EXPERTISE VS. BIAS IN PROMOTING ENTREPRENEURSHIP

AN IMPACT EVALUATION IN MEXICO

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OUTLINE

I. CONTEXT

II. RESEARCH QUESTIONS AND DESIGN

III. BASELINE RESULTS

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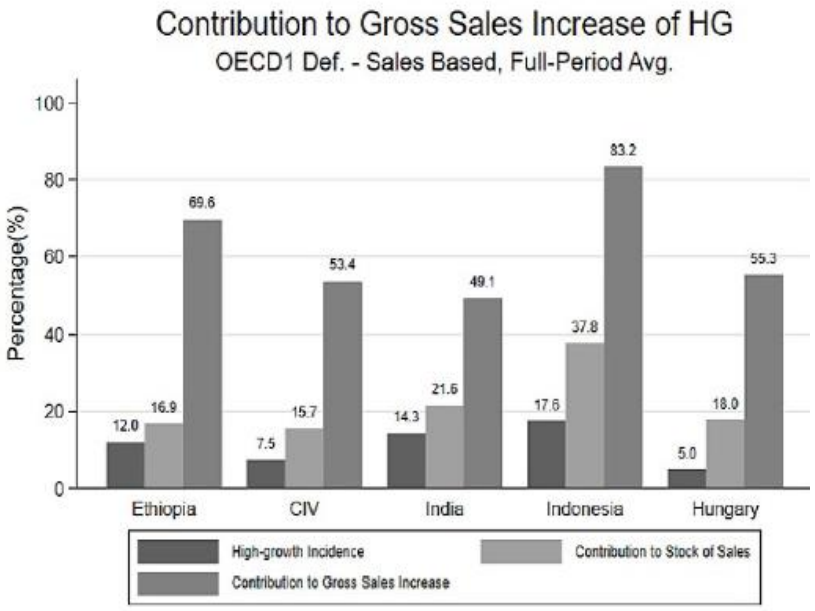
I. CONTEXT

1.1 Why do we pay so much attention to growth-oriented entrepreneurship / high-growth firms?

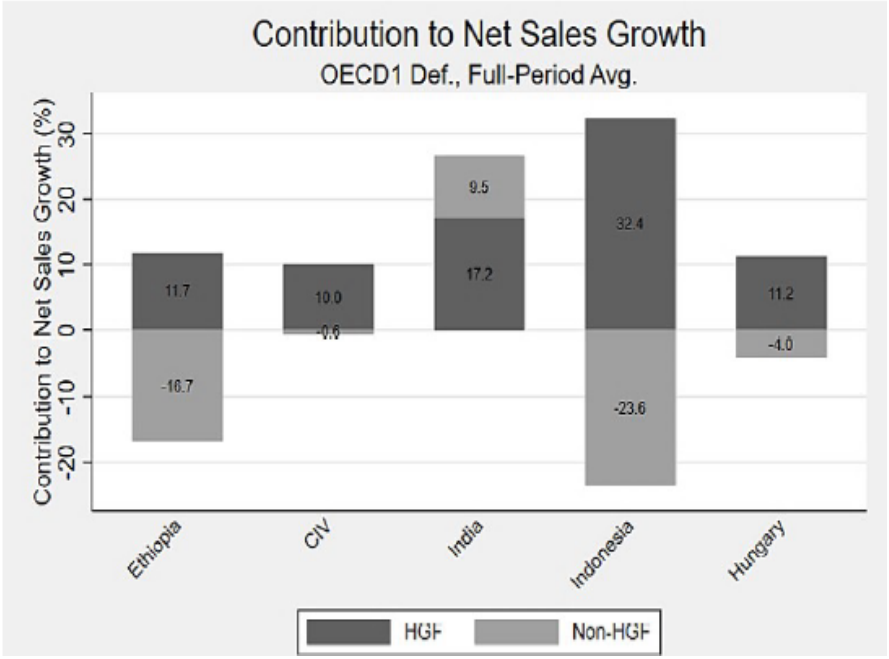
Growth-oriented entrepreneurs and high-growth firms as engines of productivity growth and job creation.

