therefore they will not severely impede the growth of their firm. Secondly, the removal of barriers enables founders endowed with high human capital to be better capable to exploit higher potential growth opportunities by facilitating their access to external resources. Following the line of reasoning already developed by (Eesley, 2016), human capital of the founding team is an important signal about the goodness of the startup for external resources providers (Hallen, 2008), and in particular external investors (Gimmon and Levie, 2010). Previous work experience and education of founders are found to be amongst the most reliable signals (Hsu, 2007), which can be crucial in establishing relationships for attracting customers, employees and funders. In this case, the reduction of barriers to growth that facilitate smoother scale up, will increase the reliability of this signal in the eyes of external stakeholders, and in doing so, it will make easy for high human capital entrepreneurs to access those complementary assets which are essential for firm growth (Teece, 1986). The previous arguments lead us to posit the following hypothesis.

***Hypothesis (3):** The introduced institutional reform (The Startup Act) will produce an increase in the wedge of growth performance between firms founded by individuals with low human capital and firms founded by individuals with high human capital.*

## 5. Methodology

### 5.1. Empirical setting

The hypotheses are tested on the Italian institutional environment that encountered a regulatory change directed at entrepreneurial dynamics. In particular, the Italian Government issued a specific law in 2012 (the Law 221/2012, modified by further amendments, so-called “*Italian Startup Act*”) intended to spark the national innovation ecosystem by providing an opportunity for YICs to access a range of benefits. We take advantage of the retroactive nature of the mechanism introduced by the reform to perform a quasi-natural experiment and discern what impact this institutional change had on the quality of created firms.

This setting is novel and interesting for several reasons. First, the recent studies in the field have been focused on the institutional changes that happened in China and Japan at the end of the previous and the beginning of the current century (Eberhart et al., 2016; Eesley, 2016). To the best of our knowledge, we are the first to offer comprehensive analysis of the effects of an institutional change oriented to innovative entrepreneurship in the Western Europe. Second, despite being a Western economy, Italy represents a laggard innovative environment when compared to the peer countries (see e.g. Malerba, 1993; Nuvolari and Vasta, 2015), and the innovation gap is argued to be a consequence of serious market failures that restrict provision of key resources necessary for company’s innovative activities (Colombo and Delmastro, 2002). A way to fix these market failures is to introduce a change in institutions that will make up for them. Thus, the institutional reform can have a considerable effect on the entrepreneurial and innovation ecosystem. Last but not the least, the focus on the recent institutional change that happened in 2012 is advantageous due to the dynamic nature of the recent technological developments, which might moderate the impact of institutional change on entrepreneurship and innovation activities.

The targeted companies of the reform are innovative startups. In order to be considered as an innovative startup, a company needs to meet an assortment of basic criteria. First, it must be five years old or younger, it cannot distribute dividends (or have not distributed dividends in the past), and it cannot be listed on a stock market. It also needs to have annual revenues not higher than 5 million Euros, and it cannot be created as a divestiture of an existing company. Furthermore, a startup needs to comply with the innovation standards. The “innovative” criteria pertains in compliance with at least one of the following three features: (i) the startup (or its founders) should be in possession of tangible intellectual property rights, such as a patent or a license; (ii) startups’ investments in R&D should account for at least 15% of the revenues (or operating costs if they exceed the revenues); or (iii) at least one third of the employees (including founders) must hold a PhD or a research tenure or at least two thirds must have obtained a Master degree. The purpose of the first two requirements is to include all the startups companies which base their businesses on knowledge and innovation, while the third requirement is strictly related to the attraction of the most qualified and highly-specialized human resources into the high-tech entrepreneurial activity, in order to reduce the innovative gap in comparison with U.S. and other innovation-advanced countries.



Several types of incentives, exemptions as well as access to privileged services at discounted price are granted to the registered innovative startups.<sup>2</sup> The benefits are mainly created to remove the usual barriers to entrepreneurship, which should in turn make the entrepreneurial activity less costly and uncertain (Hiatt and Sine, 2014). The reform tackles three groups of barriers related to the phases of the entrepreneurial life-cycle (entry, growth and exit) with a series of instruments. The first batch of regulations related to the decrease of entry barriers for Italian innovative startups comprises fees and running costs waivers, and simplification of procedures for company registration that can be done digitally. The second group integrates instruments that reduce the barriers that typically impede growth of new innovative ventures. It includes more flexible and beneficial labour regulations,<sup>3</sup> tax incentives for equity investments made by professional private investors (business angels or venture capital firms),<sup>4</sup> government-guaranteed bank loans,<sup>5</sup> eligibility to report losses for an extended time period and support in internationalization activities. The final group of benefits relates to entrepreneurial exit barriers, and it includes easing of liquidation procedure without suffering significant reputational and financial costs. In this paper, we focus on the first two mechanisms.<sup>6</sup> Summary of the implemented instruments is presented in Table 1.

Finally, it is also worthwhile to note that the retroactive nature of the policy has also allowed access to these support measures not only to new ventures, but also to those firms that already existed before the promulgation of the Law provided that these firms fulfilled the prescribed requirements (including the requirement to be less than 6 years old).

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<sup>2</sup> A brief synopsis of the Law (and a comparison with similar legislations in other EU Member States) is provided by the European Digital Forum (2016). A complete description of the eligibility criteria and all support measures are available on the governmental website (<http://www.mise.gov.it>).

<sup>3</sup> The specifically tailored labour instruments include less rigid contract requirements, possibility of equity-based compensation and dynamic performance-based salaries for employees, and tax credit for the employment of highly skilled staff.

<sup>4</sup> The tax incentives for equity investment include 20 percent fiscal deduction up to a maximum investment of € 1.8 million.

<sup>5</sup> A government-guaranteed bank loan fund is provided to ensure up to 80 percent of the credit issued of the bank, up to a total amount of € 2.5 million.

<sup>6</sup> The analysis on the role played by reduction of exit barriers on entrepreneurship dynamics is left to future research endeavors. In this respect, we are planning to comprehensively study the effect of reduction of exit barriers not only on entry dynamics but also on actual exit routes chosen by entrepreneurs. The recent nature of the reform, does not allow us to observe a sufficient number of exits to include this interesting analysis in the present work.

**Table 1.**  
**Description and taxonomy of the instruments implemented in 2012 under the Law no. 221/2012 2012**  
**intended to facilitate the creation of YICs in the Italian economy.**

Instrument group	Instrument definition
Entry instruments	<ul style="list-style-type: none"> <li>• Decrease of startup costs</li> <li>• Decrease of startup time (incorporation procedure simplification)</li> <li>• Flexible labour regulations (less rigid contract requirements)</li> <li>• Dynamic salary (performance-based compensation option)</li> <li>• Stock / equity compensation option</li> <li>• Tax credit for the employment of highly skilled personnel</li> <li>• Incentives for equity investors</li> <li>• Incentives for debt providers (government guaranteed bank loans)</li> <li>• Internationalization support</li> <li>• Incentives for equity crowdfunding</li> <li>• “Fail fast“ procedure (simplification of liquidation procedure without suffering significant reputational and financial costs)</li> </ul>
Growth instruments	
Exit instruments	

## 5.2. Data

This study takes advantage of a survey launched by the National Committee of the Italian Ministry for Economic Development on the “Monitoring and Evaluation of National policies for the Eco-system of Italian Innovative Start-ups” and administered by ISTAT in April and May 2016.<sup>7</sup> The questionnaire aims at collecting information on Italian innovative startups along a series of dimensions including the human capital endowment of the founding teams, their innovation strategies and firm growth performances and, also, entrepreneurs’ assessment of the public policy measures that were put in place in this domain. Specifically, as to this latter aspect, entrepreneurs were explicitly asked to declare whether they had already used or intend to use the growth instruments of the reform.

