Do the rules of the game determine who is playing? Institutional Change, Entrepreneurship and Human Capital

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Starting point (1)

The entrepreneurial economy

(Audretsch, D. B., Keilbach, M. C., & Lehmann, E. E. (2006). *Entrepreneurship and economic growth*. Oxford University Press)

Starting point (2)

Baumol, William J., and Robert J. Strom. "Entrepreneurship and economic growth." Strategic entrepreneurship journal 1.3-4 (2007): 233-237.

Schumpeter mark I, Audretsch and others: knowledge spillover theory of entrepreneurship, Timmons and Spinelli 2003; Aghion and others: endogenous growth theory models Bruce A. Kirchhoff's various papers.

Starting point (3)

YICs needs policy's attention

2 reasons
(universally acknowledged)

They (may) invest less in R&D than the social optimum

Spillovers

(Nelson 1959, Arrow 1962, Teece 1986, Griliches 1992, Jaffe 1996).

They (may) be financially constrained

Capital market imperfections

(Storey and Tether 1998, Hall 2000, Carpenter and Petersen 2002; Revest and Sapio 2012)

Starting point (4)

WHICH POLICY INSTRUMENT(s)? (much less agreement, see e.g. Schneider and Veugelers, 2010).

Policy usually make their selection from a wide fan of instruments: direct funds targeted to startups, fiscal incentives for investors, equity and venture capital programmes, loan guarantee schemes, and others. Different governments at different latitudes opt for different instruments.

Scientific evidence is of course mixed on the efficacy of these instruments, depending on different institutional contexts (different techniques used in evaluation, etc.)

The key stylized fact

Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small Business Economics*, *33*(2), 141–149.

Acs, Z., Åstebro, T., Audretsch, D., and Robinson, D. T. (2016). Public policy to promote entrepreneurship: a call to arms. *Small Business Economics*, *47*(1), 35–51.

…….AMONG OTHERS (including myself, see argumentative paper in Industry and Innovation 2014)

QUALITY MORE THAN QUANTITY

Founders' HC IS KING

Cooper and Bruno 1977; Eisenhardt and Schoonhoven 1990; Shane 2000; Colombo and Grilli 2005, 2010; Ganotakis 2012 among many others

Can an institutional change (i.e. a new industrial policy mechanism) modify the incentives of talented individuals to opt for the entrepreneurial career in innovative sectors?

Can this effect materialize immediately?

Methodology – Quasi-natural experiment

- Regulatory change in Italy (2012) – "The Startup Act" intended to spark the national innovation ecosystem.
- Targeted Young Innovative Companies (YICs).
- Requirements:
  - <6 years old,
  - <€ 5m annual sales,
  - Not listed,
  - No corporate spin-off,
  - Innovative:
    - Tangible IP rights (e.g. patent, license);
    - R&D investments >15% of the revenues;
    - >1/3 of employees/founders must hold a PhD or >2/3 must have a master degree.