Contribution to employment and output Creation

High-growth firms create many more jobs than their share in the firm count



Without the contribution of high-growth firms, many economies would contract



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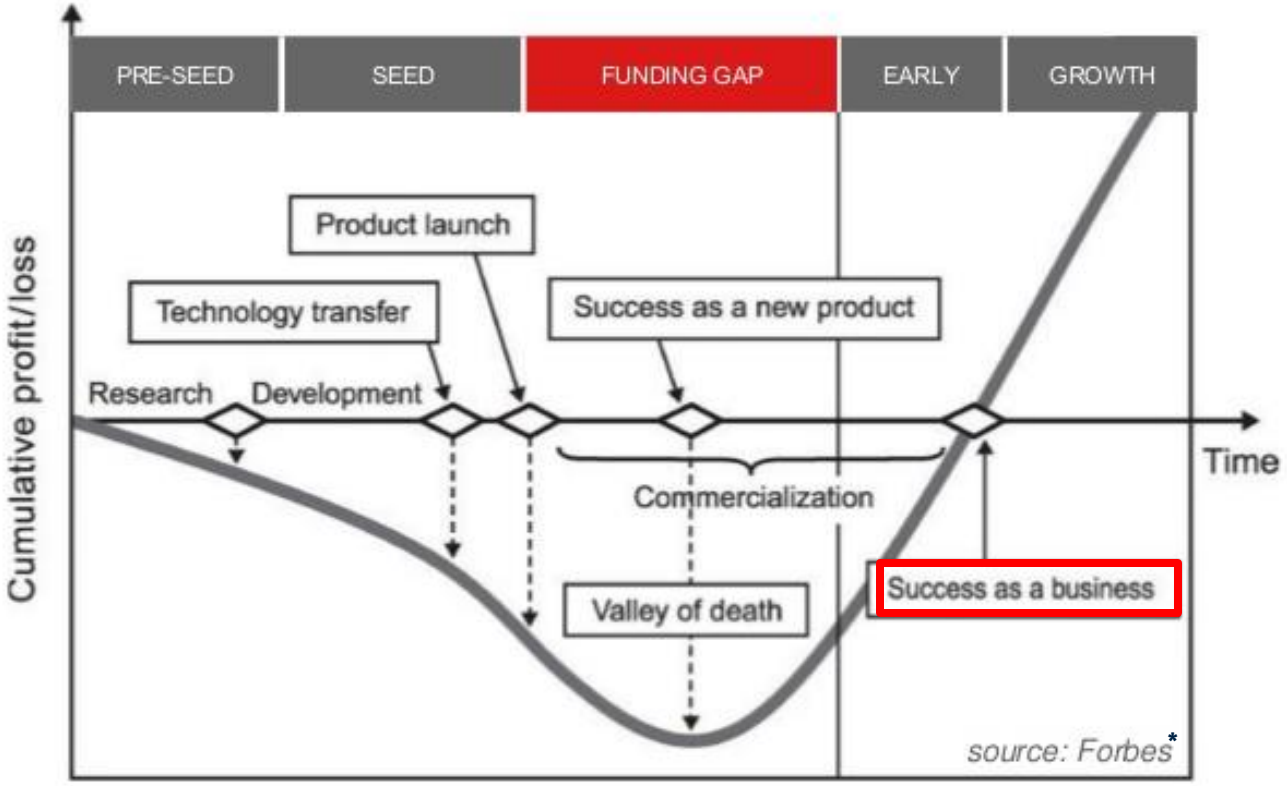
How can public policy help?

1.6 The funding gap is a crucial firm stage



* via Osawa and Miyazaki, 2006

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1.7 Matching grants are an important policy vehicle

- Matching-grant programs are popular policy for:
  - increasing innovation in presence of externalities;
  - alleviating credit constraints for SMEs.

