

Psychometrics as a tool to improve screening and access to credit

Evidence from Peru

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Motivation

- For credit markets to work effectively they need:
 - Quality information (ex-ante)
 - Legal system to enforce debt contracts (ex-post)
- SMEs lack quality information.
- US Banks developed credit scoring models based on SME owners' data.
- Not feasible in every country because of deficiencies of credit bureaus.

Need a tool to screen many people at a low cost

- The Entrepreneurial Finance Lab (EFL) developed a credit application based on psychometrics
- Psychometric tools used extensively to select personnel
 - Better than candidate job's experience, level of education, employment interview results, peer ratings, and reference checks to predict overall job performance.
- Literature shows correlations between psychometric measures and entrepreneurial success, but not yet with repayment behavior

Implementation in Peru

- Started in March 2012
(Institution has no previous experience in the segment)
- Used to screen MSMEs that applied for a working capital loan
(up to 18 months, average size US\$3,855)
- EFL credit application takes about 45 minutes
- Entrepreneurs with an EFL score above EFL threshold were approved
- Entrepreneurs with a traditional credit score above traditional threshold were approved too
 - Score for *unbanked*, i.e. without credit history, is based on demographics

Data

- Data from EFL collected during application (1,993 entrepreneurs screened by the EFL tool between March 2012 and August 2013)
 - EFL score and screening date; as well as age, gender, marital status, business sales, and sector of activity.
- Data from *Superintendencia de Banca y Seguros*
 - Maximum number of days in arrears, total debt, and a classification of debtor into one of five status categories

Decision Rule

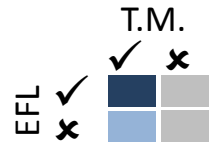
		Traditional Model decision (TM)	
		Accept	Reject
EFL decision	Accept	(1) Accepted 659 entrepreneurs (20.6% unbanked) (23.5% got loan from the implementing institution)	(2) Accepted 158 entrepreneurs (10.1% unbanked) (24.7% got loan from the implementing institution)
	Reject	(3) Accepted 860 entrepreneurs (25.1% unbanked) (29.3% got loan from the implementing institution)	(4) Rejected 209 entrepreneurs (7.2% unbanked) (0% got loan from the implementing institution)

Source: Authors' own calculation

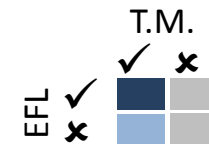
- Traditional score threshold set at 19 percentile (rejects 19% of entrepreneurs)
- EFL score threshold set at 57 percentile (rejects 57% of entrepreneurs)

Hypotheses

- **Hypothesis 1: Risk reduction.** Entrepreneurs who were accepted by the traditional model but rejected by the EFL tool have higher default risk than entrepreneurs who were accepted by both models.
- **Hypothesis 2: Credit to new borrowers.** Entrepreneurs who were rejected by the traditional model but accepted by the EFL tool do not have higher default risk than entrepreneurs who were accepted by the traditional model.
- **Hypothesis 3: Banking the unbanked.** Unbanked entrepreneurs who were accepted by the EFL tool have a greater probability of getting a loan than unbanked entrepreneurs who were rejected by the EFL tool.



Hypothesis 1



	Banked + Unbanked		Banked		Unbanked	
	Accepted by EFL (1)	Diff § (2)	Accepted by EFL (3)	Diff § (4)	Accepted by EFL (5)	Diff § (6)
Classification worse than "Normal" at SBS (12 months after app.)						
More than 90 days in arrears at SBS (12 months after app.)						
More than 90 days in arrears at SBS (during next 12 months following app.)						
Number of days in arrears (6 months after app.)						
Number of days in arrears (12 months after app.)						
Increase in debt at SBS (1 month after test wrt 1 month before app.)						
Increase in debt at SBS (6 month after test wrt 1 month before app.)						
Classification at SBS (12 months after app.)						
Loan from implementing institution						
Number of observations						

Source: Authors' own calculations

Note: § Difference between entrepreneurs rejected and accepted by the EFL tool provided they were all accepted by the traditional model. Ordinary least squares estimates given. All outcome variables are associated with repayment behavior and access to credit from formal financial institutions and are not limited to the implementing bank. Robust standard errors in parenthesis: * p<0.1, ** p<0.05, ***p<0.01.