The questionnaire targeted the population of Italian YICs, which as of December 2015 was equal to 5,150 innovative startups. The questionnaire was filled with partial information from 2,275 firms, leading to a considerable 44% response rate, and with complete information for the variables of interest of this study for 1,769 YICs. The sample is ensured to be representative of the population on all dimensions on which ISTAT has information on both sides, i.e. population and sample, including firms’ geographic location, industry affiliation, age and legal status.<sup>8</sup>

## 5.3. Estimation methods

In the estimation methods we closely follow the empirical strategy implemented by Eesley (2016) also for the purpose of increasing the comparability of results across the different institutional settings analyzed by our and his study. More specifically, we opt for the difference-in-differences (DID) estimation technique in the main analysis, which allows control for omitted variables. As the

<sup>7</sup> One of the authors of the present study is an academic member of this ministerial committee and he actively participated in the questionnaire design.

<sup>8</sup> The chi-squared tests between the surveyed population and the final sample of YICs show high levels of representativeness of the latter (e.g.  $\chi^2_{Nuts\ 2\ level} = 0.46$  (p – value = 1.000) ,  $\chi^2_{NACE\ Rev.2} = 4.54$  (p – value = 0.999),  $\chi^2_{Age} = 1.09$  (p – value = 0.955)). See MISE (2016) report for further details.



institutional change was put in place on the national level, we include in our models a vector of dummies for Italian regions on NUTS 2 level in order to control for unobservable structural variance between different areas of the country that may locally impact entrepreneurial dynamics. We additionally introduce a vector of dummies for industrial sectors the startups belong to based on NACE classification, with the aim of controlling for intrinsic yet unobservable differences between industrial sectors.<sup>9</sup> As our data are available on the individual-, founder-level, we estimate the models allowing for company-level clustering of the errors, that is, allowing for correlation in the error terms between the cofounders.

In particular, in order to test Hypothesis 1, we estimate a logit model where the dependent variable is an indicator that separates entrepreneurs depending on whether they founded a company before or after the reform. The main interest is to understand the impact of founder's human capital, which in turn will explain if the reform as a whole has attracted founders endowed with relatively higher human capital. As robustness checks, we perform two additional tests. First, we exploit the panel data structure to estimate a pooled logit model, which allows us to better control for possible endogeneity issues. Secondly, we carry out a Cox event-history analysis. We define a "failure" event as the year when the entrepreneur starts a company (by the nature of our dataset, we have no censored data). The advantage of the Cox model is that it allows for a fairly flexible specification as it uses a semi-parametric estimation. In both cases, the interest lies in the interaction between the human capital variables and a dummy variable that indicates the time period after the policy. While Ai and Norton (2003) suggest that the magnitude of the interaction effect in non-linear models does not necessarily reflect its marginal effect, in the longitudinal DID non-linear analysis here described (and the ones detailed below), it is worthwhile to note that as shown by (Puhani, 2012) and further extended by Eesley (2016, see his Appendix), the coefficient of the interaction term fully accounts for the treatment effect of interest, provided that the two-way interaction term is formed by at least a treatment dummy.

In order to test Hypothesis 2, we use a similar approach. We estimate the logit model with a reform variable adjusted for the specific instruments it implemented related to the growth of the startups. Namely, we multiple the previously used dummies with a binary variable that records if an entrepreneur has used or plans to use growth-related benefits of the reform. By doing that, we are able to measure if an entrepreneur had in mind the reform instruments intended to decrease growth barriers when starting the company. For Hypothesis 2, as robustness checks, we repeat pooled logit model estimation and Cox survival analysis. However, in order to conduct an even more rigorous test and better understand which instruments truly impact the inflow of high human capital into entrepreneurship, we estimate another pooled logit model, with more precise explanatory variables related to the reform. We create two binary variables: one that captures whether an entrepreneur founded the company after the policy and she has used only the entry-related instruments of the reform, and the other that records whether an entrepreneur founded the company after the policy and she has also used growth-related instruments. In all the cases, the major interest resides in the interaction between the human capital variables and the two created dummy variables.

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<sup>9</sup> As an additional robustness check, we also include year-specific dummy variables in the pooled logit models to control for nation-wide shocks and trends that shape income distribution over time. We find consistent results.

Finally, in order to test Hypothesis 3, we use Ordinary Least Square (OLS) estimation with the logarithm of total sales in the last year of observation (2015) as the dependent variable. We use the same set of explanatory variables as in the previous analyses related to founding activity, with an addition of a few relevant control variables (to control for age and incubation experience of the companies). Moreover, we again focus on the interaction terms between the human capital and the growth-related reform variables. Additionally, as the observed period is relatively short and might not allow to all startups to deploy their full potential, we alternatively test whether the growth-related instruments of the reform impact high-growth ambitions of entrepreneurs, and the results yield not to be different from the original model.

## 5.4. Measures

### 5.4.1. Dependent variables

**Founding event.** In order to test Hypotheses 1 and 2, we deploy two different dependent variables depending on the estimation model. First, for the purpose of the logit model (see *infra*), we use two binary measures: *Founded after reform* that equal 1 if an entrepreneur started the company after the reform (and zero otherwise), and *Founded after growth reform* if an entrepreneur started the company after the reform and has used or intends to use its growth instruments (and zero otherwise). Second, for the purpose of the pooled logit and Cox models (see *infra*), a dichotomous variable *Foundation* that equals 1 if an entrepreneur founded the company in the given year (and zero otherwise) is built.

**Company performance.** In order to test Hypothesis 3, we use a logarithm of *Total sales* as a measure of performance. Sales has been widely used in the entrepreneurship literature and is beneficial for several reasons. First, as company's *Age* is controlled for in the model, total sales at available year is a proxy of the average yearly absolute sales growth since foundation (for a similar approach, see e.g. Colombo and Grilli, 2005). Second, total sale is a favorable measure to capture company performance in terms of growth when compared to employee or profitability (which is additionally challenging to measure) due to considerably less discrepancy across industries (Eberhart et al., 2016). This is particularly true for young companies, which are typically operating without (or no substantial) profits and on an extremely prudent number of employees for a fairly long period of time. A potential issue with this measure might emerge from the short time span we are able to observe, and the sales measure at year 2015 might be structurally different as new companies in some sectors might require considerably longer time to achieve revenues (e.g. high-tech manufacturing). In order to cope with this issue, in the robustness checks we introduce an alternative proxy of (potential) performance quality that should not require varying (or particularly long) time intervals to show –R&D expenditures as percentage of total sales, internationalization intentions and the event of obtaining external funding (equity or debt).

### 5.4.2. Explanatory variables

**Human capital.** The explanatory variables are built on the same principles extensively used in previous studies to describe the human capital endowments of entrepreneurs (e.g. see Colombo and Grilli, 2005, 2010). In particular, we create the variable *Human capital* that comprises total years of university education and work experience prior to foundation (see e.g. Beckman et al., 2007; Eisenhardt and Schoonhoven, 1990). Furthermore, we break down this measure in two groups – generic and specific human capital. The distinction has been shown to be crucial for understanding entrepreneurial behavior and outcomes (see Grilli, 2014 for a review and a discussion). The measure

of *Generic human capital* sums years of university education, freelance work experience, and employment in other sectors from the sector in which the founded company operates. On the other hand, *Specific human capital* is a measure of total years of entrepreneurial or managerial experience (no matter the sector), and years of employment in the same sectors of founded company's activity. The operationalization of the two variables closely follows previous studies in the field (Colombo and Grilli, 2005; Ganotakis, 2012; Garrone, Grilli, and Mrkajic, 2017).<sup>10</sup>

**Reform.** Depending on the estimation method, we use differently built explanatory variables related to the reform. First, for the cross-section analysis (OLS performance models) we use a pair of variables related to foundation (used as dependent variable in the logit models) – *Founded after reform* and *Founded after growth reform*. Second, for the pooled logit models, we build another batch of binary variables; *Post reform* that equals 1 in the years after the reform (and 0 before the reform), *Post entry reform* that equals 1 in the years after the reform for the firms that have used only the entry instruments of the reform (and 0 otherwise), and *Post growth reform* that equals 1 in the years after the reform for the firms that have used also the growth instruments of the reform (and 0 otherwise).

