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Bidding against the odds? The impact evaluation of grants for young micro and small firms during the recession

SmartEIZ Final Conference

Smart Specialization Strategies: Contemporary Challenges of its Design and Implementation

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Introduction and motivation I

- Young firms contribute most to **net job creation and innovation** despite **high relative exit rates**
- However, young firms have **greater difficulties in securing external financing** (**information asymmetries** and **low value of collateral**) → often corrected by government interventions
- Young firms **most vulnerable during the first few years on the market**, especially during a recession
- **Lack of research of such grants is preventing governments from designing optimal policies** to counteract these damaging effects
- We examine **whether such grants increase survival and performance of young firms**, and by which mechanism.
- The setting is the Republic of Croatia (2009–2014) - a **perfect laboratory environment for studying recession-related topics**

Introduction and motivation II

- This study also seeks to understand the mechanism by which these impacts are produced - **direct** and **indirect** mechanism (*certification effect* and *behavioural additionality*)

- **Our contribution to the literature** on young firms:
    1. We **address impact of business development grants instead of R&D grants**, which is relevant for a larger percentage of young firms
    2. We examine the **impact of business development grants in long recession**, an under-researched area
    3. We postulate that the **impact of business development grants can be achieved indirectly**, by enabling firms to get external financing that allows them to grow and survive

- Our results also carry **important policy implications**

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Literature review I

- Peak failure time for young firms is between 18 months to 2 year (Cowling, 2016) while about 50% of new entrants exit after 3-4 years (Coad, 2018)
- One of the main reasons for firm exit is limited access to external finance, (Evans & Jovanovic, 1989), especially during an economic downturn (Stucki, 2014)
- Analyses of R&D grants for young firms have been conducted in the US (e.g. Lerner, 1999), Germany (e.g. Czarnitzki & Delanote, 2015), Belgium (e.g. Decramer & Vanormelingen, 2016), Italy (e.g. Pellegrini & Muccigrosso, 2017), France (e.g. Crepon & Duguet, 2003), Spain (e.g. Segarra-Biasco & Teruel, 2016) and most of these find positive effects on survival and/or performance
- Impact of grants on securing external finance has been less researched (e.g. Meuleman & De Maeseneire, 2012; Marti & Quas, 2018)

Literature review II

- Empirical evidence on the impact of grants during recessions is scarce:
  - Aristei et al. (2017) and Hud and Hussinger (2015) evaluate the impact of R&D grants during the last recession and find a positive impact
  - Burger and Rojec (2018) in Slovenia find anti-crisis measures to have a positive impact only on the number of employees
- Few papers evaluate the impact of matching grants for business development (e.g. López-Acevedo & Tan, 2011; McKenzie, Assaf & Cusolito, 2017), but these studies are not specific to young firms
- Information asymmetry problem yielded "certification hypothesis" (e.g. Marti & Quas, 2018), stating that receiving a public grant acts as a governmental quality stamp indicating the firm's quality
- Clarysse, Wright and Mustar (2009) evaluate the behavioral additionality of grants, whereby the firms' learning activities change as a result of a policy instrument, and find a positive effect of R&D grants on learning activities

Data and institutional setting |

- Data come from three large datasets:
    1. Financial data on the population of Croatian enterprises from the 2007–2016 period (FINA)
    2. Data on grants given to firms in the 2008–2013 period (Ministry of Entrepreneurship and Crafts)
    3. Court register of incorporated companies

- Our analysis is set in the period of economic downturn in Croatia
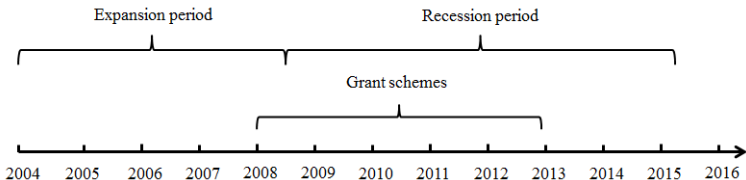
Data and institutional setting II

