

# USING “PSYCHOMETRIC” FACTORS TO IMPROVE CREDIT SCORING MODELS FOR SMALL BUSINESS LENDING

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Exploratory Research Results, August 2013

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This research is supported by a grant from the  
UNIVERSITY OF EDINBURGH BUSINESS SCHOOL Venture Fund



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# PURPOSE

Find ways to measure “willingness to repay” when:

- The borrower has no credit history with the lender
- The borrower has no credit history in a credit bureau

Particularly relevant to “microfinance”



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# MIXED METHOD RESEARCH TO DATE: 1<sup>st</sup> 3 STEPS

1. Review literature
2. Conduct 10 expert interviews
3. Identify personality trait theoretically and intuitively closest to “Willingness to Repay”
4. Identify “facets” of the trait with reference to existing psychometric instruments
5. Develop instrument to measure trait in credit scoring model context
6. Test instrument in Bank in South Africa



# THE “BIG 5” PERSONALITY TRAITS

Trait	Description
<b>O</b> penness	Curious, original, intellectual, creative, and open to new ideas.
<b>C</b> onscientiousness	Organized, systematic, punctual, achievement oriented, and dependable.
<b>E</b> xtraversion	Outgoing, talkative, sociable, and enjoys being in social situations.
<b>A</b> greeableness	Affable, tolerant, sensitive, trusting, kind, and warm.
<b>N</b> euroticism	Anxious, irritable, temperamental, and moody.

[http://blog.lib.umn.edu/vanm0049/myblog/fwk-carpenter-fig02\\_004.jpg](http://blog.lib.umn.edu/vanm0049/myblog/fwk-carpenter-fig02_004.jpg)



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# LITERATURE REVIEW HIGHLIGHTS

**Most recently, papers on personality traits and loan repayment :**

- 1. Klinger, Entrepreneurial Finance Lab (2013)**, innovator of “full” psychometric models for credit assessment
  - Uses existing and new measures of personality and fluid intelligence
  - Find significant correlations of personality measures/default
- 2. Karlan (2011)**, used short-form tests (TIPI) in Philippines, found personality measures not strong predictors of default
- 3. Berneth (2012)**, found Big 5 personality traits (Conscientiousness (+) and Agreeableness (-)) significantly related to credit scores



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# 10 EXPERT INTERVIEWS

<b>REF</b>	<b>POSITION (Based In)</b>	<b>REGION OF EXPERIENCE</b>
W1	CEO, Scoring Provider (USA)	Worldwide
AF1	Head of Scoring, Bank (South Africa)	Africa
W2	VP, Bank (USA)	Worldwide
AS1	CEO, MFI/Bank (Philippines)	Philippines
AF2	Head Retail Credit, Bank (South Africa)	South Africa
AS2	Deputy Director, MFI (Tajikistan)	Tajikistan
W3	Consultant (Germany)	Worldwide
W4	Consultant (USA)	Worldwide
LA1	Consultant (Latin America)	Worldwide
W5	Consultant (Poland)	Worldwide



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# EXPERT INTERVIEW FINDINGS

## NATURE OF MICROFINANCE LENDING PROCESS

- Lack of official financial statements
- Loan officers create financial statements
- Lack of or inadequate credit bureau data
- Loan officer visits client business and home
- Borrower honesty, integrity, moral character important
- May use scoring models (expert/statistical) as support tool
- Loans are presented to credit committees for decision

**Impressions of borrower character discussed, not 'measured'**



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# EXPERT INTERVIEW FINDINGS

## HOW IS “WILLINGNESS TO REPAY” ASSESSED NOW?

1. Credit history in whatever form available (All)
2. Internal information on *bank* customer deposits (W2)
3. Cross-checks of borrower description of business with receipts, actual inventory, questions, etc. (W3) \*
4. Talks with relatives, neighbours, partners (AS1, W2, AS2) \*
5. Appearance of *home/business* (AF1, W4) \*
6. Connections in community (AF1, W2, AS2) \*
7. Demographics (age, marital status, education) (AF1, W4)

\* ***Investigated, but generally not measured***



# SYNTHESIS: WHAT ROLE FOR PSYCHOMETRICS in otherwise “traditional” credit scoring?

- Psychometric factors add much less ‘power’ when good credit history (behavioural) data is available (W1, W2)
- When no credit history, measure borrower personal qualities are related to the responsibility for obligations” evidenced by credit history.
- Look for things that are easy-to-document, verifiable, and unlikely to be ‘gamed’



# WHAT PERSONALITY TRAIT IS MOST LIKE “WILLINGNESS TO REPAY” ?

## 6 ‘FACETS’:

1. Competence
2. Order
3. Dutifulness
4. Achievement Striving
5. Self-Discipline
6. Deliberation

	Description
	Curious, original, intellectual, creative, and open to new ideas.
<b>C</b> onscientiousness	Organized, systematic, punctual, achievement oriented, and dependable.
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# WHAT PERSONALITY TRAIT IS MOST LIKE “WILLINGNESS TO REPAY” ?

Example of BIG 5 TEST (NEO FFI) item that measures a facet of conscientiousness: “I PAY MY DEBTS PROMPTLY AND IN FULL”

Berneth finds correlation between credit scores and conscientiousness

**C**onscientiousness

Organized, systematic, punctual, achievement oriented, and dependable.

