

Industrial policy, innovative entrepreneurship, and the human capital of founders

Online Supplemental Material - Appendix

Small Business Economics

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CONTENT

Appendix: Data and sample

Sample representativeness

Survivorship bias

Additional descriptive statistics

Appendix: Robustness analyses and additional evidence

References

Tables and figures

DATA AND SAMPLE

This study is based on data collected by the National Committee of the Italian Ministry for Economic Development (MISE) on the “Monitoring and Evaluation of National policies for the Eco-system of Italian Innovative Startups” and administered by the Italian National Institute of Statistics (ISTAT) in 2016. The survey was designed in order to enhance the qualitative side of the available data about the young innovative companies (YICs) in Italy, for going beyond the traditional register data already available (quantitative aspects like the number of startups launched, the geographical and sector distribution and so on).

All the innovative startups listed in the special registry of young innovative startups as of December 31st 2015 (5150 companies) were mailed with the goal of creating the first national statistical survey of innovative startups. The survey was administered during April and May 2016. Most of the surveyed companies were located in the north of Italy (31.2% in the North West and 26.8% in the North East), while the other areas were also well represented (22% in the South and 20% in the Centre). The companies were mainly active in providing services (79.6%), in particular software production (29.7%), with the remaining 20.4% operate in manufacturing, and of these, 3.5% produce innovative machinery.

Sample representativeness

Out of the total population of the startups that the questionnaire was sent to, 2275 completed it. This represents a response rate of over 44% and is a very significant percentage for a voluntary statistical survey. The exceptionally high portion of completed questionnaires offers a unique opportunity to study a wide group of heterogeneous young innovative companies, unlike studies that focus on more specific subgroups (e.g. companies founded by university graduates, companies invested or investigated by a single association or organization, etc.). We were able to extract full information for our key variables of interest for 1769 YICs (c.a. 35% of the total population, still a fairly high percentage).

To rule out the possibility of systematic upward biases in our sample, we performed a set of chi-squared tests using different measures. We first examine the population of innovative startups who have had access to the government-guaranteed (GG) bank loan program before the end of the survey – May 2016. In fact, Italian YICs have priority and simplified access to a GG bank loan fund which offers a partial public guarantee on bank loans. Data on the identity of beneficiaries were strictly confidential and made available by MISE to one of the author on a confidentiality basis and only for scientific purposes. Focusing on this population, we ran a chi-squared test of the null hypothesis that the group of survey respondents does not differ from the one of non-respondents. The result of the test ($\chi_{GG\ bank\ loan}^2 = 3.62$ ($p - value = 0.955$)) confirms that no statistically significant differences exist between the two.

Furthermore, 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 and age. See the MISE (2016) report for more details. We ran chi-squared tests between the surveyed population and the final sample of YICs and the results show high levels of representativeness of the latter (e.g. $\chi_{Nuts\ 2\ level}^2 = 0.46$ ($p - value = 1.000$), $\chi_{Age}^2 = 1.09$ ($p - value = 0.955$), $\chi_{NACE\ Rev.2}^2 = 4.54$ ($p - value = 0.999$)). The regional, yearly and sectoral distributions are shown in Table A1, Table A2 and Table A3, respectively. The assured representativeness of the sample alleviates possible concerns on the presence of systematic non-response biases in the survey.

Survivorship bias

Another concern with the data is a potential survivorship bias since the companies are not sampled at their birth. Instead, we are able to include in the survey only the companies that had survived until the moment of the survey, and we are not able to recover the information on the companies that had failed to that date. These unobserved (failed) companies might have different characteristics from the ones we can observe. Moreover, for the same reason, we have an unbalanced representativeness of the companies with respect to their age – we probably have more nascent companies than companies

that are 4-5 years old (as it is legitimate to expect that a higher number of old rather than young companies had failed before the survey was conducted).

There are two mechanisms that could be in place due to this bias in our context. The first one is based on evolutionary and competence-based theories of the firm and would work in favor of our findings. Namely, the entrepreneurship literature has argued and shown that companies founded by high human capital founders survive longer (i.e. fail less) than the companies founded by low human capital founders (e.g. Unger et al. 2011). If that was the case, high human capital founders would indeed be overrepresented in the older companies (and hence the ones founded before the reform), and would bias the results against (and not in favor of) our findings. The second mechanism is more concerning, though less probable. In that alternative scenario, high human capital founders are more prone and faster to fail their startups and move on to other more promising labor options such as employment or another more promising entrepreneurial opportunity (e.g. Gimeno et al. 1997). If that was the case, high human capital founders would indeed be underrepresented in the older companies (and hence the ones founded before the reform), and could potentially falsely bias our results in the direction of our findings.

In order to assure that our findings are indeed not driven by this unavoidable discrepancy, we run several tests. First, we try to infer the failure (survival) hazard of the companies in our sample based on their observable characteristics. We add to our data information on the survival of companies exactly one year after the survey took place (May 2017) drawing from AIDA database (provided by Bureau Van Dijk which reports complete financial accounting data for public and private Italian firms), and conduct a two-stage procedure. We first regress this dichotomous variable on a set of features of founders and their companies using a probit estimator, which allows us to estimate the Inverse Mills ratio (IMR). Then, at the second stage, we repeat all the estimations from the main analysis adding the IMR variable in the specification, controlling for the probability of failure. The obtained results stay almost unchanged, while the coefficient of IMR yields to be insignificant (for a snapshot of results see Table A4).