- Common across developing and developed countries:
  - e.g. SBIR/STTR programs in US
  - 60 World Bank projects totaling over US$1.2 billion

1.8 Limited evidence

But evidence is limited on two dimensions:

1. The impact of existing matching-grant programs.
   - Non-experimental evaluations (e.g. Cadot et al. (2015), Crespi et al. (2011), Castillo et al. (2011)) struggle with selection bias.
   - Small number of experimental evaluations on matching grants: Bruhn et al. (forthcoming) for consulting services; McKenzie et al. (2017) for business services (but could not assess long term impacts); several experiments have failed (Campos et al., 2014).
   - McKenzie (forthcoming) business plan competition.

2. How best to design programs, in particular how to select beneficiaries.
   - Industry participants are well-informed but may have conflicts of interest.

- This project hopes to make progress on both dimensions.

1.9 Mexico's HIEP program

- Context: Mexico's High Impact Entrepreneurship Program (HIEP)
  - Government program run by Instituto Nacional del Emprendedor (INADEM)
  - Eligible firms: start-ups and "scale-ups" judged to offer an innovative product, service or business model with high potential to compete globally.
  - Selected firms receive up to 5 million pesos (~$280,000 USD) with 20-30% match to spend on IT/software, certifications, consulting/professional services, or machinery/equipment
  - 400 million pesos (US$22 million) budget this year, will fund about ~200 firms (approx. ~US$110k/firm)

- INADEM has agreed to randomize grants within the set of "eligible" firms.

II. OBJECTIVES, RESEARCH QUESTIONS, EXPERIMENTAL AND EVALUATION DESIGN

2.1 Key challenge: how to select beneficiaries

- Two objectives:
  1. Choose the "best" firms
     Could be most likely to succeed, or most likely to benefit from grant. (Will come back to this.)
  2. Minimize corruption (i.e. giving grants to connected firms) or "bias"

- Key questions: Is there a trade-off? What type of review panel strikes best balance?
  - Relevant for other countries that use panels to pick grant recipients (e.g. SBIR/STTR).
  - Relevant for other industrial policy and trade programs where governments try to pick winners.

- Expertise versus bias trade-off has been explored in other contexts (e.g. NIH funding, Li (2017)), but we are not aware of a study in context of grants to firms.

2.2 Research questions

1. What is the impact of (large matching) grants aimed at high-impact entrepreneurs on firms' performance (productivity, sales, job creation) and on innovation?

    a. How heterogeneous are the outcomes depending on initial firm characteristics?

2. Which evaluation/selection model is most effective at identifying high-impact entrepreneurs? Are these the same firms who benefit most from the matching-grant program (i.e. firms with large treatment effects from the program)?

    a. Does the increased expertise of the expert panel compensate for the greater bias they may have?

2.3 Current HIEP evaluation ("traditional" panel)

- Firms submit detailed application.
- Reviewers are specialized "evaluators" (with university certificate in evaluation) who typically have no industry experience.
- Scoring rubric confidential.
  - Each application reviewed by two reviewers (plus a third if scores far apart, with two closest scores used).
- System designed to minimize corruption.
  - Reviewers' identities kept secret.
  - Reviewers work on many different industries, have few network connections, conflicts of interest.

2.4 New evaluation system ("VC" panel)

- Same basic structure, but reviewers are "experts" with more relevant experience.
  - Aspires to imitate selection by venture-capital (VC) funds.