- The Ministry supported new firms during recession with the grant schemes: (1) Youth in entrepreneurship; (2) Entrepreneur beginner; (3) Entrepreneurship of youth, beginners and people with disabilities; (4) Entrepreneurship of target groups; (5) Youth and beginners in entrepreneurship
- Conditions for obtaining a grant typically involved:
    - To be registered in Croatia
    - Positive profit in previous year of business
    - At least one full time employee
    - No unpaid debts towards the State or employees
    - Incorporated at most three years prior to application for grant
- Activities co-funded by the grant typically involved:
    - Purchase of equipment, tools and inventory
    - Arranging of internal business space/workshop
    - Development of business plan and consulting services
    - Entrepreneurial training, web site design and publishing costs

Distribution of government grants by year

Year	Grant scheme name	Firms	Total amount (HRK)	Mean (S.d.) (HRK)
2008	Entrepreneurship od targer groups	275	2,136,000	7,767 (6,178)
2009	Entrepreneurship of youth, beginners and people with disabilities	83	2,030,000	24,458 (9,306)
2010	Entrepreneurship of youth, beginners and people with disabilities	288	3,039,000	10,552 (7,448)
2011	Entrepreneurship of youth, beginners and people with disabilities	346	2,478,000	7,162 (4,420)
2012	Entrepreneur beginner	21	1,898,000	90,381 (22,409)
	Youth in entrepreneurship	19	1,648,386	86,757 (22,728)
2013	Youth and beginners in entrepreneurship	20	3,173,679	158,684 (80,462)
	TOTAL	**1,052**	**16,403,065**	

Distribution of government grants by NACE sectors

NACE Rev 2. 1-digit industries	Firms	Total amount (HRK)	Mean (s. d.) (HRK)
Agriculture, forestry and fishing	13	357,691	27,515 (44,467)
Manufacturing	254	6,298,079	24,796 (32,452)
Electricity, gas, steam and air conditioning supply	5	702,533	140,507 (106,168)
Construction	101	1,212,533	12,005 (16,566)
Wholesale and retail trade; repair of motor vehicles and motorcycles	147	1,427,433	9,710 (19,688)
Transporting and storage	13	180,000	13,846 (25,947)
Accommodation and food service activities	27	399,360	14,791 (45,759)
Information and communication	145	2,487,575	17,156 (27,286)
Financial and insurance activities	5	26,000	5,200 (447)
Real estate activities	6	61,000	10,167 (10,028)
Professional, scientific and technical activities	231	2,025,702	8,769 (15,764)
Administrative and support service activities	34	516,260	15,184 (33,728)
Public administration and defense; compulsory social security	1	3,000	3,000 (0)
Education	15	116,000	7,733 (3,575)
Human health and social work activities	9	295,400	32,822 (78,229)
Arts, entertainment and recreation	5	29,500	5,900 (1,025)
Other services activities	41	265,000	6,463 (2,992)
TOTAL	**1,052**	**16,403,065**	

Methodology I

1. Merge FINA and Ministry dataset
2. Data cleaning
3. Decide on estimation methodology - Matching techniques
4. Estimate the probability of obtaining a grant (propensity score) using probit model

$$p(X) = P(D = 1|X) = E(D|X)$$

$$subs_{it} = \alpha_i + \beta PGC_{it-1} + \gamma PER_{it-1} + \delta X_i + \eta EC_{it-1} + \epsilon_{it}$$

Methodology II

where *subs* represents a dummy variable indicating whether or not
the firm received a grant, *PGC* is a matrix of public call variables,
PER is a matrix of performance variables (including previous subsidy
experience), *EC* is a matrix of all entrepreneur characteristics used,
X is a matrix of other firm time-invariant charatceristics (region,
sector and year), and *e* is the i.i.d. error term

5. Define **outcome variables**: survival until 2016, growth in turnover,
growth in employment, growth in labour productivity, long- and
short-term bank loans