Second, we use the same information to run a Monte Carlo simulation exercise based on semi-random deletion of companies from our sample, with the goal of making a more balanced dataset that reassembles the one without any survivorship bias. In order to do so, by looking into the newly added information on the survival of companies to May 2017, we approximate the probability of survival of the companies conditional on their age (see Table A5). The survival rates are relatively higher than the ones available in general statistics, which is to be expected for innovative companies (Colombelli et al., 2016). Using this information, we randomly, yet disproportionately (depending on their age) eliminate companies from our sample in such a way to have a more comparable number of companies for each age group (we eliminate to a lesser degree the older companies, as they are already underrepresented in our sample; for example, we eliminate more than 20% of the companies founded in 2015, and only 2.4% of companies founded in 2011) and repeat the full analysis. We reiterate this exercise for a number of times (we used 50 repetitions) and then average out the key result of interest related to human capital (see the average coefficient value, standard error and p-value in Table A6). Furthermore, in order to address the second mechanism that could adversely bias our results, we also created a scenario with unbalanced failures of founders with high versus low human capital (2 times more failures of the former). The results of this check are presented in Table A7. In either case, we obtained the same findings as in the main analysis, assuring the survivorship bias is not confounding them.

Last but not least, our before-and-after analysis with different time windows (see Table 4 in the paper for more details) also points in the direction of no serious issue caused by the survivorship bias. Thus, concerns regarding the issue of survivorship bias should be fairly minimized.

Additional descriptive statistics

We now provide some additional descriptive statistics on the sample respect to those already highlighted in the main text (see Table 2). Table A8 provides means and standard deviations, along with information about the significant differences between two subsamples – entrepreneurs who founded their ventures before (538) and after (3517) the reform. It is noteworthy that there is an

increase in women entrepreneurs after the reform, from 14.5% to almost 19%. More importantly, Figure A1 compares the year-by-year percentages of low and high human capital founders along the foundation years, and we use the median value of the variable *Human capital* to identify the two groups. As appears to be evident, the prereform trends in the two categories appear to be relatively similar, while things seem to abruptly change starting from immediately after the reform for both groups. Figure A2 goes deeper and suggests the idea that the industrial policy reform produced a wedge only for a specific typology of entrepreneurs. Indeed, while the year-by-year (average) value of the variable *Generic human capital* is relatively similar before and after the reform, an upsurge seems to be traceable only for what concerns the variable *Specific human capital* after 2012.

ROBUSTNESS ANALYSES AND ADDITIONAL EVIDENCE

A first preliminary worrying issue in our empirical setting is the fact that other important contextual factors beside the analyzed policy reform could have driven our results. The key assumption we are making is that the distribution of human capital in the Italian population is remaining fairly unchanged over the entire time window of analysis (in principle, from year 2009 to 2015). This assumption is rather credible, as no other major reform has been put in place that could influence human capital in Italy. Nevertheless, besides the check already exposed in Table 4 to further cope with this potential issue, we also run our models introducing a new control, i.e. *Regional education difference*, computed as the difference between 2009 and 2015 in the percentage of adults (from 24 to 65 years old) who possess a higher education degree (at least a bachelor degree) along the NUTS2 regions in Italy (source: ISTAT). As shown in Table A9, the variable proves to be largely insignificant, leaving unaffected all our findings.

To further assure the robustness of the findings, we perform several additional robustness tests and provide interesting additional evidence on the dynamics at issue.

First, we repeat all key estimations by excluding from the sample the founders who founded ventures in the period around the reform (the opposite from the before-and-after exercise with different time windows exposed in Table 4). In particular, we leave out founders who created their

ventures in the immediate pre- and post-neighborhood of the reform (six months before and after November 2012). By doing this, we rule out the possibility that prereform 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 one of the highest rate of cabinet turnover in Western Europe in the last fifty years, see, for instance, Curini 2011). The obtained results presented in Table A10 are fully in line with the results obtained on the complete sample, which provides further support on the reliability of the findings.

Second, we look deeper into the specific human capital variable to discover which features of experience truly matter in the context of our study. Therefore, we break down specific human capital into its two components: work experience in the same sector of new venture's activity and entrepreneurial experience. The main findings exposed in Table A11 are unchanged – the industrial policy reform does indeed increase the propensity of individuals with the experience in the same sector of activity as well as serial entrepreneurs to found new ventures. This result rules out the possibility that our results are driven by serial entrepreneurs only and that the policy reform had simply allowed them to fail faster and create new business ventures. Though serial entrepreneurship is also a relevant phenomenon, our analysis points to the power of the reform to attract new highly skilled individuals to start their own ventures. Furthermore, the survey questionnaire asked respondents to categorize their previous professional conditions in several ways, including role, function, sector-specific experience. In first instance, variables related to professional experience were made continuous in years by taking into account the age of the entrepreneurs at founding time and considering the time of their (eventual) entry into the labor market. This specific operationalization choice, which accounts for the importance of the length of experience, may also

be sensitive to extreme (unlikely) values in the variables of interest. To cope with this problem, we re-estimate the main model of equation (1), by winsorizing the variables capturing generic and specific human capital at the cut off levels of the 10th and 90th percentiles of the corresponding variables, thus creating the new independent variables *Generic human capital –winsorized* and *Specific human capital –winsorized*. Also in this case the results shown in Table A11 confirm the increase in the human capital of founders after the reform.