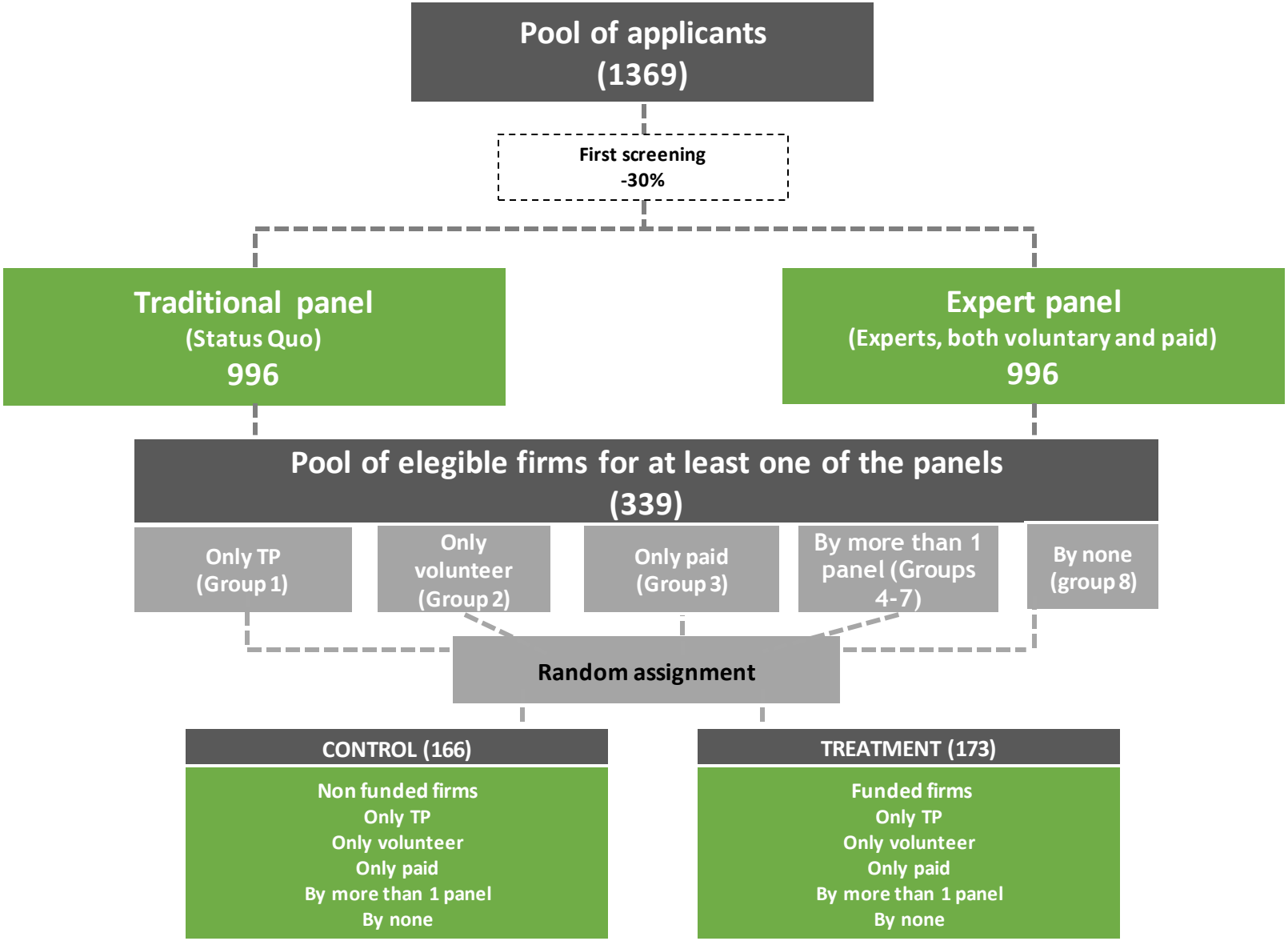
- Who will the experts be?

1. Volunteers with experience in same industry as applicant
   - Many successful businesspeople interested in "giving back."
   - Likely to be too expensive to hire for wage.
   - Probably best informed about quality of application.
   - But also potentially the most biased, connected through network links to applicant.
2. Volunteers from different industries.
   - Fewer links through business networks.
   - Also less informed.
3. Paid consultants (e.g. PWC, Deloitte)
   - Present in almost every country so widely applicable.
   - Have broad experience (not necessarily same industry).
   - Have company reputation to protect.
   - Payment may motivate more effort and/or less graft.