### 5.4.3. Control variables

We follow previous studies of founding determinants and performance of new ventures to complement the specification of the econometric model. The international experience of founders is likely to affect entrepreneurial decision-making processes (e.g. Hutchinson, Quinn, and Alexander, 2006; Reuber and Fischer, 1997), so we include an *International experience* index that is built on student, work and entrepreneurial experience abroad gained by entrepreneurs in the past (the higher the value, the greater the international experience). Then, female entrepreneurs are less common when compared to male entrepreneurs (e.g. Minniti and Nardone, 2007), so we include a dichotomous gender variable *Gender male*, which equals 1 if the entrepreneur is male and 0 otherwise. Another stream of literature has argued that parents' experience impact entrepreneurial entry and behavior (e.g. Cooper and Dunkelberg, 1986; Greve and Salaff, 2003). Hence, we control for whether one of the founder's parents has had any entrepreneurial experience (dummy variable *Parent entrepreneur* equals 1 if one of the parents was an entrepreneur, and 0 otherwise). Founding team size is also accounted for by including a continuous variable *Founding team size* that equals the number of operative cofounders. Then, as firm performance is strictly related to the availability of resources (Barney, 1991), we also control in the performance model for the participation of founder's company in an incubator (*Incubated*), which should enable YICs to access more easily some of key resources. Finally, apart from the firm-level controls, we also add to the model a relevant macro-environmental variable. Namely, we control for total entrepreneurship rate on a NUTS2 regional level (*TEA*), which should corroborate our analysis in line with the set hypotheses that are intended to understand if the reform changes the quality and not the quantity of the national entrepreneurial ecosystem. *TEA* is sourced from the Regional Global Entrepreneurship

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<sup>10</sup> (Colombo and Grilli, 2005, p. 796): "Generic human capital relates to the general knowledge acquired by entrepreneurs through both formal education and professional experience. Specific human capital consists of capabilities that founders can directly apply to the entrepreneurial job in the newly created firm. These include knowledge of the industry in which the new firm operates, that is industry-specific human capital obtained by founders through prior work experience in the same industry. They also include knowledge of how to manage a new firm, that is entrepreneur-specific human capital; this is developed by founders through "leadership experience" (Bruderl, Preisendorfer, and Ziegler, 1992) obtained either through a managerial position in another firm or in prior self-employment episodes."

Monitor (GEM), and is time-invariant in the cross-sectional analysis (fixed to the value in the year of company foundation) and time varying in the panel structure.

## 6. Results

### 6.1. Descriptive statistics

Table 2 presents descriptive statistics among the key variables used in the study, as well as their correlation matrix based on 4,055 founders of 1,769 YICs. As expected, most of the founders are based in large city areas (12.93% in Milan, 7.9% in Rome, 6.1% in Turin), and are active in information technology (31.47%) and scientific research and development (17.54%) sectors. One may notice interestingly similar means of the two types of human capital (on average, a single founder has around 9.5 years of generic and around 9.8 years of specific experience). Furthermore, the high ratio of male representation reflects the strikingly low engagement of women in entrepreneurship (only around 18 percent), a common and concerning fact. A remarkably high percentage of founders (close to 20 percent) have at least one parent with entrepreneurial experience, speaking in favor of the importance that family culture plays in entrepreneurship as a professional choice. No particular correlations are large in magnitude, hence eliminating concerns of potential multi-collinearity that might affect our results.

**Table 2.**  
Means, standard deviations and mutual correlation among the key variables.

Variable	Mean	St. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) <i>Founded after reform</i>	0.867	0.338	1													
(2) <i>Founded after growth reform</i>	0.735	0.441	0.785	1												
(3) <i>Total sale</i>	115,395	319,260	-0.171	-0.139	1											
(4) <i>Human capital</i>	19.276	11.848	0.046	0.056	0.011	1										
(5) <i>Generic human capital</i>	9.451	9.867	-0.005	0.001	0.002	0.351	1									
(6) <i>Specific human capital</i>	9.825	12.494	0.047	0.054	0.009	0.680	-0.448	1								
(7) <i>International experience</i>	0.317	0.583	-0.006	0.026	-0.007	0.118	-0.015	0.124	1							
(8) <i>Gender male</i>	0.817	0.386	-0.045	-0.038	0.032	0.098	-0.019	0.108	0.059	1						
(9) <i>Parent entrepreneur</i>	0.193	0.395	0.001	0.022	0.004	0.015	0.037	-0.015	0.036	-0.008	1					
(10) <i>Founding team size</i>	2.925	2.250	0.075	0.114	-0.019	-0.028	0.018	-0.041	-0.037	-0.044	-0.105	1				
(11) <i>GDP per capita</i>	35,378	639.375	-0.082	-0.061	0.034	0.002	0.006	-0.002	-0.004	0.010	-0.013	0.010	1			
(12) <i>TEA</i>	0.040	0.021	0.155	0.102	-0.038	-0.070	-0.056	-0.024	-0.020	-0.044	0.008	-0.006	-0.045	1		
(13) <i>Age</i>	1.188	1.157	-0.817	-0.660	0.193	-0.053	0.004	-0.053	-0.007	0.045	-0.001	-0.084	-0.231	-0.014	1	
(14) <i>Incubated</i>	0.297	0.457	0.031	0.032	-0.096	-0.081	-0.029	-0.054	-0.001	-0.047	0.004	0.103	-0.066	0.022	-0.013	1

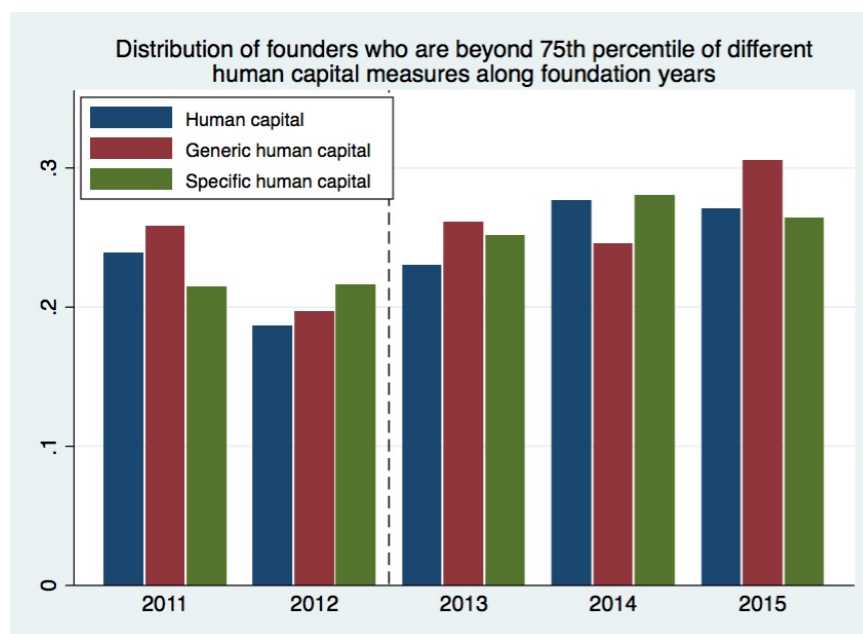
*Notes:* Statistics are based on 4,055 founders (of 1,769 YICs born from 2009 to 2015, yielding 28,381 observations in longitudinal terms); *Total sale* variable is logged in the analyses.

Table 3 provides means and standard deviations, as well as information regarding statistical difference between two subsamples – entrepreneurs who founded their ventures before (542) and after (3,513) the reform. It is noteworthy to remark there is an increase of women entrepreneurs after the reform, from 15 to almost 18 percent. The drop in total sales is expected due to the age differential between the two groups, as we measure the variable in year 2015. By looking at the means of the human capital variables, the surge in the overall level after the reform can be mainly attributed to the increase in the level of specific experience of the founders. Similar trends can also be observed in Figure 1, which presents distribution of high human capital founders (75 percentile and beyond) along foundation years.