Finally, we unpack the growth instruments put in place by the industrial policy reform.

First, we group them in two major categories – funding instruments and labor instruments. The distinction seems relevant for two reasons. On the one hand, funding is widely argued to be one of the key obstacles for growing companies and decreasing the monetary burden of scaling a business could be perceived by highly skilled individuals as decisive to found a new innovative venture. On the other hand, highly skilled founders might find acquisition of employees endowed with high human capital very challenging, since their startup could be perceived as less attractive than other employment options, given the untested nature of the business idea that they propose and the lack of a track record for the new born firm. Funding instruments encompass incentives for equity investors, debt providers and equity crowdfunding. Labor instruments comprise flexible labor regulations, performance-based, stock or equity employee compensation options, and tax credit for the employment of highly skilled personnel (see again Table 1). The obtained results are presented in Table A12. Both types of growth instruments appear to be relevant in attracting high specific human capital founders.

Second we focus on a specific growth instrument which was deemed particularly important (see Giraud et al. 2019): GG bank loans. By exploiting data on the use by innovative startups of such specific measure provided by respondents of the survey, we also explore whether the relationship between human capital and access to this specific financial measure is different for startups born after the reform from those created before the policy. For this purpose, two subsamples were created, formed by innovative startups before and after the reform, respectively. The results of the probit

analyses presented in Table A13 display that postreform founders endowed with better human capital have overall slightly higher chances to obtain a GG bank loan. Furthermore, the postreform entrepreneurs with high specific human capital are the only ones to exhibit a significant (at the 5% level) higher probability to obtain a GG bank loan. Conversely, we cannot observe the same pattern for the entrepreneurs of the startups founded before the reform. Results are also confirmed, once we take into consideration the number of GG bank loans granted per startup (source: MISE) and run two separate OLS regressions for the two subsamples. Overall, these findings are in line with the main analysis, since they show that the reduction of growth barriers – as funding instruments - create an appealing environment especially for those individuals who decide to become entrepreneurs after the reform and who have high specific human capital.

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TABLES AND FIGURES

Table A1. Regional distribution of the companies in the final sample (1,769 firms) and the surveyed population (5,150 firms)

No.	Region (Nuts 2)	Final sample (%)	Population (%)
1	Abruzzo	2.39	2.27
2	Basilicata	0.74	0.68
3	Calabria	2.19	2.35
4	Campania	6.03	6
5	Emilia-Romagna	11.23	11.13
6	Friuli-Venezia Giulia	2.16	2.52
7	Lazio	10.22	9.94
8	Liguria	1.74	1.61
9	Lombardia	22.84	22.12
10	Marche	5.61	4.8
11	Molise	0.44	0.39
12	Piemonte	6.09	6.74
13	Puglia	3.96	3.84
14	Sardegna	2.63	2.64
15	Sicilia	4.82	4.68
16	Toscana	5.52	5.67
17	Trentino-Alto Adige	2.9	3.4
18	Umbria	1.39	1.48
19	Valle D'Aosta	0.21	0.21
20	Veneto	6.91	7.53
Chi-squared test		$\chi^2_{Nuts\ 2\ level} = 0.46$	$p - value = 1.000$

Table A2. Yearly distribution of the companies (birth's date) in the final sample (1,769 firms) and the surveyed population (5,150 firms)

No.	Year of birth	Final sample (%)	Population (%)
1	(2009) - 2010	0.28	0.52
2	2011	5.38	4.80
3	2012	8.73	9.15
4	2013	17.96	19.78
5	2014	33.94	29.78
6	2015	33.71	35.97
Chi-squared test		$\chi^2_{Age} = 1.09$	$p - value = 0.955$

Table A3. Sectoral distribution of the companies in the final sample (1,769 firms) and the surveyed population (5,150 firms)

No.	Sector of activity (NACE Rev. 2)	Final sample (%)	Population (%)
1	A 01	0.06	0.23
2	A 02	0.005	0.06
3	C 10	0.34	0.6
4	C 11	0.11	0.08
5	C 13	0.17	0.19
6	C 14	0.23	0.25
7	C 15	0.11	0.25
8	C 16	0.23	0.27
9	C 17	0.11	0.17
10	C 18	0.06	0.14
11	C 20	0.91	0.74
12	C 21	0.28	0.23
13	C 22	0.74	0.54
14	C 23	0.17	0.21
15	C 24	0.005	0.21
16	C 25	0.91	0.6
17	C 26	4.48	3.84
18	C 27	1.76	2.14
19	C 28	3.91	3.36
20	C 29	0.34	0.45
21	C 30	0.91	0.83
22	C 31	0.11	0.31
23	C 32	1.36	1.26
24	C 33	0.34	0.35
25	D 35	1.02	1.2
26	E 36	0.06	0.02
27	E 38	0.06	0.35
28	E 39	0.005	0.08
29	F 41	0.23	0.31
30	F 42	0.005	0.04
31	F 43	0.79	0.76
32	G 45	0.06	0.14
33	G 46	1.53	1.84
34	G 47	2.1	2.33
35	H 49	0.005	0.02
36	H 52	0.06	0.25
37	H 53	0.17	0.12
38	I 55	0.005	0.06
39	I 56	0.17	0.39
40	J 58	1.93	2.19
41	J 59	0.45	0.54
42	J 60	0.17	0.08
43	J 61	0.68	0.54
44	J 62	31.56	30.19
45	J 63	7.14	8.19
46	K 64	0.11	0.14
47	K 66	0.005	0.04
48	M 69	0.005	0.12
49	M 70	3.57	2.97
50	M 71	4.31	3.44
51	M 72	15.98	15.18
52	M 73	1.13	1.55
53	M 74	4.42	3.84
54	M 75	0.005	0.02
55	N 77	0.68	0.5
56	N 78	0.06	0.1
57	N 79	0.45	0.76
58	N 80	0.005	0.02
59	N 81	0.11	0.04
60	N 82	1.42	1.86
61	P 85	0.57	0.64
62	Q 86	0.28	0.27
63	Q 87	0.005	0.06
64	Q 88	0.45	0.31
65	R 90	0.17	0.19
66	R 91	0.06	0.04
67	R 93	0.11	0.16
68	S 95	0.11	0.04
69	S 96	0.17	0.27
Chi-squared test		$\chi^2_{NACE Rev.2} = 4.54$	$p - value = 0.999$