2.5 Experimental Design

- Every application read by both Traditional and VC panels.
- Traditional panel (as before):
  - Two initial reviewers.
  - If scores >15 points apart (on 100 pt scale), third reviewer assigned, two closest scores averaged.
- VC panel:
  - Initially, one volunteer expert same industry, one paid expert.
  - If scores >15 points apart, a volunteer expert different industry review assigned, two closest scores averaged.
- Scores of each reviewer type rescaled so same proportion of firms above eligibility threshold *X* for each type.
- Firm is "eligible" if either average of two closest traditional reviews or two closest expert reviews is above threshold *X*.
- Threshold *X* chosen so that 400 firms "eligible" (out of approx. 800 applicants).

2.6 Evaluation Design



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2.7 Randomization

- Stratify eligible firms and randomize within strata:
    - Strata 1: average score of traditional panel> X , average score of expert panel> X
    - Strata 2: average score of traditional panel≤ X , average score of expert panel> X
    - Strata 3: average score of traditional panel> X , average score of expert panel≤ X
- Will add additional strata to ensure greater balance if we want to experimentally compare the three types of expert panel (but underpowered for such an experimental comparison).

2.8 Data

- Collected data on sales, employment, profits, exports, innovation etc.
    - Baseline survey before winners announced, round 1 survey (October 2017) 1 year after receipt on money (September 2019), round 2 survey 2 years after receipt (2020)
    - INADEM administrative data on grant implementation and basic outcomes
    - Using INEGI (national statistical agency) for later round survey connection, and INADEM providing carrots and sticks to help increase response rates.
    - Half-year surveys to follow up on the treatment and control groups

- Surveyed all reviewers to obtain information on characteristics and network links to applicants.

- Industry of expertise, business links to firm, do you know the applicant, where do you live, previous jobs, your university, business/sports/social association memberships, etc.

2.9 Experimental comparisons

- Treatment vs. control among firms deemed eligible by Traditional panel.
  >> Will estimate effect of program under existing regime.

- Treatment vs. control among firms deemed eligible by VC panel.
  >> Will estimate effect of program under VC regime.

III. BASELINE RESULTS

3.1 Entrepreneurs characteristics

Number of applications

Type/Size	Startup	Scaleup	Total
High Impact	301	496	797
Social	44	56	100
Environmental	36	63	99
Total	381	615	996

Age of applicants

	Entrepreneur's Characteristics		
Age range	Number of applicants	% of male	% of female
18_25	47	72%	28%
26_30	200	77%	22%
31_40	414	81%	19%
41_50	221	84%	16%
>51	116	85%	15%

Education of applicants

	Project Leader-Maximum level of education			Population in Mexico	
Level of education	ALL	Male	Female	Male	Female
Graduate	0.42	0.42	0.44	ND	ND
Undergraduate	0.56	0.56	0.55	0.19	0.18
Highschool & equivalent	0.02	0.02	0.01	0.22	0.21

3.2 Firms characteristics

VARIABLES	(1) N	(2) mean	(5) N	(6) mean
Firm-age	859.00	5.06	333.00	5.09
Proportion of women as founding partners	856.00	0.28	333.00	0.24
Firm-Revenue-winsor, 2017	859.00	10,347,796.28	333.00	11,433,596.67
Firm-Profits calculated-winsor, 2017	857.00	1,271,856.37	333.00	1,436,314.83
Firm-Total employment reported-winsor	859.00	14.94	333.00	15.41
Firm-R&D expenditure-winsor	832.00	486,967.40	321.00	582,783.75
Firm-Certification in process or granted	859.00	0.39	333.00	0.43
Firm-access to 1 mill-formal sources	857.00	0.57	332.00	0.55

3.3 Traditional panel vs experts characteristics

There were 2 types of reviewers:

- INADEM's Traditional Panel (99 evaluators).
- 2 types of experts:
  a) Volunteers (261 experts)
  b) Payed (13 experts)

The youngest experts were the payed ones.

37% of the traditional panel are women, becoming the largest proportion between reviewers

Volunteer experts have professional experience in higher positions than the rest.