**Table 3.**  
Statistical difference between the two groups of founders on the key variables.

Variable	Founded before reform (No. of founders: 542; No. of observations: 3,794)		Founded after reform (No. of founders: 3,513; No. of observations: 24,591)		Statistical difference
	Mean	St. Dev.	Mean	St. Dev.	
<i>Total sale</i>	193,640	436,047	83,906	250,994	- ***
<i>Human capital</i>	17.959	10.980	19.480	11.964	+ ***
<i>Generic human capital</i>	9.145	9.114	9.498	9.977	0
<i>Specific human capital</i>	8.813	10.945	9.982	12.710	+ ***
<i>International experience</i>	0.316	0.563	0.317	0.586	0
<i>Gender male</i>	0.851	0.356	0.812	0.390	- ***
<i>Parent entrepreneur</i>	0.183	0.387	0.194	0.396	0
<i>Founding team size</i>	2.683	1.584	2.961	2.333	+ ***
<i>GDP per capita</i>	35,378	639,539	35,378	639,362	0
<i>TEA</i>	0.035	0.021	0.041	0.021	+ ***
<i>Age</i>	3.390	0.512	0.842	0.791	- ***
<i>Incubated</i>	0.260	0.439	0.303	0.459	+ ***

*Notes:* Total sale variable is logged in the analyses.



**Figure 1.**  
Distribution of high human capital founders (75 percentile and beyond) along foundation years.

The dashed vertical line indicates the reform event.

## 6.2. Institutional change and founders' human capital

The first set of results, testing Hypothesis 1 that posits that the institutional reform that removes barriers to entrepreneurship increases the propensity of individuals endowed with high human capital to found a new venture, is presented in Table 4. The first two columns (Models 1a and 1b) report estimates of the logit models. The coefficients of the variables explain which characteristics of the founders (or the external environment) impact the probability of foundation after the reform. Hypothesis 1 predicts that high human of founders will be more prone to found a new venture after the reform, which is indicatively supported in Model 1a with a positive and statistically significant (at the one percent level) coefficient of the *Human capital* variable. However, when a more sophisticated measure of human capital is used, the results display that the reform has managed to impact only founders with high specific human capital (at the one percent level), while no significant influence is found for the ones with high generic human capital. The effect is not only significant from a statistical point of view but it is also remarkable in economic terms. Looking at Model (1b), *ceteris paribus* (i.e. other independent variables at the median or mean value), an individual entrepreneur located near Rome and active in the information technology services sector (the benchmark case in our estimates), and characterized by high specific human capital (90° percentile of the corresponding variable) is +49.47% more likely than the same individual characterized by low specific human capital (10° percentile of the corresponding variable) to have become an entrepreneur after the reform. The next four columns of Table 4 report robustness checks performed on a longitudinal structure of the data, by the estimation of the pooled logit and Cox models. In this case, as the dependent variable is a dummy which equals one if the firms were founded in the given year, and zero otherwise, and the model specification includes the *Post reform* variable, coefficients related to human capital have a distinctive interpretation. Specifically, the interest does not solely lie in the direct effect of human capital variables, where the associated coefficient reflects the human capital endowment of pre-reform entrepreneurs compared to post-reform ones, but rather it resides in their interactions with the *Post reform* variable (see Eesley, 2016). To be in line with our hypothesis, by the means of this specification, we expect a negative sign for the direct effect of human capital and a positive one for the interaction terms of the human capital variables with the *Post reform* variable. The findings fully comply with this pattern and, therefore, they are totally in line with the findings of the logit model estimations, providing further support for Hypothesis 1.

**Table 4.**  
**Institutional change and human capital of founders.**

Model	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Analysis type	Logit models		Pooled logit models		Cox models	
Dependent variable	<i>Founded after reform</i>		<i>Foundation</i>		<i>Foundation</i>	
<i>Human capital</i>	0.015 *** (0.005) [0.005]		-0.010 ** (0.004) [0.017]		-0.009 ** (0.004) [0.027]	
<i>Generic human capital</i>		0.011 (0.007) [0.131]		-0.009 (0.006) [0.147]		-0.008 (0.006) [0.205]
<i>Specific human capital</i>		0.017 *** (0.006) [0.003]		-0.011 ** (0.004) [0.016]		-0.010 ** (0.004) [0.022]
<i>Post reform</i>			1.734 *** (0.135) [0.000]	1.742 *** (0.139) [0.000]	11.409 / /	8.570 / /
<i>Post reform</i> <i>x Human capital</i>			0.013 ** (0.004) [0.011]		0.008 * (0.004) [0.072]	
<i>Post reform</i> <i>x Generic human capital</i>				0.012 (0.007) [0.118]		0.005 (0.006) [0.388]
<i>Post reform</i> <i>x Specific human capital</i>				0.014 *** (0.005) [0.001]		0.009 * (0.005) [0.051]
<i>International experience</i>	-0.071 (0.110) [0.520]	-0.076 (0.110) [0.495]	0.003 (0.004) [0.428]	0.004 (0.004) [0.417]	-0.016 (0.024) [0.529]	-0.016 (0.025) [0.552]
<i>Gender male</i>	-0.373 ** (0.159) [0.019]	-0.380 ** (0.159) [0.017]	0.003 (0.008) [0.674]	0.004 (0.008) [0.655]	0.056 * (0.033) [0.092]	0.056 * (0.034) [0.099]
<i>Parent entrepreneur</i>	-0.009 (0.151) [0.952]	-0.003 (0.152) [0.986]	-0.010 (0.009) [0.222]	-0.110 (0.009) [0.215]	0.001 (0.034) [0.997]	0.001 (0.034) [0.988]
<i>Founding team size</i>	0.085 * (0.046) [0.067]	0.087 * (0.046) [0.063]	0.001 (0.002) [0.634]	0.001 (0.002) [0.648]	-0.013 (0.010) [0.221]	-0.013 (0.010) [0.229]
<i>GDP per capita</i>			0.001 *** (0.000) [0.000]	0.001 *** (0.000) [0.000]	0.000 / /	0.000 / /
<i>TEA</i>	27.466 *** (9.486) [0.004]	27.428 *** (9.488) [0.004]	13.837 *** (2.794) [0.000]	13.841 *** (2.794) [0.000]	4.390 ** (1.950) [0.024]	4.399 ** (1.949) [0.024]
<i>Const.</i>	-2.862 (2.275) [0.208]	-2.814 (2.294) [0.220]	-43.919 *** (3.548) [0.000]	-43.927 *** (3.548) [0.000]		
<b>Industry dummies</b>	Included	Included	Included	Included	Included	Included
<b>Regional dummies</b>	Included	Included	Included	Included	Included	Included
<b>Observations</b>	3420	3420	28381	28381	15514	15514
<b>Founders</b>	3420	3420	4055	4055	4051	4051
<b>Companies</b>	1497	1497	1769	1769	1766	1766
<b>Log. likelihood</b>	-1311.988	-1311.527	-955.924	-9558.837	-31396.795	-31396.497
<b>Pseudo R<sup>2</sup> / Wald Chi<sup>2</sup></b>	0.114	0.114	0.181	0.181	1.27 × 10 <sup>10</sup>	2.25 × 10 <sup>8</sup>

*Notes:* GDP per capita in the Cox model is included as a time-varying control. The reported standard errors (in parenthesis) are robust standard errors clustered by company. The number of observations varies between models due to the relatively fine-grained taxonomies of industries (NACE Rev. 2 intermediate aggregation) and regions (Nuts 2 level), which yields no variation in the dependent variables within some of the groups. The regressions were repeated with a higher level of aggregation of the control variables and similar results are obtained, providing support for the consistency of the results. STATA does not report standard errors for (some) time-varying variables in the Cox model due to the presence of collinearity. *p*-values are shown in the square brackets. Asterisks correspond to the significance levels: \* for 10%, \*\* for 5% and \*\*\* for 1%.



Hypothesis 2 predicts that propensity of high human capital founders will increase as a consequence of reduction of growth barriers by the reform. To test this, the same set of analyses was repeated, with the only difference that now *Post reform* variable is substituted with the variable *Post growth reform*. The latter variable is a dummy that equals one only if a founder founded the firm after the policy and has used or plans to use growth related instruments of the reform. Otherwise, this dummy variable equals zero for a founder who founded the firm before the policy or after the policy but has not used and plans not to use the growth-related measures. Results reported in Table 5 indicate confirmation of Hypothesis 2. Individuals endowed with high levels of human capital, and especially with the specific type of it are found to be more prone to become entrepreneurs after the growth reform was introduced. By mimicking the same simulation exercise exposed before, we can again gauge the economic impact that the reduction of growth barriers may produce on individuals with high specific human capital. In fact, by the means of Model (4b), the increase in the probability to opt for the entrepreneurial career after the reform and thanks to the decrease in growth barriers for this typology of individuals (with respect to individuals with low specific human capital) is estimated to be equal to +32.68%. Results are confirmed by looking at the interaction terms of the pooled logit model and (to a lesser extent in terms of statistical significance) of the Cox model.