Table A4. Two-stage logit and pooled logit models based on Inverse Mills ratio estimated from the Startup Act dataset

Analysis type Model Dep. variable	Logit (A4a) <i>Founded after reform</i>	Pooled logit (A4b) <i>Foundation</i>
<i>Generic human capital</i>	0.011 (0.007) [0.126]	-0.009 (0.006) [0.126]
<i>Specific human capital</i>	0.019*** (0.006) [0.002]	-0.011** (0.004) [0.012]
<i>Post reform</i>		1.750*** (0.140) [0.000]
<i>Post reform</i> <i>x Generic human capital</i>		0.011 (0.007) [0.125]
<i>Post reform</i> <i>x Specific human capital</i>		0.014** (0.005) [0.012]
<i>International experience</i>	-0.088 (0.111) [0.428]	0.001 (0.001) [0.355]
<i>Gender male</i>	-0.344** (0.165) [0.037]	0.001 (0.001) [0.386]
<i>Parent entrepreneur</i>	0.066 (0.171) [0.700]	0.001 (0.001) [0.190]
<i>Founding team size</i>	0.087* (0.047) [0.062]	0.001 (0.001) [0.636]
<i>GDP per capita</i>		0.001*** (0.000) [0.000]
<i>TEA</i>	25.606*** (9.814) [0.009]	13.864*** (2.798) [0.000]
<i>Inverse Mills ratio (IMR)</i>	0.947 (0.905) [0.295]	0.014 (0.013) [0.299]
<i>Const.</i>	-2.662 (2.309) [0.249]	-44.032*** (3.557) [0.000]
Industry dummies	Included	Included
Regional dummies	Included	Included
Observations	3420	28353
Founders	3420	4051
Companies	1497	1766
Log. likelihood	-1304.527	-9507.832
Pseudo R ² / Wald Chi ²	0.120	0.182

Notes: The reported standard errors (in parenthesis) are robust standard errors clustered by company. *p*-values are shown in square brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A5. Survival rates based on the extended Startup Act Survey dataset

Survival rate	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6
May 2016 - May 2017	93.6%	95.0%	95.1%	94.1%	96.3%	97.6%
Cumulative	93.6%	88.9%	84.6%	79.6%	76.6%	74.8%

Notes: Cumulative survival rate is approximated based on the survival rates from May 2016 to May 2017.

Table A6. Simulation of the analysis after random exclusion of companies based on approximated age-by-age survival rates from the Startup Act dataset; 50 iterations