Variables	(1) Volunteer-expert Mean/SE	(2) Paid-expert Mean/SE	(3) Traditional Mean/SE	t-test (1)-(2) p-value	t-test (1)-(3) p-value	t-test (2)-(3) p-value
Female reviewer (proportion)	0.242	0.308	0.375	0.617	0.022**	0.628
	[0.030]	[0.133]	[0.050]			
Age (years)	39.227	30.000	36.875	0.000***	0.024**	0.000***
	[0.594]	[1.000]	[0.848]			
Years of education	18.928	18.077	17.387	0.029**	0.000***	0.102
	[0.032]	[0.400]	[0.156]			
Reviewer studied abroad-any level (proportion)	0.430	0.538	0.161	0.449	0.000***	0.011**
	[0.034]	[0.144]	[0.038]			
Job position-CEO (proportion)	0.227	0.000	0.155	0.000***	0.167	0.001***
	[0.029]	[0.000]	[0.043]			
Job position-Director (proportion)	0.522	0.308	0.268	0.110	0.000***	0.775
	[0.035]	[0.133]	[0.053]			
Job position-Mid level (proportion)	0.179	0.538	0.493	0.012**	0.000***	0.766
	[0.027]	[0.144]	[0.060]			
Job position-External Consultant/Other (proportion)	0.072	0.154	0.085	0.426	0.750	0.517
	[0.018]	[0.104]	[0.033]			
Professional experience abroad (proportion)	0.242	0.308	0.043	0.617	0.000***	0.048**
	[0.030]	[0.133]	[0.024]			

The value displayed for t-tests are p-values.

Standard errors are robust.

***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

3.4 Traditional panel and experts scores

Number of reviews by type of evaluator (including only High Impact applicants)

Type of reviewer	Number of reviewers	Number of reviews	Percent
Volunteer-expert	207	993	26.37
Paid-expert	13	945	25.1
Traditional	83	1,827	48.53
Total	303	3,765	100

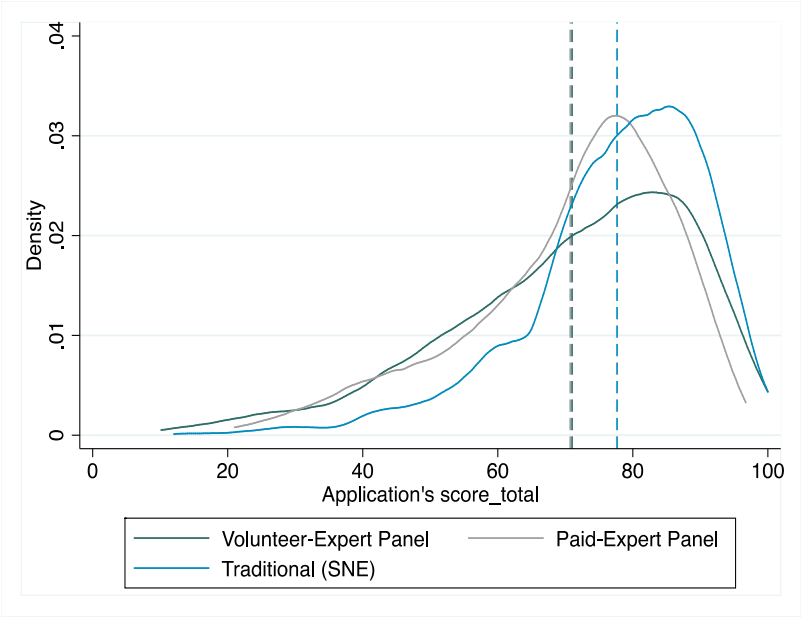
- There was a lack of experts for the environment and social projects evaluations. Therefore, evaluators were randomly assigned. For the analysis we only considered the traditional panel scores.