**Table 5.**  
**Reduction of growth barriers and human capital of founders.**

Model	(4a)	(4b)	(5a)	(5b)	(6a)	(6b)
Analysis type	Logit models		Pooled logit models		Cox models	
Dependent variable	Founded after growth reform		Foundation		Foundation	
<i>Human capital</i>	0.013 *** (0.004) [0.002]		-0.007 *** (0.002) [0.002]		-0.006 ** (0.003) [0.021]	
<i>Generic human capital</i>		0.007 (0.006) [0.189]		-0.004 (0.003) [0.147]		-0.007 ** (0.004) [0.048]
<i>Specific human capital</i>		0.016 *** (0.005) [0.000]		-0.008 *** (0.003) [0.001]		-0.006 ** (0.003) [0.043]
<i>Post growth reform</i>			1.689 *** (0.061) [0.000]	1.699 *** (0.062) [0.000]	-0.065 (0.080) [0.416]	-0.070 (0.082) [0.390]
<i>Post growth reform x Human capital</i>			0.008 *** (0.002) [0.001]		0.005 (0.003) [0.104]	
<i>Post growth reform x Generic human capital</i>				0.006 * (0.003) [0.056]		0.006 (0.004) [0.153]
<i>Post growth reform x Specific human capital</i>				0.009 *** (0.003) [0.001]		0.004 (0.003) [0.162]
<i>International experience</i>	0.097 (0.092) [0.292]	0.089 (0.092) [0.332]	-0.017 (0.017) [0.341]	-0.015 (0.017) [0.395]	-0.016 (0.025) [0.528]	-0.016 (0.025) [0.552]
<i>Gender male</i>	-0.314 *** (0.117) [0.007]	-0.327 *** (0.118) [0.005]	0.062 *** (0.022) [0.006]	0.065 *** (0.023) [0.004]	0.057 * (0.034) [0.088]	0.056 * (0.034) [0.094]
<i>Parent entrepreneur</i>	0.276 ** (0.115) [0.016]	0.284 ** (0.115) [0.013]	-0.060 *** (0.022) [0.007]	-0.062 ** (0.022) [0.006]	-0.001 (0.010) [0.997]	0.001 (0.034) [0.994]
<i>Founding team size</i>	0.143 *** (0.041) [0.000]	0.146 *** (0.041) [0.000]	-0.021 *** (0.006) [0.002]	-0.021 *** (0.007) [0.001]	-0.013 (0.010) [0.214]	-0.013 (0.010) [0.220]
<i>GDP per capita</i>			0.001 *** (0.000) [0.000]	0.001 *** (0.000) [0.000]	-0.000 / /	-0.000 / /
<i>TEA</i>	15.547 ** (6.740) [0.021]	15.460 ** (6.766) [0.022]	15.340 *** (2.493) [0.000]	15.346 *** (2.494) [0.000]	4.336 ** (1.954) [0.026]	4.334 ** (1.953) [0.027]
<i>Const.</i>	-1.634 (1.593) [0.305]	-1.583 (1.587) [0.318]	-46.020 *** (2.983) [0.000]	-46.036 *** (2.984) [0.000]		
<b>Industry dummies</b>	Included	Included	Included	Included	Included	Included
<b>Regional dummies</b>	Included	Included	Included	Included	Included	Included
<b>Observations</b>	3420	3420	28381	28381	15514	15514
<b>Founders</b>	3420	3420	4055	4055	4051	4051
<b>Companies</b>	1497	1497	1769	1769	1766	1766
<b>Log. likelihood</b>	-2041.675	-2039.826	-9524.356	-9523.668	-31397.575	-31397.490
<b>Pseudo R<sup>2</sup> / Wald Chi<sup>2</sup></b>	0.1009	0.1017	0.1844	0.1845	3.03 × 10 <sup>13</sup>	4.9 × 10 <sup>8</sup>

*Notes:* GDP per capita in the Cox model is included as a time-varying control. The reported standard errors (in parenthesis) are robust standard errors clustered by company. The number of observations varies between models due to the relatively fine-grained taxonomies of industries (NACE Rev. 2 intermediate aggregation) and regions (Nuts 2 level), which yields no variation in the dependent variables within some of the groups. The regressions were repeated with a higher level of aggregation of the control variables and similar results are obtained, providing support for the consistency of the results. STATA does not report standard errors for (some) time-varying variables in the Cox model due to the presence of collinearity. *p*-values are shown in the square brackets. Asterisks correspond to the significance levels: \* for 10%, \*\* for 5% and \*\*\* for 1%.

To provide further evidence that are especially the growth rather than the entry instruments of the introduced institutional change to drive high human capital individuals into entrepreneurship, we perform an additional check on the panel structure of the data. As previously explained, we use two binary variables *Post entry reform* and *Post growth reform*. They capture whether an entrepreneur founded the company after the policy and she has used its entry-related instruments only, and whether an entrepreneur founded the company after the policy and she has used growth-related instruments, respectively. Table 6 reports the results of the pooled logit model, with the main coefficient of interest being the interaction terms. The results corroborate the confirmation of Hypothesis 2. Even though coefficients corresponding to both entry and growth instruments are positive, only growth-related instruments appear to have a statistically significant effect on the foundation decision of high human capital founders (and particularly on those characterized by a high specific component).

**Table 6.**  
Reduction of entry and growth barriers, and human capital of founders.

Model	(7a)	(7b)	(8a)	(8b)
Analysis type	Pooled logit models		Cox models	
Dependent variable	<i>Foundation</i>		<i>Foundation</i>	
<i>Human capital</i>	-0.010 ** (0.004) [0.015]		-0.009 ** (0.004) [0.024]	
<i>Generic human capital</i>		-0.008 (0.006) [0.157]		-0.008 (0.006) [0.193]
<i>Specific human capital</i>		-0.011 ** (0.004) [0.013]		-0.010 ** (0.004) [0.020]
<i>Post entry reform</i>	0.960 *** (0.200) [0.000]	0.960 *** (0.206) [0.000]	0.007 / /	-0.018 / /
<i>Post growth reform</i>	2.014 *** (0.108) [0.000]	2.019 *** (0.112) [0.000]	-0.005 (0.085) [0.950]	-0.008 (0.086) [0.926]
<i>Post entry reform x Human capital</i>	0.012 (0.008) [0.126]		0.006 (0.005) [0.246]	
<i>Post growth reform x Human capital</i>	0.011 *** (0.004) [0.009]		0.008 * (0.004) [0.082]	
<i>Post entry reform x Generic human capital</i>		0.012 (0.011) [0.268]		0.001 (0.007) [0.876]
<i>Post growth reform x Generic human capital</i>		0.010 * (0.006) [0.099]		0.006 (0.006) [0.377]
<i>Post entry reform x Specific human capital</i>		0.012 (0.008) [0.160]		0.009 (0.006) [0.115]
<i>Post growth reform x Specific human capital</i>		0.012 *** (0.004) [0.009]		0.008 * (0.004) [0.064]
<i>International experience</i>	-0.011 (0.012) [0.357]	-0.010 (0.012) [0.411]	-0.021 (0.025) [0.403]	-0.021 (0.025) [0.401]
<i>Gender male</i>	0.044 ** (0.017) [0.011]	0.046 *** (0.017) [0.008]	0.048 (0.032) [0.138]	0.046 (0.032) [0.153]
<i>Parent entrepreneur</i>	-0.047 *** (0.017) [0.005]	-0.048 ** (0.017) [0.004]	0.019 (0.032) [0.560]	0.019 (0.032) [0.555]
<i>Founding team size</i>	-0.015 *** (0.005) [0.002]	-0.015 *** (0.005) [0.002]	-0.014 (0.010) [0.182]	-0.014 (0.010) [0.190]
<i>GDP per capital</i>	0.001 *** (0.000) [0.000]	0.001 *** (0.000) [0.000]	-0.002 / /	-0.000 / /
<i>TEA</i>	13.683 *** (2.767) [0.000]	13.685 *** (2.766) [0.000]	4.442 ** (1.953) [0.024]	4.438 ** (1.952) [0.023]
<i>Const.</i>	-44.523 *** (3.629) [0.000]	-44.533 *** (3.629) [0.000]		
<b>Industry and regional dummies</b>	Included	Included	Included	Included
<b>Observations</b>	28381	28381	15514	15514
<b>Founders</b>	4055	4055	4051	4051
<b>Companies</b>	1769	1769	1766	1766
<b>Log. likelihood</b>	-9367.779	-9367.489	-31317.557	-31316.846
<b>Pseudo R<sup>2</sup> / Wald Chi<sup>2</sup></b>	0.1991	0.1992	4.38 × 10 <sup>7</sup>	3.36 × 10 <sup>14</sup>

*Notes:* The reported standard errors (in parenthesis) are robust standard errors clustered by company. STATA does not report standard errors for (some) time-varying variables in the Cox model due to the presence of collinearity. *p*-values are shown in the square brackets. Asterisks correspond to the significance levels: \* for 10%, \*\* for 5% and \*\*\* for 1%.