No.	Generic Human Capital			Specific Human Capital		
	Coefficient	St. Err.	p-value	Coefficient	St. Err.	p-value
1	0.0111088	0.0075821	0.1428859	0.0181881	0.0058839	0.0019937 ***
2	0.0105697	0.007673	0.1683561	0.0167096	0.0058684	0.0044081 ***
3	0.0122635	0.007625	0.1077662	0.0189298	0.0058598	0.0012359 ***
4	0.0104812	0.0074035	0.156861	0.0178461	0.0058121	0.0021368 ***
5	0.012575	0.0077298	0.1037752	0.0179256	0.0057961	0.0019835 ***
6	0.0110053	0.0075656	0.1457654	0.0182011	0.0057822	0.0016451 ***
7	0.0112286	0.0075501	0.1369599	0.01637	0.0058133	0.004863 ***
8	0.0102438	0.0075662	0.175769	0.0186411	0.0058163	0.0013507 ***
9	0.0107825	0.0076206	0.1570932	0.0177529	0.0058419	0.0023744 ***
10	0.0097564	0.0076729	0.2035366	0.0171589	0.0058416	0.0033099 ***
11	0.011672	0.007606	0.1248875	0.0166659	0.0057509	0.003756 ***
12	0.0106384	0.0075649	0.1596422	0.0154107	0.0058187	0.0080862 ***
13	0.0104613	0.0075678	0.1668671	0.0168561	0.0057814	0.0035504 ***
14	0.011824	0.0077708	0.1281079	0.016151	0.0057892	0.0052729 ***
15	0.0114658	0.0076943	0.1361783	0.0178488	0.0058449	0.0022599 ***
16	0.0121988	0.0077708	0.1164593	0.0188147	0.0058127	0.0012086 ***
17	0.0112293	0.0073388	0.1259836	0.0165606	0.0058221	0.0044488 ***
18	0.0103663	0.0074731	0.1653931	0.0170567	0.0058137	0.0033475 ***
19	0.0105339	0.0075104	0.1607444	0.0163079	0.0058386	0.0052205 ***
20	0.0120906	0.0076201	0.1125868	0.0171359	0.0058147	0.0032086 ***
21	0.0105604	0.0075691	0.1629541	0.0164916	0.0058364	0.0047189 ***
22	0.013357	0.0074739	0.0739134 *	0.0183472	0.0058114	0.0015934 ***
23	0.0121571	0.0076357	0.1113541	0.0174125	0.0057885	0.0026289 ***
24	0.0112775	0.0074179	0.1284332	0.0174677	0.0057833	0.0025247 ***
25	0.0134703	0.0077714	0.0830412 *	0.0184455	0.0057462	0.0013272 ***
26	0.0078969	0.0075734	0.2970788	0.0158003	0.0057999	0.0064452 ***
27	0.0110698	0.0076328	0.1469775	0.0177494	0.0058122	0.0022595 ***
28	0.0099536	0.0075063	0.184826	0.01644	0.0058025	0.0046078 ***
29	0.0135676	0.0074673	0.0692276 *	0.0183236	0.0058797	0.0018305 ***
30	0.0105309	0.0075517	0.1631621	0.0162831	0.0058084	0.005057 ***
31	0.0092354	0.0073831	0.2109777	0.0151693	0.0058394	0.0093838 ***
32	0.0116276	0.0075963	0.1258464	0.0163763	0.0058156	0.0048634 ***
33	0.0121324	0.0076603	0.1132412	0.016658	0.0058495	0.0044029 ***
34	0.0125313	0.0077193	0.1045099	0.0169809	0.0059078	0.0040491 ***
35	0.0095592	0.0075697	0.2066497	0.0168516	0.0058152	0.0037574 ***
36	0.0100151	0.0076254	0.1890515	0.0169886	0.0058716	0.0038119 ***
37	0.0099584	0.007563	0.1879352	0.0157283	0.0057476	0.0062096 ***
38	0.0106121	0.0075623	0.1605318	0.0168902	0.0058574	0.0039323 ***
39	0.0103162	0.007525	0.1703972	0.0161641	0.0058127	0.0054219 ***
40	0.0112659	0.0075991	0.1381986	0.0163835	0.0057421	0.0043278 ***
41	0.0142479	0.0077038	0.0643919 *	0.0203842	0.0058548	0.0004984 ***
42	0.0117178	0.0076774	0.1269446	0.0161837	0.0058435	0.0056138 ***
43	0.0121086	0.0075324	0.1079395	0.0163748	0.0057823	0.0046274 ***
44	0.0103593	0.0074972	0.1670468	0.0176016	0.0058765	0.002742 ***
45	0.0094881	0.0074748	0.2043196	0.0172765	0.0059334	0.0035945 ***
46	0.0121779	0.0077156	0.1144823	0.0163235	0.005906	0.0057116 ***
47	0.0107535	0.0076646	0.1606133	0.0170492	0.0059053	0.003888 ***
48	0.0131516	0.0078264	0.0928778 *	0.0168077	0.0058713	0.0042004 ***
49	0.0112701	0.0076779	0.1421401	0.0179978	0.0058394	0.0020553 ***
50	0.0101064	0.0075597	0.1812636	0.017348	0.0058623	0.0030839 ***
Average	0.0111794	0.0075928	0.1457189	0.0171366	0.0058281	0.0036966 ***

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A7. Simulation of the analysis after random exclusion of companies biased toward elimination of two times more companies endowed with high human capital than the ones with low human capital, based on approximated age-by-age survival rates from the Startup Act dataset; 50 iterations