6. Estimate the **average treatment effect on the treated (ATT)**
using matching techniques

$$ATT = \frac{1}{N^T} \Sigma(y_i^T - y_i^C)$$

Descriptive statistics

Variable	Before matching			After matching		
	Treated (n=222)	Control (n=32,322)	Difference	Treated (n=222)	Control (n=222)	Difference
Public grant call variables						
Surplus	0.78	0.74	0.04	0.78	0.78	0.00
Age of firm	0.54	2.02	-1.48***	0.54	0.54	0.00
(ln) employees	1.21	1.47	-0.26***	1.21	1.15	0.06
(ln) real exports	1.56	1.82	-0.26	1.56	2.11	-0.55
(ln) real turnover	12.30	13.35	-1.05***	12.30	12.18	0.12
Other performance variables						
(ln) real cash	9.56	9.75	-0.19	9.56	9.41	0.14
(ln) real fixed liab. (labour)	2.55	4.12	-1.57***	2.55	2.56	-0.01
(ln) real current liab. (labour)	8.51	9.15	-0.64***	8.51	8.58	-0.07
(ln) real current liab. (state)	9.16	9.65	-0.49***	9.16	9.20	-0.04
(ln) real current liab. (bank)	1.79	2.28	-0.49	1.79	1.90	-0.11
(ln) real fixed liab. (bank)	1.86	3.11	-1.25***	1.86	1.74	0.12
(ln) average real wage	9.73	10.37	-0.64***	9.73	9.62	0.11
(ln) real assets	8.87	10.04	-1.16***	8.87	9.05	-0.18
Prev. subsidy dummy	0.20	0.07	0.13***	0.20	0.17	0.03
Entrepreneur characteristics						
Mean age	36.61	41.62	-5.00***	36.61	36.81	-0.20
Mean age * One team member	45.41	62.05	-16.64***	45.41	42.74	2.67
Two team members	0.98	0.86	0.12***	0.98	0.99	-0.01
Three team members	0.01	0.07	-0.06***	0.01	0.00	0.00
Only men	0.01	0.07	-0.06***	0.01	0.00	0.01
Only women	0.65	0.69	-0.04	0.65	0.69	-0.04
Men and women	0.34	0.28	0.07*	0.34	0.30	0.04

Variable	Before matching			After matching		
	Treated (n=222)	Control (n=32,322)	Difference	Treated (n=222)	Control (n=222)	Difference
Firm characteristics						
Domestic	1.00	0.97	0.03	1.00	0.99	0.00
Agriculture and mining	0.01	0.02	-0.01	0.01	0.01	0.00
High-tech manuf.	0.01	0.00	0.01	0.01	0.00	0.01
Mid high-tech manuf.	0.01	0.01	0.00	0.01	0.03	-0.01
Mid low-tech manuf.	0.05	0.04	0.01	0.05	0.05	0.01
Low-tech manuf.	0.09	0.05	0.04*	0.09	0.11	-0.02
Energy	0.00	0.01	-0.01	0.00	0.00	0.00
Construction	0.10	0.13	-0.03	0.10	0.11	0.00
KIS high-tech	0.13	0.04	0.08***	0.13	0.15	-0.03
KIS other	0.34	0.23	0.12***	0.34	0.29	0.05
LKIS	0.25	0.45	-0.20***	0.25	0.26	-0.01
Zagreb	0.41	0.38	0.02	0.41	0.40	0.01
Western Croatia	0.12	0.15	-0.03	0.12	0.11	0.01
East Croatia	0.14	0.08	0.05**	0.14	0.13	0.00
Central Croatia	0.20	0.14	0.06*	0.20	0.23	-0.03
South Croatia	0.14	0.24	-0.10***	0.14	0.14	0.00
Year dummies						
2008	0.25	0.16	0.09***	0.25	0.25	0.00
2009	0.07	0.16	-0.09***	0.07	0.07	0.00
2010	0.27	0.16	0.11***	0.27	0.27	0.00
2011	0.37	0.16	0.21***	0.37	0.37	0.00
2012	0.01	0.18	-0.16***	0.01	0.01	0.00
2013	0.02	0.17	-0.15***	0.02	0.02	0.00