### 6.3. Institutional change, founders' human capital and growth of new ventures

Table 7 and Table 8 show the results of OLS regressions of total sales on reform introduction and human capital variables, as well as control variables. The first two columns (Models 9a and 9b) of Table 7 do that on the full sample of founders, while the third and fourth column (Models 10a and 10b) are estimated on a sample of founders without the ones that founded their ventures in 2015. Table 8 presents the same estimations, only based on the firm- rather than on the founder-level (Models 11a, 11b, 12a and 12b). In all the models, the coefficients of interest correspond to the interaction terms between the reform and human capital variables. The results provide confirmatory evidence for Hypothesis 3, which proposes that removing growth barriers by means of an institutional reform will increase the difference in terms of growth performance between firms founded by individuals with low human capital and firms founded by individuals with high human capital. In particular, founders endowed with the high levels of specific human capital perform better in terms of their venture growth after the institutional reform. Taking as reference estimates of the Model (9b), before the reform, a low or great level of *Specific human capital* does not make any difference in terms of the YICs' sales (the corresponding coefficient is not statistically different from zero). While after the reform, everything else being equal (i.e., other independent variables at the median or mean value), moving the variable *Specific human capital* from its 10<sup>o</sup> to the 90<sup>o</sup> percentile leads to an increase in sales performance of +23%.

**Table 7.**  
Reduction of growth barriers, human capital of founders and new ventures growth estimated on the founder-level.

Model	(9a)	(9b)	(10a)	(10b)
Analysis type	Ordinary Least Squares		Ordinary Least Squares	
Dependent variable	<i>Total sales log</i>		<i>Total sales log</i>	
<i>Human capital</i>	-0.014 (0.009) [0.106]		-0.018 ** (0.009) [0.040]	
<i>Generic human capital</i>		-0.025 * (0.015) [0.099]		-0.035 ** (0.016) [0.031]
<i>Specific human capital</i>		-0.008 (0.008) [0.282]		-0.012 (0.009) [0.157]
<i>Founded after growth reform</i>	-0.220 (0.246) [0.373]	-0.228 (0.257) [0.376]	-0.561 * (0.298) [0.060]	-0.578 * (0.304) [0.058]
<i>Founded after growth reform x Human capital</i>	0.019 * (0.010) [0.050]		0.023 ** (0.011) [0.038]	
<i>Founded after growth reform x Generic human capital</i>		0.021 (0.016) [0.179]		0.029 (0.018) [0.120]
<i>Founded after growth reform x Specific human capital</i>		0.017 * (0.009) [0.079]		0.020 * (0.011) [0.063]
<i>International experience</i>	-0.301 *** (0.086) [0.001]	-0.314 *** (0.087) [0.000]	-0.274 ** (0.110) [0.013]	-0.294 *** (0.111) [0.008]
<i>Gender male</i>	0.027 (0.109) [0.804]	0.009 (0.110) [0.937]	0.058 (0.132) [0.658]	0.035 (0.133) [0.792]
<i>Parent entrepreneur</i>	-0.091 (0.122) [0.454]	-0.084 (0.121) [0.489]	-0.063 (0.145) [0.663]	-0.044 (0.145) [0.759]
<i>Founding team size</i>	-0.050 (0.051) [0.331]	-0.048 (0.051) [0.342]	-0.060 (0.067) [0.376]	-0.056 (0.067) [0.401]
<i>Age</i>	0.879 *** (0.072) [0.000]	0.880 *** (0.072) [0.000]	0.493 *** (0.120) [0.000]	0.502 *** (0.120) [0.000]
<i>Incubated</i>	-0.329 ** (0.151) [0.030]	-0.330 ** (0.151) [0.029]	-0.474 ** (0.189) [0.012]	-0.476 ** (0.188) [0.012]
<i>TEA</i>	1.790 (3.430) [0.602]	1.639 (3.428) [0.633]	0.452 (4.522) [0.920]	0.279 (4.505) [0.951]
<i>Const.</i>	0.327 (1.273) [0.797]	0.399 (1.291) [0.757]	1.347 (1.229) [0.273]	1.423 (1.249) [0.255]
<b>Industry dummies</b>	Included	Included	Included	Included
<b>Regional dummies</b>	Included	Included	Included	Included
<b>Observations</b>	2709	2709	1884	1884
<b>Companies</b>	1175	1175	814	814
<b>R<sup>2</sup></b>	0.2876	0.2899	0.1970	0.2018

*Notes:* Models 10a and 10b are regressed on a subsample of founders excluding the ones that founded the company in 2015, in which case total sales in 2015 is not a relevant measure of growth (in fact, no measure is). The number of observations varies between models due to the relatively fine-grained taxonomies of industries (NACE Rev. 2 intermediate aggregation) and regions (Nuts 2 level), which yields no variation in the dependent variables within some of the groups. The regressions were repeated with a higher level of aggregation of the control variables and similar results are obtained, providing support for the consistency of the results. *p*-values are shown in the brackets. The reported standard errors (in parenthesis) are robust standard errors clustered by company. *p*-values are shown in the square brackets. Asterisks correspond to the significance levels: \* for 10%, \*\* for 5% and \*\*\* for 1%.

**Table 8.**  
Reduction of growth barriers, human capital of founders and new ventures growth estimated on the firm-level.

Model	(11a)	(11b)	(12a)	(12b)
Analysis type	Ordinary Least Squares		Ordinary Least Squares	
Dependent variable	<i>Total sales log</i>		<i>Total sales log</i>	
<i>Human capital</i>	-0.008 (0.011) [0.474]		-0.018 (0.012) [0.127]	
<i>Generic human capital</i>		-0.022 (0.019) [0.255]		-0.037 * (0.020) [0.072]
<i>Specific human capital</i>		-0.002 (0.011) [0.840]		-0.011 (0.011) [0.322]
<i>Founded after growth reform</i>	-0.013 (0.262) [0.962]	-0.070 (0.278) [0.802]	-0.432 (0.320) [0.177]	-0.509 (0.334) [0.129]
<i>Founded after growth reform x Human capital</i>	0.011 (0.013) [0.386]		0.021 (0.014) [0.141]	
<i>Founded after growth reform x Generic human capital</i>		0.023 (0.020) [0.278]		0.037 (0.023) [0.114]
<i>Founded after growth reform x Specific human capital</i>		0.005 (0.012) [0.654]		0.014 (0.014) [0.296]
<i>International experience</i>	-0.275 *** (0.099) [0.005]	-0.282 *** (0.098) [0.004]	-0.227 * (0.126) [0.073]	-0.237 * (0.125) [0.059]
<i>Gender male</i>	-0.071 (0.159) [0.655]	-0.085 (0.162) [0.600]	-0.063 (0.207) [0.762]	-0.086 (0.211) [0.683]
<i>Parent entrepreneur</i>	-0.077 (0.143) [0.591]	-0.068 (0.144) [0.635]	-0.034 (0.168) [0.842]	-0.013 (0.170) [0.941]
<i>Founding team size</i>	-0.033 (0.040) [0.408]	-0.031 (0.040) [0.439]	-0.029 (0.051) [0.571]	-0.024 (0.051) [0.634]
<i>Age</i>	0.874 *** (0.062) [0.000]	0.876 *** (0.062) [0.000]	0.483 *** (0.100) [0.000]	0.492 *** (0.100) [0.000]
<i>Incubated</i>	-0.412 *** (0.125) [0.001]	-0.412 *** (0.125) [0.001]	-0.560 *** (0.156) [0.000]	-0.559 *** (0.156) [0.000]
<i>TEA</i>	0.817 (2.987) [0.785]	0.835 (2.993) [0.780]	-1.390 (3.862) [0.719]	-1.473 (3.861) [0.703]
<i>Const.</i>	0.374 (1.314) [0.763]	0.451 (1.258) [0.720]	1.503 (1.146) [0.190]	1.598 (1.165) [0.169]
<b>Industry dummies</b>	Included	Included	Included	Included
<b>Regional dummies</b>	Included	Included	Included	Included
<b>Observations</b>	1175	1175	814	814
<b>Companies</b>	1175	1175	814	814
<b>R<sup>2</sup></b>	0.2947	0.2962	0.1933	0.1968