No.	Generic Human Capital			Specific Human Capital		
	Coefficient	St. Err.	p-value	Coefficient	St. Err.	p-value
1	0.0105958	0.0075577	0.1609194	0.016724	0.0057886	0.0038631 ***
2	0.01057	0.0077471	0.1724507	0.0167118	0.0058009	0.0039656 ***
3	0.0094885	0.0076564	0.2152383	0.015368	0.0058544	0.0086639 ***
4	0.0102558	0.0075034	0.1716792	0.0156998	0.0057289	0.0061351 ***
5	0.0072352	0.0076559	0.3446335	0.0136088	0.0058185	0.0193414 **
6	0.0087205	0.0075627	0.2488703	0.0153872	0.0058842	0.0089224 ***
7	0.0087075	0.0074097	0.2399364	0.0155998	0.0058923	0.0081088 ***
8	0.009632	0.0076321	0.2069356	0.0148186	0.0058603	0.0114509 **
9	0.0084114	0.0077002	0.2746776	0.0151367	0.0059679	0.0112008 **
10	0.0100393	0.0077103	0.1928947	0.0157314	0.0057938	0.006623 ***
11	0.0086487	0.0075373	0.2511903	0.0142582	0.0057403	0.0129969 **
12	0.010363	0.007537	0.169148	0.0164397	0.0058	0.0045907 ***
13	0.0095616	0.007642	0.2108659	0.0165539	0.0058569	0.0047074 ***
14	0.0082948	0.0075499	0.2719122	0.0151469	0.0058489	0.0096055 ***
15	0.009229	0.0075694	0.2227494	0.0150732	0.0058103	0.0094809 ***
16	0.0100285	0.0075637	0.1848818	0.0157706	0.0058976	0.0074939 ***
17	0.0099013	0.0075535	0.189919	0.0158429	0.0058159	0.0064486 ***
18	0.0083719	0.0074306	0.2598808	0.0154158	0.0058664	0.0085937 ***
19	0.0085757	0.0074549	0.2500006	0.0140776	0.0057063	0.013623 **
20	0.0099739	0.0076123	0.1901134	0.0162965	0.005892	0.0056774 ***
21	0.0100156	0.0077184	0.1944187	0.0156515	0.0057979	0.0069439 ***
22	0.0075953	0.007533	0.3133245	0.016172	0.0057129	0.0046434 ***
23	0.0080292	0.0076244	0.2922961	0.0156641	0.0059793	0.0088004 ***
24	0.0088001	0.007488	0.2399012	0.0148327	0.0059293	0.0123634 **
25	0.0072782	0.0075371	0.33422	0.0163393	0.0058456	0.0051874 ***
26	0.0124731	0.0076913	0.104866	0.0163264	0.0057911	0.0048136 ***
27	0.0108536	0.0076458	0.155738	0.0150588	0.0058073	0.0095122 ***
28	0.0089307	0.0074159	0.2284901	0.0161997	0.0057903	0.0051462 ***
29	0.0065837	0.0074303	0.3755784	0.0148404	0.0057871	0.0103349 **
30	0.01021	0.007569	0.1773649	0.0161198	0.0058084	0.0055156 ***
31	0.0091356	0.0075231	0.2246143	0.0170335	0.0058352	0.0035103 ***
32	0.0095546	0.007665	0.2125734	0.0139358	0.0057925	0.0161357 **
33	0.0120324	0.0076417	0.1153539	0.0169218	0.0058753	0.0039745 ***
34	0.0084099	0.0076666	0.2726612	0.016754	0.0059186	0.0046438 ***
35	0.0102122	0.0076437	0.1815378	0.0155224	0.0058494	0.0079623 ***
36	0.0109004	0.0077064	0.157226	0.0172088	0.0058672	0.0033563 ***
37	0.0091529	0.0074972	0.2221479	0.0150006	0.0058402	0.0102132 **
38	0.0081292	0.0075366	0.2807535	0.014927	0.0057259	0.0091354 ***
39	0.0107005	0.0075929	0.1587529	0.0151558	0.0058333	0.0093726 ***
40	0.0080684	0.0075994	0.288363	0.0140788	0.0059097	0.0172031 **
41	0.0100961	0.0077244	0.191198	0.0143444	0.0057202	0.0121537 **
42	0.0104131	0.0076442	0.1731249	0.0156988	0.0060039	0.0089286 ***
43	0.0091219	0.0077008	0.2361957	0.0150352	0.0058253	0.0098512 ***
44	0.0095075	0.0074215	0.2001641	0.015513	0.0057841	0.0073176 ***
45	0.0082583	0.0076456	0.2800845	0.0147236	0.0058446	0.0117621 **
46	0.0091151	0.007523	0.225654	0.0154902	0.005739	0.0069529 ***
47	0.0091596	0.0074596	0.2194859	0.0147486	0.0058426	0.0115926 **
48	0.0107666	0.0075872	0.1558881	0.0152443	0.0057924	0.0084943 ***
49	0.0086732	0.0075486	0.2505628	0.0166221	0.0059498	0.0052107 ***
50	0.0102499	0.0076117	0.1781095	0.0161478	0.0058422	0.0057095 ***
Average	0.0093806	0.0075836	0.2213909	0.0155395	0.0058333	0.0083647 ***

Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A8. Statistical difference between the two groups of founders on the key variables

Variable	Founded before reform (No. of founders: 538; No. of observations: 3,762)		Founded after reform (No. of founders: 3,517; No. of observations: 24,619)		Difference after vs. before reform (p-value)
	Mean	St. Dev.	Mean	St. Dev.	
Human capital	18.086	11.149	19.584	12.006	+ (0.000)
Generic human capital	9.244	9.246	9.505	9.991	0 (0.132)
Specific human capital	8.842	11.020	10.079	12.769	+ (0.000)
International experience	0.319	0.567	0.321	0.591	0 (0.822)
Gender male	0.855	0.352	0.813	0.390	- (0.000)
Parent entrepreneur	0.188	0.391	0.194	0.396	0 (0.344)
Founding team size	2.701	1.588	2.943	2.132	+ (0.000)

Table A9. Robustness analysis of the baseline results with an additional control in models specifications