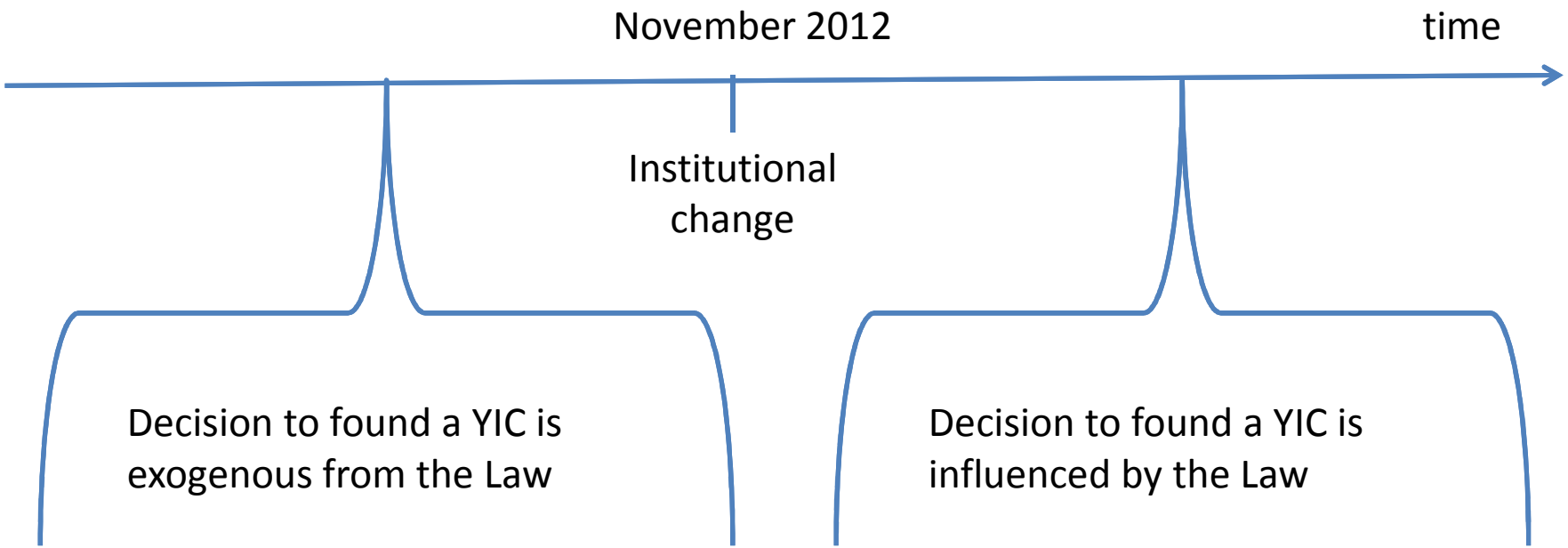
Methodology – Quasi-natural experiment

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	• Decrease of startup costs
	• Decrease of startup time (incorporation procedure simplification)
Growth instruments	• Flexible labour regulations (less rigid contract requirements)
	• Dynamic salary (performance-based compensation option)
	• Stock / equity compensation option
	• Tax credit for the employment of highly skilled personnel
	• Incentives for equity investors
	• Incentives for debt providers (government guaranteed bank loans)
	• Internationalization support
	• Incentives for equity crowdfunding
Exit instruments	• "Fail fast" procedure (simplification of liquidation procedure without suffering significant reputational and financial costs)

Methodology – Quasi-natural experiment

Retroactive nature of the mechanism: both firms born before and after the reform (provided that requirements are fulfilled) could gain the status of YIC and access the benefits



Hypotheses development

We ground on two recent papers by Eberhart, Eesley, and Eisenhardt (2016; *Org Sci*) and Eesley (2016; *Org Sci*) which analyze similar issues in the Asian context

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

***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.*

***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.*

Data

- **Survey** 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 the Italian National Institute of Statistics (ISTAT) in **April and May 2016**.
- The questionnaire enquired about
  - Human capital endowment of complete founding teams,
  - Innovation strategies,
  - Firm growth performances,
  - Entrepreneurs' assessment of the policy instruments.
- 5,150 eligible YICs (as of Dec 2015) were surveyed, 2,275 responded.
- **1,769 YICs (4,055 founders)** with complete information.
- The final sample is ensured to be representative of the population by chi-squared tests (i.e. firms' location, industry affiliation, age and legal status).

Descriptive statistics

- Location: 12.93% in Milan, 7.9% in Rome, 6.1% in Turin.
- Industry: 31.47% in IT, 17.54% in scientific research and development.
- No particular correlations are large in magnitude.

Variable	Founded before reform (No. of founders: 542)		Founded after reform (No. of founders: 3,513)		Statistically significant difference
	Mean	St. Dev.	Mean	St. Dev.	
Human capital	17.959	10.980	19.480	11.964	+ ***
Generic human capital	9.145	9.114	9.498	9.977	0
Specific human capital	8.813	10.945	9.982	12.710	+ ***
International experience	0.316	0.563	0.317	0.586	0
Gender male	0.851	0.356	0.812	0.390	– ***
Parent entrepreneur	0.183	0.387	0.194	0.396	0
Founding team size	2.683	1.584	2.961	2.333	+ ***
GDP per capita	35,378	639.539	35,378	639.362	0
TEA	0.035	0.021	0.041	0.021	+ ***
Age	3.390	0.512	0.842	0.791	– ***
Incubated	0.260	0.439	0.303	0.459	+ ***

Estimation methods

- **Hypotheses 1**

  Logit model, dependent variable dummy that equals 1 if a founder founded a company after the reform.