*Notes:* Models 11 and 12 are regressed on a subsample of companies instead of founders, where measures are averaged from the founder-level. The number of observations varies between models due to the relatively fine-grained taxonomies of industries (NACE Rev. 2 intermediate aggregation) and regions (Nuts 2 level), which yields no variation in the dependent variables within some of the groups. The regressions were repeated with a higher level of aggregation of the control variables and similar results are obtained, providing support for the consistency of the results. *p*-values are shown in the brackets. The reported standard errors (in parenthesis) are robust standard errors clustered by company. *p*-values are shown in the square brackets. Asterisks correspond to the significance levels: \* for 10%, \*\* for 5% and \*\*\* for 1%.

The alternative measures of ventures' growth potential or rather ventures' ambition (i.e. R&D expenditures, internationalization, external funding) have shown comparable results too (results for R&D expenditures are presented in Table 9, while the remaining results are available upon request from the authors), which advocates for validation of Hypothesis 3.

**Table 9.**  
**Reduction of growth barriers, human capital of founders and new ventures growth.**

Model	(13a)	(13b)	(14a)	(14b)
Analysis type	Tobit models		Tobit models	
Dependent variable	<i>R&amp;D expenditures</i>		<i>R&amp;D expenditures</i>	
<i>Human capital</i>	-0.046 (0.028) [0.104]		-0.171 *** (0.024) [0.000]	
<i>Generic human capital</i>		0.146 *** (0.037) [0.000]		-0.276 (0.032) [0.391]
<i>Specific human capital</i>		-0.143 ** (0.028) [0.014]		-0.254 ** (0.026) [0.000]
<i>Founded after growth reform</i>	8.920 *** (0.753) [0.000]	9.406 *** (0.763) [0.000]	5.792 *** (0.635) [0.000]	6.289 *** (0.644) [0.000]
<i>Founded after growth reform x Human capital</i>	0.012 (0.028) [0.671]		0.131 *** (0.024) [0.000]	
<i>Founded after growth reform x Generic human capital</i>		-0.095 ** (0.039) [0.014]		-0.012 (0.034) [0.717]
<i>Founded after growth reform x Specific human capital</i>		0.077 *** (0.028) [0.006]		0.206 *** (0.027) [0.000]
<i>International experience</i>	1.930 *** (0.394) [0.000]	2.082 *** (0.395) [0.000]	3.614 *** (0.335) [0.000]	3.703 *** (0.339) [0.000]
<i>Gender male</i>	5.530 *** (0.732) [0.000]	5.792 *** (0.734) [0.000]	4.949 *** (0.620) [0.000]	5.035 *** (0.623) [0.000]
<i>Parent entrepreneur</i>	1.240 ** (0.509) [0.015]	1.124 ** (0.513) [0.028]	2.829 *** (0.445) [0.000]	2.707 *** (0.450) [0.000]
<i>Founding team size</i>	-0.384 ** (0.154) [0.013]	-0.409 *** (0.155) [0.008]	-0.382 ** (0.171) [0.026]	-0.411 ** (0.173) [0.017]
<i>Age</i>	2.926 *** (0.257) [0.000]	2.947 *** (0.258) [0.000]	2.487 *** (0.211) [0.000]	2.484 *** (0.212) [0.000]
<i>Incubated</i>	2.833 *** (0.570) [0.000]	2.872 *** (0.572) [0.000]	2.564 *** (0.462) [0.000]	2.560 *** (0.464) [0.000]
<i>TEA</i>	-31.958 ** (13.830) [0.021]	-30.539 ** (13.886) [0.028]	1.537 (11.483) [0.893]	2.228 (11.538) [0.847]
<i>Const.</i>	-252.698 *** (0.812) [0.000]	-254.625 *** (0.816) [0.000]	-246.772 *** (0.677) [0.000]	-247.189 *** (0.682) [0.000]
<b>Industry dummies</b>	Included	Included	Included	Included
<b>Regional dummies</b>	Included	Included	Included	Included
<b>Observations</b>	3963	3963	1735	1735
<b>Companies</b>	1735	1735	1735	1735
<b>Log. likelihood</b>	-16023.069	-16019.965	-7018.514	-7017.940
<b>Pseudo R<sup>2</sup></b>	0.0100	0.0102	0.0098	0.0098

**Notes:** Models 13 and 14 are estimated using a Tobit regression due to the nature of the dependent variable (percentage of R&D expenditures out of total sales). Models 13a and 13b are based on a sample of founders, while models 14a and 14b are based on a sample of companies. The reported standard errors (in parenthesis) are robust standard errors clustered by company. *p*-values are shown in the square brackets. Asterisks correspond to the significance levels: \* for 10%, \*\* for 5% and \*\*\* for 1%.



#### **6.4. Additional robustness analyses**

In order to assure robustness of the findings, we perform an additional test. We repeat all key estimations by excluding from the sample the founders who founded ventures in the period around the reform. In particular, we leave out founders who created their ventures in the immediate pre- and post-neighborhood (six months before and after November 2012). By doing this, we rule out the possibility that pre-reform entrepreneurs found their firm because they had the capacity to foresee with certainty the implementation of the policy. Moreover, we rule out that, because the founding of a firm is a process rather than an event, those entrepreneurs who founded their firms immediately after the policy was implemented, had instead decided to become entrepreneurs before the policy. We should point out that the former possibility is highly unlikely in the first place, given the great uncertainty surrounding the Italian political system (e.g. the Italian Republic has been characterized by the highest rate of cabinet turnover in Western Europe in the last fifty years, see, for instance, Curini, 2011). The obtained results are fully in line with the results obtained on the complete sample, which provides further support for the reliability of the findings (the key portion of the results is presented in Table 10, while the rest of them is available upon request).

**Table 10.**  
**Robustness analysis of the mainline results based on a sample that excludes founders that founded firms in the period around the reform.**

Model	(15)	(16)	(17)
Analysis type	Logit model	Logit model	OLS regression
Dependent variable	<i>Founded after reform</i>	<i>Founded after growth reform</i>	<i>Total sales log</i>
<i>Generic human capital</i>	0.012 (0.010) [0.221]	0.008 (0.007) [0.208]	-0.032 * (0.018) [0.083]
<i>Specific human capital</i>	0.021 *** (0.007) [0.003]	0.020 *** (0.005) [0.000]	-0.018 * (0.010) [0.072]
<i>Post growth reform</i>			-0.447 (0.300) [0.136]
<i>Post growth reform x Generic human capital</i>			0.028 (0.019) [0.155]
<i>Post growth reform x Specific human capital</i>			0.025 ** (0.011) [0.023]
<i>International experience</i>	0.011 (0.140) [0.939]	0.197 * (0.109) [0.070]	-0.273 *** (0.091) [0.003]
<i>Gender male</i>	-0.293 (0.186) [0.116]	-0.295 ** (0.131) [0.025]	-0.071 (0.118) [0.546]
<i>Parent entrepreneur</i>	-0.016 (0.194) [0.932]	0.308 ** (0.134) [0.041]	-0.094 (0.135) [0.485]
<i>Founding team size</i>	0.110 * (0.063) [0.081]	0.169 *** (0.048) [0.000]	-0.057 (0.054) [0.297]
<i>Age</i>			0.818 *** (0.081) [0.000]
<i>Incubated</i>			-0.307 * (0.169) [0.069]
<i>TEA</i>	87.483 *** (16.650) [0.000]	50.099 *** (9.166) [0.000]	1.842 * (3.848) [0.063]
<i>Const.</i>	-6.322 *** (2.748) [0.021]	-5.210 *** (1.742) [0.003]	0.802 (1.310) [0.541]
<b>Industry dummies</b>	Included	Included	Included
<b>Regional dummies</b>	Included	Included	Included
<b>Observations</b>	2784	3286	2354
<b>Founders</b>	2784	3286	2354
<b>Companies</b>	1212	1422	1012
<b>Log. likelihood</b>	-852.423	-1582.521	/
<b>(Pseudo) R<sup>2</sup></b>	0.202	0.144	0.261