Analysis type Dep. variable	Logit model <i>Founded after reform</i>	Pooled logit model <i>Foundation</i>
<i>Generic human capital</i>	0.011 (0.008) [0.131]	-0.005 (0.003) [0.122]
<i>Specific human capital</i>	0.017*** (0.006) [0.003]	-0.009*** (0.003) [0.001]
<i>Post growth reform</i>		1.713*** (0.061) [0.000]
<i>Post growth reform</i> <i>x Generic human capital</i>		0.006* (0.003) [0.075]
<i>Post growth reform</i> <i>x Specific human capital</i>		0.009*** (0.003) [0.001]
<i>International experience</i>	-0.076 (0.111) [0.495]	-0.018 (0.017) [0.304]
<i>Gender male</i>	-0.381** (0.160) [0.017]	0.061*** (0.021) [0.004]
<i>Parent entrepreneur</i>	-0.003 (0.152) [0.986]	-0.050** (0.021) [0.018]
<i>Founding team size</i>	0.087* (0.047) [0.063]	-0.023*** (0.007) [0.000]
<i>GDP per capita</i>		0.001 *** (0.000) [0.000]
<i>TEA</i>	27.428*** (9.489) [0.004]	15.370 *** (2.497) [0.000]
<i>Regional education difference</i>	-161.346 (131.259) [0.219]	-68.157 (54.684) [0.213]
<i>Const.</i>	1.858 (3.171) [0.558]	-45.602*** (3.036) [0.000]
Industry dummies	Included	Included
Regional dummies	Included	Included
Observations	3420	28381
Founders	3420	4055
Companies	1497	1769
Log. likelihood	-1311.527	-9472.087
(Pseudo) R ²	0.115	0.186

Notes: For the sake of synthesis only representative estimates of model (3b) (Table 3) and model (5d) (Table 5) are here presented. The reported standard errors (in parenthesis) are robust standard errors clustered by company. p-values are shown in square brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A10. Robustness analysis of the baseline results based on a sample that excludes founders that founded firms in the period just before or just after the reform (6-month window)

Analysis type Dep. variable	Logit model <i>Founded after reform</i>	Pooled logit model <i>Foundation</i>
<i>Generic human capital</i>	0.012 (0.010) [0.221]	-0.006 (0.004) [0.109]
<i>Specific human capital</i>	0.021*** (0.007) [0.003]	-0.012*** (0.003) [0.000]
<i>Post growth reform</i>		1.842*** (0.069) [0.000]
<i>Post growth reform</i> <i>x Generic human capital</i>		0.007* (0.004) [0.072]
<i>Post growth reform</i> <i>x Specific human capital</i>		0.011*** (0.003) [0.000]
<i>International experience</i>	0.011 (0.140) [0.939]	-0.032* (0.019) [0.093]
<i>Gender male</i>	-0.293 (0.186) [0.116]	0.060*** (0.023) [0.010]
<i>Parent entrepreneur</i>	-0.016 (0.194) [0.932]	-0.054** (0.023) [0.020]
<i>Founding team size</i>	0.110* (0.063) [0.081]	-0.025*** (0.007) [0.000]
<i>GDP per capita</i>		0.001 *** (0.000) [0.000]
<i>TEA</i>	87.483*** (16.650) [0.000]	13.076 *** (2.373) [0.000]
<i>Const.</i>	-6.322 ** (2.748) [0.021]	-39.225*** (3.158) [0.000]
Industry dummies	Included	Included
Regional dummies	Included	Included
Observations	2784	24825
Founders	2784	3286
Companies	1212	1543
Log. likelihood	-852.423	-8207.5778
(Pseudo) R ²	0.202	0.193

Notes: For the sake of synthesis only representative estimates of model (3b) (Table 3) and model (5d) (Table 5) are here presented. The reported standard errors (in parenthesis) are robust standard errors clustered by company. p-values are shown in square brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A11. Robustness analysis on the operationalization of human capital variables

Analysis type Dep. variable	Logit model <i>Founded after reform</i>	Logit model <i>Founded after reform</i>
<i>Generic human capital</i>	0.012 (0.008) [0.109]	
<i>Specific work experience</i>	0.014** (0.006) [0.019]	
<i>Entrepreneurial experience</i>	0.030*** (0.010) [0.004]	
<i>Generic human capital winsorized</i>		0.016* (0.010) [0.085]
<i>Specific human capital winsorized</i>		0.018** (0.007) [0.013]
<i>International experience</i>	-0.080 (0.110) [0.467]	-0.072 (0.111) [0.514]
<i>Gender male</i>	-0.385** (0.160) [0.016]	-0.367** (0.159) [0.021]
<i>Parent entrepreneur</i>	-0.014 (0.152) [0.927]	-0.009 (0.152) [0.951]
<i>Founding team size</i>	0.089* (0.047) [0.057]	0.087* (0.047) [0.065]
<i>TEA</i>	27.483*** (9.445) [0.004]	27.416*** (9.481) [0.004]
<i>Const.</i>	1.566 (1.706) [0.359]	1.559 (1.685) [0.355]
Industry dummies	Included	Included
Regional dummies	Included	Included
Observations	3420	3420
Founders	3420	3420
Companies	1497	1497
Log. likelihood	-1309.526	-1313.05
(Pseudo) R ²	0.116	0.114

Notes: The reported standard errors (in parenthesis) are robust standard errors clustered by company. p-values are shown in square brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A12. Additional evidence on growth reform impact that is broken down into funding instruments and labor instruments