  Two specific robustness analyses:
  - Pooled logit model.
  - Cox event-history analysis (fairly flexible specification as it uses a semi-parametric estimation).

- **Hypothesis 2**

  The same procedures as for H1, only adjusted for the growth-related reform instruments only : dependent variable is a dummy that equals 1 if a founder founded a company after the reform and has used or intends to use its growth instruments.

  Three specific robustness analyses:
  - Pooled logit model.
  - Cox event-history analysis (fairly flexible specification as it uses a semi-parametric estimation).
  - Plus another pooled logit model, with two binary variables, one related to entry and one related to growth instruments.

- **Hypothesis 3**

  OLS estimation with log of sales in the last year of observation (2015) as the dep. variable.

  The interest is in the interaction terms between the human capital and growth-related reform variables.

  Three specific robustness analyses: we test whether the growth-related instruments of the reform impact high-growth ambitions of entrepreneurs:
  - R&D expenditures as percentage of total sales,
  - internationalization intentions
  - and the event of obtaining external funding (equity or debt)

Results – Hypothesis 1

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

Results – Hypothesis 1

- Zoom into the key results

Analysis type	Logit models	
Model	(1a)	(1b)
Dep. Variable	*Founded after reform*	
Human capital	0.015 ***	
	(0.005)	
	[0.005]	
Generic human capital		0.011
		(0.007)
		[0.131]
Specific human capital		0.017 ***
		(0.006)
		[0.003]

Ceteris paribus, an individual with **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** (in the benchmark case in our estimates: Rome and IT sector).

Results – Hypothesis 2

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

Results – Hypothesis 2

- Zoom into the key results

Analysis type Model Dep. variable	Logit models (4a) *Founded after growth reform*	 (4b)
Human capital	0.013 *** (0.004) [0.002]	
Generic human capital		0.007 (0.006) [0.189]
Specific human capital		0.016 *** (0.005) [0.000]

Ceteris paribus, the **increase** in the probability to opt for the entrepreneurial career for **highly skilled individuals** (with respect to individuals with low specific human capital) after the reform and **thanks to the decrease in growth barriers** is estimated to be equal to **+32.68%** (again in the benchmark case in our estimates: Rome and IT sector).