*Notes:* The robustness analyses were performed on basic models only for each hypothesis. The full set of models estimated on the sample that excluded founders who founded firms around the reform is available upon request. The number of observations varies between models due to the relatively fine-grained taxonomies of industries (NACE Rev. 2 intermediate aggregation) and regions (Nuts 2 level), which yields no variation in the dependent variables within some of the groups. The reported standard errors (in parenthesis) are robust standard errors clustered by company. *p*-values are shown in the square brackets. Asterisks correspond to the significance levels: \* for 10%, \*\* for 5% and \*\*\* for 1%.

## 7. Discussion and conclusions

The extant literature based on the institutional theory has provided a wide body of evidence on how institutional change can impact firm entry and thus influence the quantity of entrepreneurs. We instead put forward a different, arguable equally important role of institutional change for entrepreneurship – we posited that a certain type of institutional reform may impact the quality of entrepreneurship by attracting founders equipped with better human capital.

We developed a set of hypotheses on the impact of institutional change on founders' human capital, and consequently on the performance of their ventures. We tested them using seven years of data on a comprehensive sample of founders of new Italian innovative startups created before and after a milestone reform, and found (a) that institutional change that reduces barriers to entrepreneurship increases propensity of high human capital individuals to become entrepreneurs, (b) that the instruments that reduce growth barriers in particular have a more significant impact than those directed to reduce entry barriers, and (c) that there is a super-additive effect of the reform and founders' high human capital on the performance of the created firms. Furthermore, we discovered that founders endowed with more specific rather than generic human capital are more reactive in this respect.

Our findings provide several contributions to the literature. First, we add to the intersection of the institutional theory and entrepreneurship literature by shedding light on how institutional change can impact entrepreneurship through different theoretical mechanisms. Previous studies highlight entry barriers as a pivotal mechanism influencing founding rates (Dobbin and Dowd, 1997; Klapper et al., 2006; Meek, Pacheco, and York, 2010; Sine and Lee, 2009). Eesley (2016) and Eberhart et al. (2016) do introduce and test alternative mechanisms (growth and exit barriers, respectively). However, they do not confront these mechanisms within the same institutional reform. We do exactly that, and show that lowering barriers to growth rather than barriers to entry has a prominent relevance for entrepreneurship and potentially economic and social growth. Related to that point, we study the effect of an institutional change on the previously neglected individual-level. In particular, unlike the previous literature that has focused on organizations or industries, we inspect whether an institutional reform distinctively affects different types of individuals. We center our attention on the impact on founders with high levels of different types of human capital. This group of skilled prospective entrepreneurs is a preferential target as they are also found to be more likely to succeed in their new business endeavors. By being able to clearly isolate effects of different instruments, we find that reducing barriers to growth attracts the high human capital individuals to entrepreneurship. This approach provides a more nuanced view of the effect an institutional change can have on entrepreneurial entry that goes beyond the direction (i.e. the rate) but rather qualifies the type of individuals that seize entrepreneurial opportunities as a consequence of an institutional change. Furthermore, we also add to the literature stream by theorizing and showing evidence of both direct and indirect impacts of institutional change on firm growth, which postulates the relevance and capacity of the institutional change. The extant institutional studies on entrepreneurship typically only deal with the effect on new venture rates and survival taking into account a decrease in barriers to entry (Djankov et al., 2002; Sine, Haveman, and Tolbert, 2005; Sine and Lee, 2009). Instead, similarly to Eesley (2016), yet in a different institutional context, we show how lowering barriers to growth enhances venture growth directly, as well as through attracting high human capital entrepreneurs. Interestingly, the findings show that the reform has the most significant impact on entrepreneurs who have vast specific work experience with respect to the founded venture.

Second, we also add to the entrepreneurship literature by complementing several research streams. The first group of studies has inspected individual characteristics that lead the individuals to entrepreneurial activity (e.g. see Blanchflower and Oswald, 1998; Cooper and Dunkelberg, 1986; Shane, 2000). Another group of studies has dealt with determinants of entrepreneurial ventures' success, such as founders characteristics and experience (Åstebro and Thompson, 2011; Colombo and Grilli, 2005, 2010). We add to these two streams by connecting them, i.e. by showing that the institutional change not only engages a relatively increased number of these highly skilled individuals, but they are also the ones who benefit the most from the structural reduction of the barriers in growing their businesses. By that, we bring to light the fact that institutions are an antecedent of the two, and a determinant factor in fostering high quality entrepreneurship. Particularly, we demonstrate that institutional change, and reduction of growth barriers more specifically, can create an appealing environment for the right type of entrepreneurs (Ahuja and Yayavaram, 2011; Khanna and Palepu, 2005), who have great specific human capital and thus are more likely to succeed.

Overall, this study also offers relevant implications for public policy. Most importantly, the findings suggest that regulators may impact entrepreneurship dynamics, even in a short term. By reducing barriers to entrepreneurship, policy makers may improve the incentive structure for prospective entrepreneurs, especially the ones with high human capital endowments, who have reciprocally more lucrative professional alternatives. Additionally, our study provides evidence that regulators may influence entrepreneurship dynamics by reducing both types of barriers to entrepreneurship, yet the findings emphasize a relatively more significant impact of removing barriers to growth. Indeed, considering the scarce resources policy makers could have at their disposal these days, our analysis suggests that an order of priorities can be set: introducing growth related benefits such as more flexible labour regulations, beneficial tax credit for the employment of highly skilled personnel, incentives for equity investors and debt providers are potentially the most effective measures in pushing the talented individual towards the innovative entrepreneurship career's path. Moreover, these policy dimensions will not only have the capacity to increase the number of highly skilled entrepreneurs, but they will also facilitate higher growth performance of the newly created ventures.

Nevertheless, due to the single country focus of our study, a question of generalizability of the findings arises. In this respect, if replication in other institutional contexts will admittedly bring robustness to the results here exposed, it is also important to note that the dramatic effect that a reduction in the barriers to growth may induce on entrepreneurial dynamics that we document here is qualitatively the same as the one obtained by Eesley (2016) in China in a completely diverse time frame. Combining this with the observation that we do not pose any strict and context-specific assumption on the development of the theoretical reasoning, there is a strong suspicion that these empirical effects will hold in general and only the magnitude may vary across countries. Moreover, we anticipate that our findings transcend beyond Italy particularly well in institutional environments where cultural traits about entrepreneurship are similar, particularly in Western Europe (Audretsch et al., 2002).<sup>11</sup>

To conclude, our study offers a well-grounded understanding of how institutions influence the creation and growth of firms in the early stage of their existence. In doing so, it stresses the

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<sup>11</sup> For instance, Italy, alike other Western European countries (e.g. France, Spain, Germany), ranks high on Hofstede's *uncertainty avoidance index*, which has been shown to be a key entrepreneurial trait.

importance that changeable institutions may have for public policy directed at economic growth and job creation. In particular, this study clearly shows how policy makers can influence “who is playing”, i.e. who is becoming an entrepreneur, where the typology of players, whether they are highly skilled or not, greatly impacts on the prosperity of an economic system. In fact, high quality prospective entrepreneurs react to and benefit from the changes in their institutional environment that remove barriers that otherwise impede their high potential business activities to fully develop.

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