Probit model - Results

Variable	Verion 1		Version 2	
	Estimate	S.e.	Estimate	S.e.
Grant call and performance variables				
Surplus	0.2734***	0.0757	0.2953***	0.0770
Age of firm	-0.3611***	0.0313	-0.3610***	0.0327
(ln) employees	-0.0017	0.0561	-0.2020	0.1692
(ln) real exports	0.0047	0.0069	0.0056	0.0070
(ln) real turnover	-0.0915**	0.0281	-0.0926**	0.0289
(ln) real cash	-0.0075	0.0122	-0.0044	0.0126
(ln) real fixed liab.	0.0034	0.0096	0.0050	0.0097
(ln) real current liab. (labour)	-0.0022	0.0123	0.0005	0.0125
(ln) real current liab. (state)	0.0104	0.0163	0.0096	0.0166
(ln) real current liab. (bank)	-0.0027	0.0072	0.0001	0.0073
(ln) real fixed liab. (bank)	-0.0020	0.0109	-0.0034	0.0110
(ln) average real wage	-0.0336	0.0262	-0.0303	0.0269
Prev. subsidy dummy	0.4724***	0.0782	0.4868***	0.0798
(ln) real assets	0.0115	0.0073	0.0106	0.0074
Domestic	0.5256	0.3586	0.5324	0.3658
Entrepreneurship characteristics				
Mean age			-0.0209***	0.0061
Mean age * One team member			0.0054	0.0039
Team members (benchamrk 3 or more)				
One member			0.4385	0.2452
Two members			-0.3564	0.3377
Gender combination (benchmark men and woman)				
Ony men			-0.0111	0.4334
Only women			0.0350	0.4355
Year FE	YES		YES	
Region FE	YES		YES	
Sector FE	YES		YES	
Intercept	228.4535***	34.8424	159.0049***	38.7395
Observations	32.5440		32.5440	
McFadden pseudo R2	0.1852		0.2020	

ATT - Results

Outcome variables	Treated (n = 222)	Control (n = 222)	ATT (S.e.)
Survival			
Survives in 2016 dummy	0.9279	0.8604	0.0676**
			(0.0277)
Survives in t + 1 dummy	1.0000	1.0000	0.0000
			0.0000
Survives in t + 2 dummy	1.0000	0.9910	0.0090
			(0.0063)
Survives in t + 3 dummy	0.9955	0.9820	0.0135
			(-0.0100)
Survives in t + 4 dummy	0.9595	0.9324	0.0270
			(0.0168)
Survives in t + 5 dummy	0.9189	0.8919	0.0270
			(-0.0220)
Bank loans			
Log (1 + long-term bank loans at t + 1)	4.0834	2.7488	1.3346**
			(0.5219)
Log (1 + sum of long-term bank loans at t + 1, t + 2 and t + 3)	5.8937	3.7609	2.1327***
			(0.5493)
Log (1 + short-term bank loans at t + 1)	2.1412	1.8785	0.2627
			(0.4042)
Log (1 + sum of short-term bank loans at t + 1, t + 2 and t + 3)	3.5657	3.1291	0.4366
			(0.4664)
Firm performance			
Real turnover growth from t to t + 1 (in %)	16.5081	12.0847	4.4235
			(-5.2920)
Real turnover growth from t to t + 3 (in %)	62.3571	60.4192	1.9379
			(4.2497)
Real turnover growth from t to t + 5 (in %)	105.9309	135.2771	-29.3462
			(8.7149)
Number of employees growth from t to t + 1 (in %)	20.6397	16.5886	4.0511
			(5.5811)
Number of employees growth from t to t + 3 (in %)	48.2460	39.6938	8.5522
			(9.6623)
Number of employees growth from t to t + 5 (in %)	72.2112	55.6292	16.5820
			(13.6868)
Labor productivity growth from t to t + 1 (in %)	8.8050	13.1563	-4.3513
			(7.2949)
Labor productivity growth from t to t + 3 (in %)	23.3253	21.5326	1.7926
			(9.4471)
Labor productivity growth from t to t + 5 (in %)	31.1653	53.8401	-22.6748
			(12.4221)