- *Criteria for evaluation:*

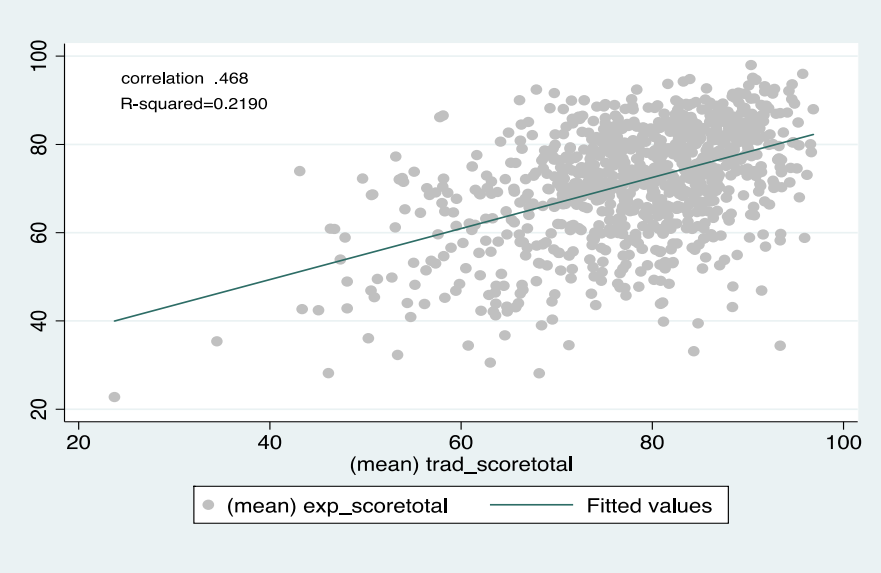
1) Leader, project and team profile
2) Technical, financial and business viability
3) Innovation
4) Impact

3.4 Traditional panel and experts scores

Distribution of the mean scores by type of reviewer



Relation between the mean scores of experts and traditional reviewers



- The differences between scores of paid experts and volunteers was not statistically significant.
- The differences between traditional and expert panels are statistically significant.
- TFN> Expert 6.7 points

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3.5 Results of the traditional and experts scores vs the characteristics of applicants

- In general, volunteer experts are more sensitive to project leaders' characteristics.

- Effects of applicants characteristics on score:
  - **Women – (all reviewers and all sample)**
  - **Graduate studies + (all reviewers and all samples)**
  - **Studied abroad + (all reviewers and all sample)**
  - **Education area (IT) + (eligible firms and volunteers are more generous)**
  - **Participate to other contests +**
  - **Has more business alliances +**

3.6 Results of the traditional and experts scores vs the characteristics of enterprises

- In general, volunteer experts are more sensitive to firms' performance.

- Effects of firms characteristics characteristics on score:
  - **Revenues + (volunteers are more generous and in all sample)**
  - **Level of employment + (volunteers are more generous)**
  - **Profits - (all reviewers and all sample)**
  - **Firms investment and values of tangible assets + (all sample, volunteers more generous)**
  - **R&D expenditure + (all reviewers and all sample)**
  - **Introducing a new product + (all reviewers and all sample)**
  - **Having (or in process) certifications + (volunteers more generous and all sample)**

3.8 Expected treatment effects and final scores

- ↑ Expected effect of investment >> ↑ Score
  - Effect on sales, profits and employees
- ↑ (Perceived) Higher quality firm>> ↑ Expected effect of investment
  - Effect on sales, profits and employees
- ↑ Access to finance >> ↓ Expected effect of investment
  - This lower effect is not expected for high quality firms

Would reviewers invest in the firms?

- All reviewers were assigned to score as if they were investors, prioritizing the performance of the projects /firms rather the allocations of resources to the firms in need.
- These results (from the Evaluators Perception Survey) confirm it:

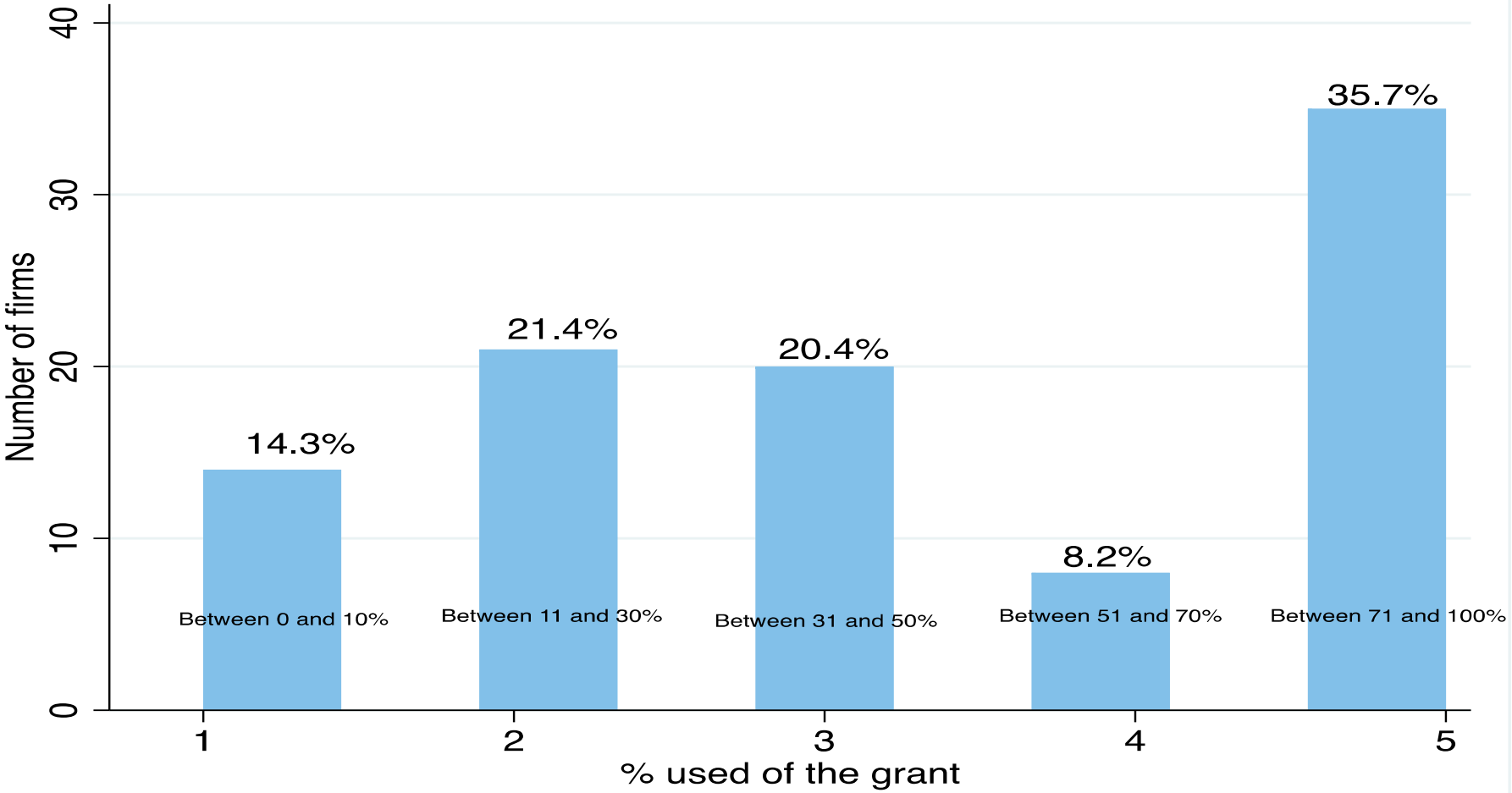
Score vs perception	Would you invest in the firm you reviewed?	
Score of Traditional and Expert Panel	**No**	**Yes**
Mean	64.9	82.5
Median	68.2	84

Score vs perception	Should INADEM invest in this project?	
Answer	**Mean**	**Median**
Strongly agree	86.8	87.7
Agree	77.2	77.7
Not agree or disagree	66.9	68.4
Disagree	56.5	57.5
Strongly disagree	42.9	43.1

WHERE DO WE STAND?

Percentage of the grant used after the 1st Quarter 2018

Until the end of the first quarter of 2018, approximately three months after receiving the grant:



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Thank you