Analysis type Dep. variable	Logit <i>Founded after growth reform – funding</i>	Logit <i>Founded after growth reform – labor</i>
<i>Generic human capital</i>	0.001 (0.005) [0.907]	0.006 (0.005) [0.240]
<i>Specific human capital</i>	0.010 ** (0.004) [0.024]	0.008 ** (0.004) [0.041]
<i>International experience</i>	0.068 (0.083) [0.413]	0.074 (0.080) [0.357]
<i>Gender male</i>	-0.221 ** (0.105) [0.036]	-0.140 (0.101) [0.167]
<i>Parent entrepreneur</i>	0.238 ** (0.103) [0.021]	0.176 * (0.099) [0.076]
<i>Founding team size</i>	0.067 (0.045) [0.113]	0.079 ** (0.035) [0.025]
<i>TEA</i>	7.534 (3.356) [0.160]	9.349 * (4.931) [0.058]
<i>Const.</i>	-0.177 (1.532) [0.908]	2.122 (1.982) [0.285]
Industry dummies	Included	Included
Regional dummies	Included	Included
Observations	3890	3953
Founders	3890	3953
Companies	1689	1724
Log. likelihood	-2356.4992	-2495.0563
Pseudo R ² / Wald Chi ²	0.0929	0.0806

Notes: The reported standard errors (in parenthesis) are robust standard errors clustered by company. p-values are shown in square brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A13. Probit model on the access to GG bank loans for startups founded before and after the reform

Analysis type Dep. variable	Probit models <i>GG bank loan born before</i>		Probit models <i>GG bank loan born after</i>	
	<i>Human capital</i>	-0.001 (0.007) [0.941]		0.004 (0.003) [0.145]
<i>Generic human capital</i>		0.005 (0.009) [0.592]		-0.001 (0.003) [0.974]
<i>Specific human capital</i>		-0.004 (0.008) [0.612]		0.006** (0.003) [0.048]
<i>International experience</i>	-0.140 (0.118) [0.235]	-0.125 (0.118) [0.289]	-0.011 (0.053) [0.842]	-0.015 (0.053) [0.778]
<i>Gender male</i>	0.301 (0.206) [0.144]	0.312 (0.207) [0.131]	0.047 (0.077) [0.539]	0.038 (0.077) [0.622]
<i>Parent entrepreneur</i>	0.156 (0.166) [0.350]	0.153 (0.166) [0.358]	0.193 *** (0.071) [0.007]	0.199 *** (0.071) [0.005]
<i>Founding team size</i>	-0.171 ** (0.080) [0.033]	-0.170 ** (0.080) [0.034]	-0.054** (0.025) [0.035]	-0.052** (0.025) [0.042]
<i>TEA</i>	-4.381 (6.289) [0.486]	-4.141 (6.289) [0.510]	2.098 (2.148) [0.329]	2.102 (2.148) [0.328]
<i>Const.</i>	-0.585 (0.366) [0.110]	-0.626 * (0.372) [0.093]	-1.022*** (0.158) [0.000]	-0.997 *** (0.159) [0.000]
Observations	521	521	3394	3394
Founders	521	521	3394	3394
Companies	230	230	1482	1482
Log. Likelihood	-234.1802	-233.4919	-1563.6073	-1561.284
<i>Pseudo R²</i>	0.042	0.045	0.011	0.013

Notes: The reported standard errors (in parenthesis) are robust standard errors clustered by company.
p-values are shown in square brackets. ***, ** and * represent statistical significance at the 1%, 5% and 10% level.

Figure A1.
 Percentage of founders endowed with high and low human capital along foundation years
 The dashed vertical line separates prereform from postreform. Low vs. High HC identified by median value of *Human capital*.

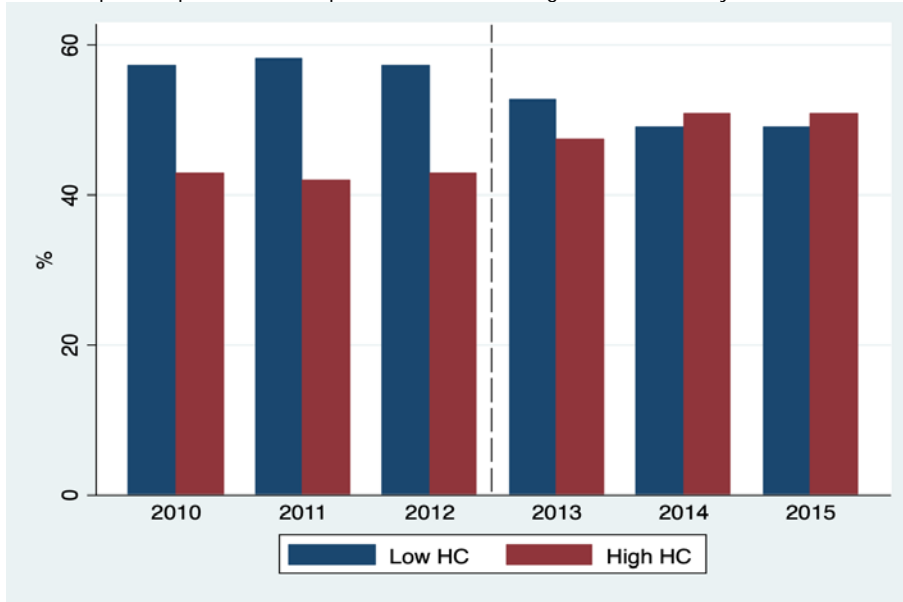


Figure A2.
 (Average) Generic vs. Specific human capital of founders (years of experience) along foundation years
 The dashed vertical line separates prereform from postreform.