Hypothesis 2



	Banked + Unbanked		Banked		Unbanked	
	Accepted by TM	Diff §	Accepted by TM	Diff §	Accepted by TM	Diff §
	(1)	(2)	(3)	(4)	(5)	(6)
Classification worse than "Normal" at SBS (12 months after app.)						
More than 90 days in arrears at SBS (12 months after app.)						
More than 90 days in arrears at SBS (during next 12 months following app.)						
Number of days in arrears (6 months after app.)						
Number of days in arrears (12 months after app.)						
Increase in debt at SBS (1 month after test wrt 1 month before app.)						
Increase in debt at SBS (6 month after test wrt 1 month before app.)						
Classification at SBS (12 months after app.)						
Loan from implementing institution						
Number of observations						

Source: Authors' own calculations

Note: § Difference between entrepreneurs rejected by the traditional model and accepted by the EFL tool and entrepreneurs accepted by the traditional model. Ordinary least squares estimates given. All outcome variables are associated with repayment behavior and access to credit from formal financial institutions and are not limited to the implementing bank. Robust standard errors in parenthesis: * p<0.1, ** p<0.05, ***p<0.01.

Hypothesis 3



	Unbanked		Unbanked controlling for EFL score		Unbanked around threshold		Unbanked around threshold c. EFL Score	
	Accepted by EFL	Diff §	Accepted by EFL	Diff §	Accepted by EFL	Diff §	Accepted by EFL	Diff §
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Classification worse than "Normal" at SBS (12 months after app.)								
More than 90 days in arrears at SBS (12 months after app.)								
More than 90 days in arrears at SBS (during next 12 months following app.)								
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Loan from implementing institution								
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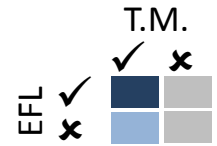
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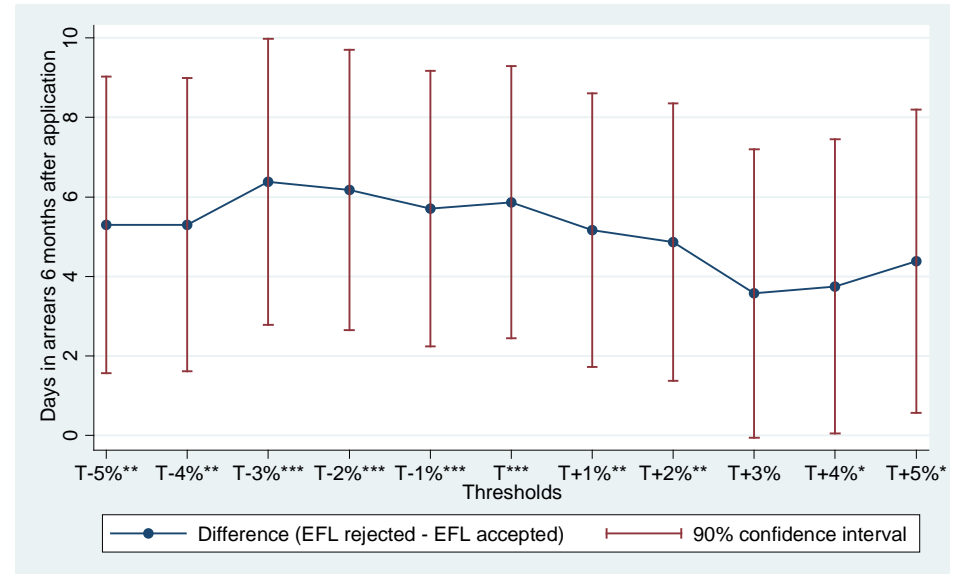
Conclusions

- For *banked* entrepreneurs:
 - When used to screen out bad credit risk from a pool of entrepreneurs accepted by traditional scoring model, EFL leads to a reduction of the portfolio risk
 - When used to sift good credit risk from a pool of entrepreneurs rejected by traditional scoring model, EFL may lead to an increase in portfolio risk
- For *unbanked* entrepreneurs:
 - EFL tool can be used to make additional loans without increasing portfolio risk
 - Leads to increase in access to credit