Robustness check - Placebo test

Outcome variables	Treated placebo (n = 222)	Control placebo (n = 222)	ATT placebo (S.e.)
Survival			
Survives in 2016 dummy	0.8604	0.8739	-0.0135
			(0.0322)
Bank loans			
Log (1 + long-term bank loans at t + 1)	2.7488	2.9261	-0.1773
			(0.4818)
Log (1 + sum of long-term bank loans at t + 1, t + 2 and t + 3)	3.7609	4.0895	-0.3286
			(0.5282)
Log (1 + short-term bank loans at t + 1)	1.8785	1.3187	0.5598
			(0.3734)
Log (1 + sum of short-term bank loans at t + 1, t + 2 and t + 3)	3.1291	2.8147	0.3144
			(0.4892)
Firm performance			
Real turnover growth from t to t + 1 (in %)	12.0847	21.7753	-9.6906
			(6.7621)
Real turnover growth from t to t + 3 (in %)	60.4192	49.1048	11.3144
			(15.0972)
Real turnover growth from t to t + 5 (in %)	135.277	96.4329	38.8442
			(30.3833)
Number of employees growth from t to t + 1 (in %)	16.5886	16.2746	0.314
			(5.5298)
Number of employees growth from t to t + 3 (in %)	39.6938	35.0107	4.6831
			(8.9815)
Number of employees growth from t to t + 5 (in %)	55.6292	55.4564	0.1728
			(14.5088)
Labor productivity growth from t to t + 1 (in %)	13.1563	15.7646	-2.6084
			(-9.111)
Labor productivity growth from t to t + 3 (in %)	21.5326	23.2762	-1.7435
			(12.2059)
Labor productivity growth from t to t + 5 (in %)	53.8401	79.2772	-25.4371
			(24.6119)

Robustness check - Rosenboum bounds

Gamma	Survives in 2016 dummy		Long-term bank loans in next three years		Long-term bank loans in next year	
	Lower bound significance level	Upper bound significance level	Lower bound significance level	Upper bound significance level	Lower bound significance level	Upper bound significance level
1.00	0.0111	0.0111	0.0024	0.0024	0.0316	0.0316
1.05	0.0072	0.0167	0.0011	0.0051	0.0192	0.0499
1.10	0.0046	0.024	0.0005	0.0096	0.0114	0.0743
1.15	0.003	0.0333	0.0002	0.0168	0.0067	0.1052
1.20	0.0019	0.0447	0.0001	0.0277	0.0039	0.1424
1.25	0.0012	0.0584	0.0000	0.043	0.0022	0.1856
1.30	0.0008	0.0743	0.0000	0.0634	0.0013	0.2338

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Conclusion I

- Although **grants were very small**, they were still able to **affect survival up to 2016 and access to external finance**
- We **do not find any evidence of the negative "cash and carry" effect** of grants on firm survival
- **Recipient firms exhibited a larger amount of long-term loans** almost immediately after the grant was awarded, as well as three years later
- We explain our results through two channels: **behavioral additionality and certification effect**, which are both consequences of the grant scheme nature
- Although the **grants were too small to have any striking direct effect**, through these channels they **paved the way for acquiring bank loans**, which were in turn substantial enough to enable the recipients to survive the recession

Conclusion II

- We find **no significant effect on young firm performance** - just surviving and maintaining the same level of performance takes so much effort for young firms in recession that none of the firm's capacity is left for performance improvement

- Policy implication - **even small sums of money widely distributed can have a significant effect if they are targeted at knowledge absorption and skill creation**

- Limitations and future of our research:
  - Availability of more covariates to account for unobservables
  - We do not undertake the general equilibrium analysis, but only analyze the average treatment effect on the treated firms - possible other positive spillovers (consultants, suppliers of equipment)

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Thank you for your attention!

We would appreciate any questions/comments!

For any further questions/comments, please contact us by e-mail:

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