## OTHER SUPPORTING EVIDENCE

Related personality dimensions (self control, responsibility) in the CPI test used “act frequency data” and “life history interviews” to show correlation with observable behaviours such as “listens attentively” (+) or “behaved in crude or impolite fashion” (-)

Psychology Academic Advisor suggests measure of “Responsibility for Obligations”

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# EXPERT INTERVIEWS SUGGEST 3 MAIN THEMES

## In How To Measure “WILLINGNESS TO REPAY”

1. Favour observable (easy-to-document or verifiable) components of the client interview/visit
2. Ensure questions not “transparent” if applicant self-assessment or loan officer judgment if required
  - Minimize Issues with awkward questions, ‘gaming’, honesty, ‘socially desirable’ responses,
3. Put proper incentives in place for loan officers (regardless of what exactly is measured)



# INTENDED NEXT STEPS

With partner bank in South Africa

1. Identify measures conceptually related to ‘Conscientiousness’ (“face validity”) and which loan officers could observe and record.
2. Look for existing or new “personality test” questions to measure ‘facets’ of Conscientiousness in a way that is not awkward or excessively transparent
3. Collect measures at time of application and observe performance data over time



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# PRELIMINARY ATTEMPTS TO HAVE LOAN OFFICERS MEASURE WILLINGNESS TO REPAY IN CHINA

	Best	Good	Average	low Average	Poor	
	优秀	良好	一般	略差	很差	
<b>Honesty and Transparency</b> 诚信透明度						
Borrower is friendly, honest and open 借款人态度友好，开诚布公	1	2	3	4	5	Borrower evasive and offers inconsistent information 借款人言语保留，所述情况前后不一
<b>Support from Family and Business Partners</b> 家人和商业伙伴的支持度						
Borrower has support of family and business 借款人有家人和商业伙伴的支持	1	2	3	4	5	Borrower does not demonstrate stable family / business relationships 借款人与家人/商业合作关系不稳定
<b>Clarity in explaining Loan Request</b> 贷款请求的清晰度						
Borrower clearly explains use of loan and source 借款人能够清晰的解释贷款用途及还款来源	1	2	3	4	5	Borrower unclear on explanation of how the funding will help the business 借款人无法清晰的解释该款项将如何帮助自己的生意
<b>Business and Home Appearance</b> 业务及住宅感官						
Business and home look well organized and clean 业务及住宅看起来组织良好、洁净有序	1	2	3	4	5	Business and/or home poorly organized, dirty, or inconsistent with borrower story 业务/住宅组织混乱、杂乱无章，或与借款人背景不符
<b>Financial Control</b> 财务控制						
Impression of borrower knowledge of business 借款人对经营方面的财务信息了如指掌	1	2	3	4	5	Borrower unable to answer questions about or provide financial information requested 借款人答不出来或者无法提供所需的财务信息

Bank 1: In Testing Since December 2012, still no problem loans

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# PRELIMINARY ATTEMPTS TO HAVE LOAN OFFICERS MEASURE WILLINGNESS TO REPAY IN CHINA

1 HONESTY	Best	Good	Average	Below Average	Poor	
Borrower is friendly, honest and open	优秀	良好	一般	略差	很差	Borrower evasive, and offers inconsistent information
借款人态度友好, 开诚布公	○	○	○	○	○	借款人言语保留, 所述情况前后不一
2 CLIENT'S CHOICE OF BUSINESS	优秀	良好	一般	略差	很差	
Matches long-term vision/business plan of client	○	○	○	○	○	Forced into line of business to make a living
3 REPUTATION		Positive	Neutral	Not Positive	None	
References from:						
Family		○	○	○	○	
Employees		○	○	○	○	
Neighboring businesses		○	○	○	○	
Customers		○	○	○	○	
Suppliers		○	○	○	○	
Other		○	○	○	○	

Bank 2: Currently on in Pilot Testing, no problem loans yet

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# PRELIMINARY ATTEMPTS TO HAVE LOAN OFFICERS MEASURE WILLINGNESS TO REPAY IN CHINA

SECTION 2: BUSINESS PROSPECTS							
5	BUSINESS APPEARANCE	优秀	良好	一般	略差	很差	
	Business looks well organized and clean	○ ○ ○ ○					Business poorly organized, dirty, or inconsistent with borrower story
	业务及住宅看起来组织良好、洁净有序						业务/住宅组织混乱、杂乱无章，或与借款人背景不符
6	OWNER INVOLVEMENT	优秀	良好	一般	略差	很差	
	Owner very involved; it is his/her main business	○ ○ ○ ○					Owner seldom around, busy with other things
7	ORGANIZATION/RECORD KEEPING	优秀	良好	一般	略差	很差	
	Very detailed and orderly records kept	○ ○ ○ ○					Lack of evidence that business controls its finances
	<i>For Retail/Service businesses</i>						
8	LOCATION	优秀	良好	一般	略差	很差	
	Excellent location, easy access, popular, many people	○ ○ ○ ○					Poor location, poor access and/or less desirable area

Bank 2: Currently on in Pilot Testing, no problem loans yet

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# EARLY LESSONS FROM CHINA

1. May work better to avoid rating scales
2. Need to train and coach loan officers to avoid ratings clustered in the best possible categories
3. Consider the role of Loan Officer incentives

Models also measure credit history—will be able to examine correlations and predictive power of new measures in comparison to traditional credit history info



THANK YOU.

QUESTIONS?



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