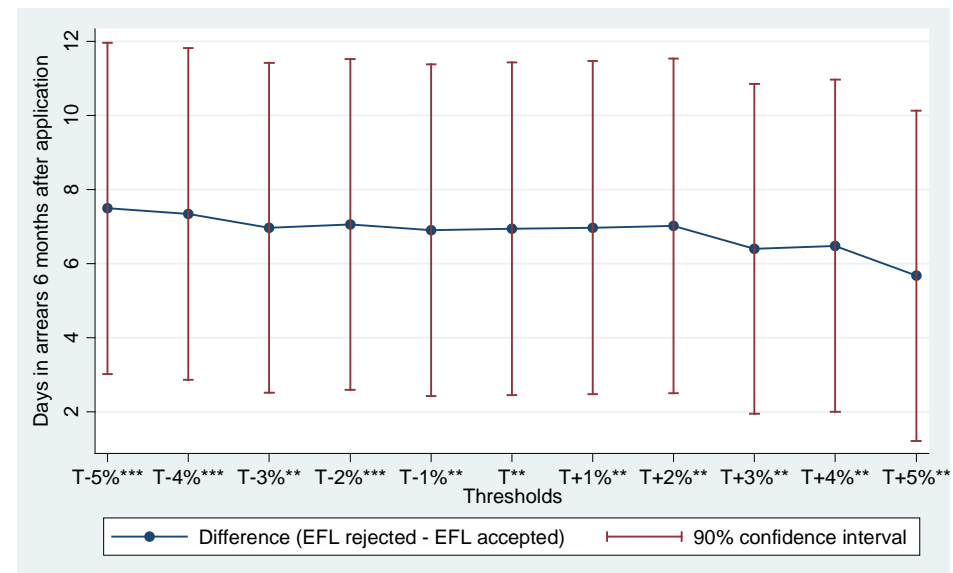
Hypothesis 1



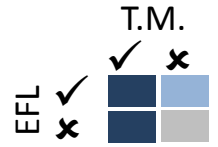
Additional Number of Days in Arrears—for entrepreneurs rejected by the EFL tool—6 Months after the EFL Application Using Different EFL Decision Thresholds



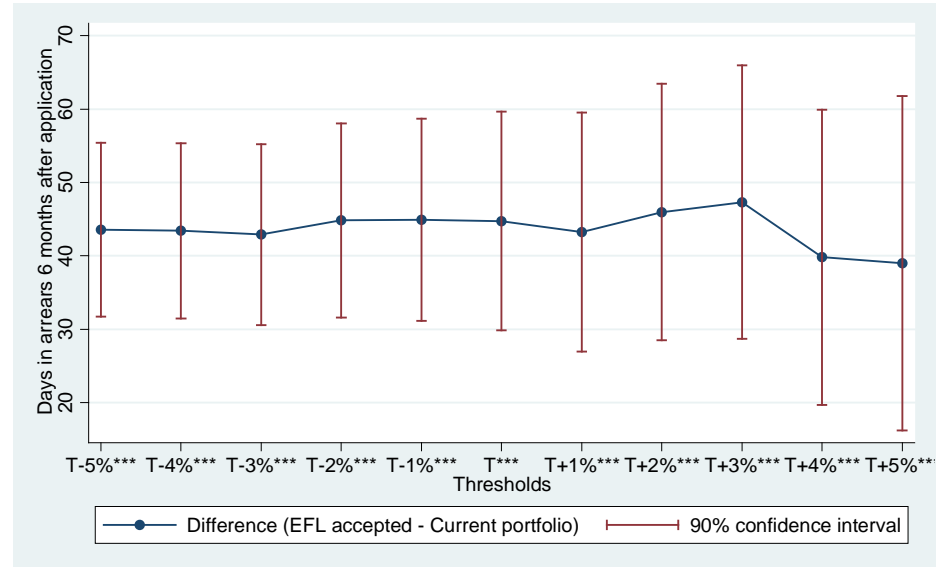
Additional Number of Days in Arrears—for entrepreneurs rejected by the EFL tool—6 Months after the EFL Application Using Different Traditional Credit Score Decision Thresholds