Results – Hypothesis 3

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

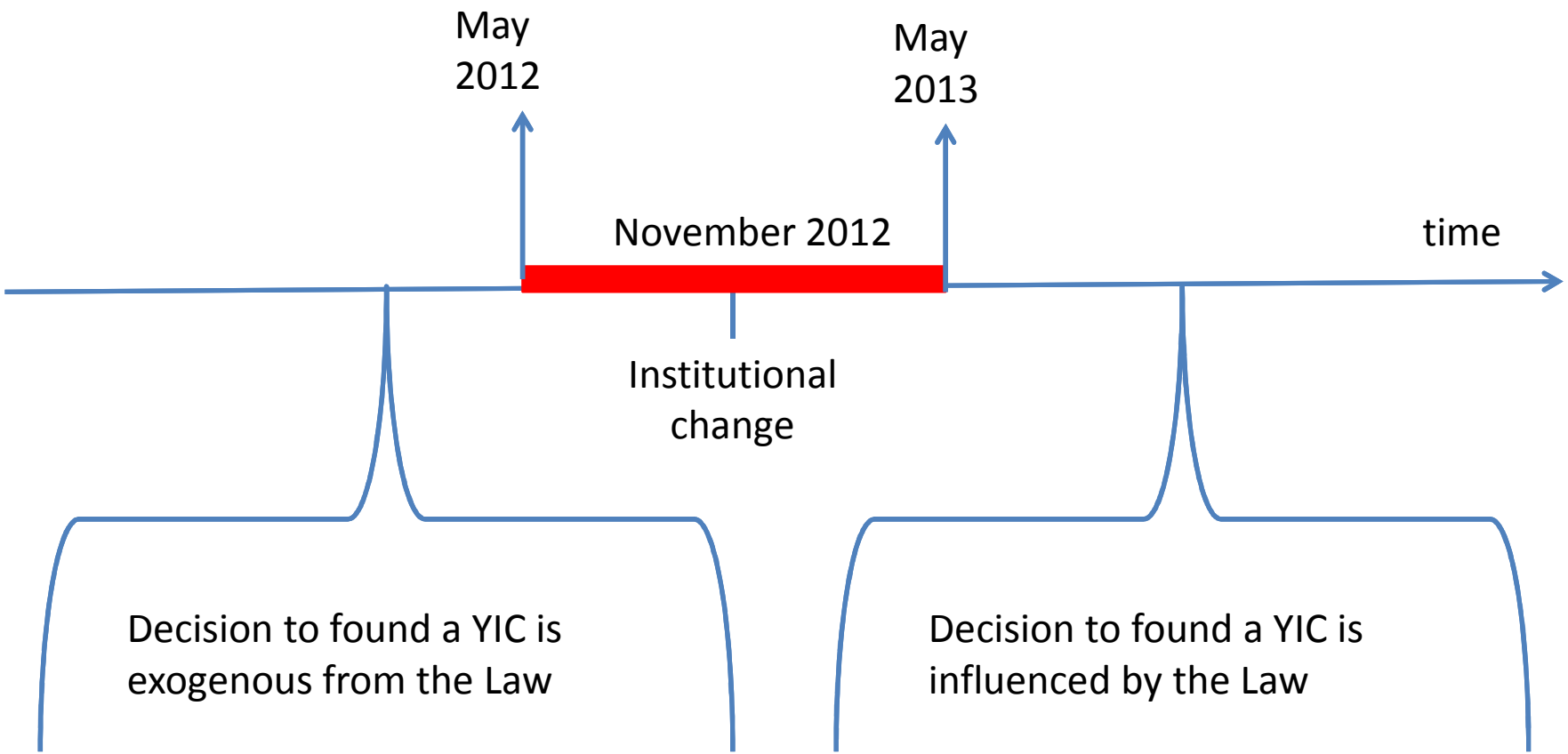
Results – Hypothesis 3

- Zoom into the key results

Analysis type Model Dep. variable	Ordinary Least Squares (9a) *Total sales log*	 (9b) 	Ordinary Least Squares (10a) *Total sales log*	 (10b)
Human capital	–0.014 (0.009) [0.106]		–0.018 ** (0.009) [0.040]	
Generic human capital		–0.025 * (0.015) [0.099]		–0.035 ** (0.016) [0.031]
Specific human capital		–0.008 (0.008) [0.282]		–0.012 (0.009) [0.157]
Founded after growth reform	–0.220 (0.246) [0.373]	–0.228 (0.257) [0.376]	–0.561 * (0.298) [0.060]	–0.578 * (0.304) [0.058]
Founded after growth reform x Human capital	0.019 * (0.010) [0.050]		0.023 ** (0.011) [0.038]	
Founded after growth reform x Generic human capital		0.021 (0.016) [0.179]		0.029 (0.018) [0.120]
Founded after growth reform x Specific human capital		0.017 * (0.009) [0.079]		0.020 * (0.011) [0.063]

Ceteris paribus, moving the variable ***Specific human capital*** **from its 10° to the 90° percentile** leads to an **increase in sales performance of +23%** after the reform.

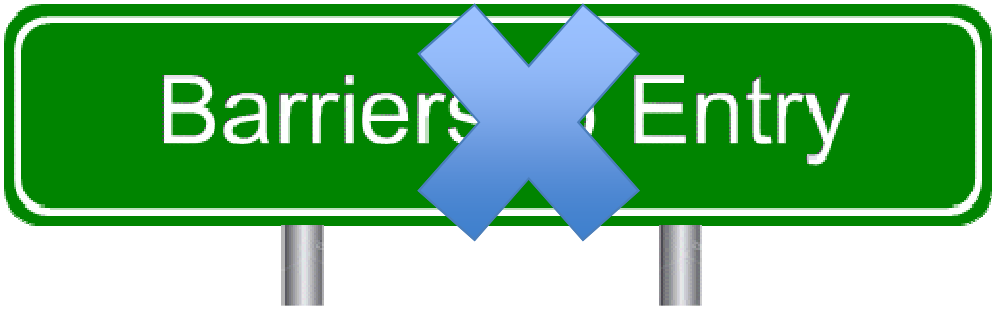
Final general robustness test



Concluding implications

1° message: change is possible and beneficial

2° message: priorities can be set



Thank you very much