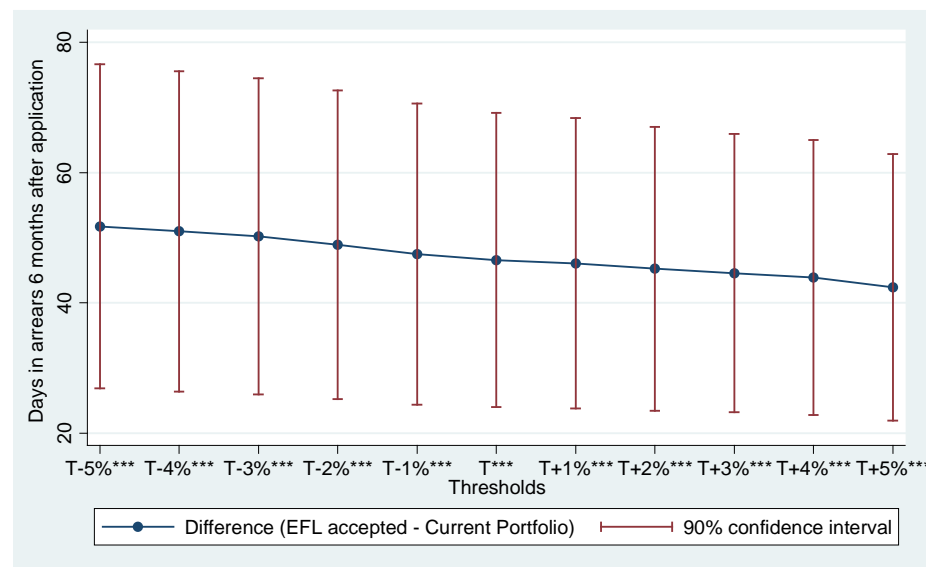
Hypothesis 2



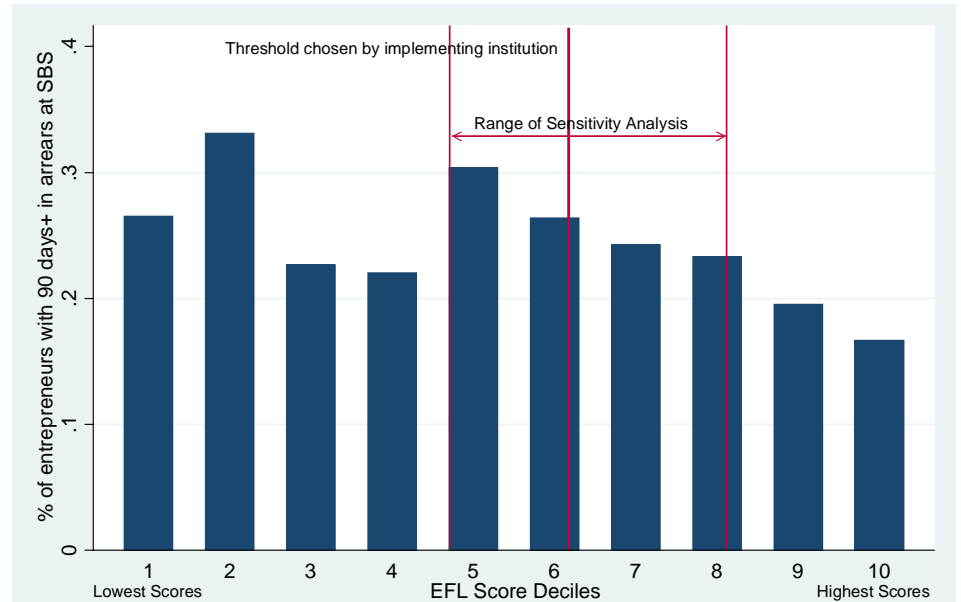
Additional Number of Days in Arrears—for entrepreneurs rejected by the traditional method—6 Months after the EFL Application Using Different EFL Decision Thresholds



Additional Number of Days in Arrears—for entrepreneurs rejected by the traditional method—6 Months after the EFL Application Using Different Traditional Credit Score Decision Thresholds



Percentage of Entrepreneurs with more than 90 days in Arrears at the SBS during the 12 months following the EFL application by EFL Score Decile



Percentage of Entrepreneurs with more than 90 days in Arrears at the SBS during the 12 months following the EFL application by Traditional Credit Score Decile

