Enterprising Psychometrics and Poverty Reduction

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Abstract

Chapter 1

There is a huge lost opportunity in emerging markets. Between 310 and 380 million of small business owners want loans, and could earn very high rates of return on that additional capital if they could get it. Banks have this capital available, and want to lend it out, particularly to small businesses since competition in that segment is low, unmet demand is high, and the interest rates that can be paid are very attractive. But the connection between the banks and entrepreneurs just isn't happening, because it is extremely difficult for banks to evaluate risk and know who to lend to. The entrepreneurs running these small businesses typically lack credit history and collateral. They don't have well-formatted trustable financial statements, and many of their transactions are with cash. So banks have no means to identify the high-potential, honest entrepreneurs. Lending to small businesses in advanced economies suffered this same problem, until the banks started evaluating and serving small business more like they serve the mass individual segment rather than treating them as mini-corporations. One of the key innovations was to use individual borrowing history of the owner to evaluate risk for the small business loan, applying quantitative credit scoring. This approach lead to a rapid expansion in profitable and sustainable small business lending, because it leveraged what information was available, and did it in a way that kept transaction costs low so that banks could make a large number of smaller loans to businesses. But what can be done in emerging markets, where credit bureaus lack the depth and breadth of coverage?

Chapter 2

Industrial and Organizational Psychology has developed tools to solve a similar problem: personnel selection. Big companies need to select among a large number of individuals applying for a job. This has to be done with relatively low transaction costs, and there is little information available to separate the good candidates from the bad candidates—a very similar problem to that facing the banks. Psychologists have developed psychometric tools to measure things like personality, motivation, outlook, and intelligence, which are related to subsequent job performance. These tools have been shown to work even better than other methods like interviews and background checks, and are widely used. What if they could be applied to the selection of small businesses to lend to? We review a variety of academic studies that have already used these tools to evaluate entrepreneurs and distinguish entrepreneurs from non-entrepreneurs and good entrepreneurs from bad entrepreneurs. The studies center on three main themes: personality, intelligence, and honesty. The first two relate to the ability to repay a loan, in that they could identify entrepreneurs who are more likely to successfully grow their business and its cash flows. Honesty relates to the willingness to repay a loan, as banks need to worry not just if the entrepreneur has enough money to repay but if they then decide to repay or else take the money and run. These studies provide initial insight into what particular characteristics and abilities could be systematically related to credit risk, and used for future lending to small business owners who would traditionally be rejected by banks due to a lack of information.

Chapter 3

We took a set of the psychometric instruments reviewed in Chap. 2 and gave them to a sample of 1,580 small business owners. The majority of businesses had 0–5 employees, had been in operation for more than 3 years, and had $10,000 USD or less in monthly sales. The sample had nearly an equal mix of males and females, typically between the ages of 25 and 54, and over three quarters had at least completed high-school studies. These entrepreneurs were selected because they had loans at one of six participating banks and microfinance institutions across Peru, Kenya, Colombia, and South Africa. Most loans were between $800 and $3,000, though the banks in Kenya & South Africa included clients with loans from $20,000 up to $100,000. Each client was given the series of assessments by representatives of the financial institution. The clients already had their loans for at least six months, and therefore the clients knew that their answers would not directly impact their loan (i.e. a low-stakes setting). This is useful for research, though not ideal for implementation as psychometric tools for credit scoring would be used in practice in a high-stakes setting, where applicants will try to manipulate their responses to get approval of their loan application. In evaluating the contribution of psychometric instruments to better identify high-potential entrepreneurs and direct finance to their ventures, there are two principal outcomes of interest: Business performance (best represented with company profits); and loan repayment (i.e., did the person default). We collected loan repayment history from the financial institution, and profit levels as reported by the entrepreneurs, to compare to responses on the psychometric assessments.

Chapter 4

This chapter examines the relationships between psychometric assessments and the entrepreneur's business performance (profits) and credit risk (default). Regarding the Big 5 personality traits, extroversion is found to be strongly related to higher profit levels, with weaker relationships for agreeableness (positive) and conscientiousness (negative). Interestingly, integrity is found to have a weak negative relationship with profits: the most honest entrepreneurs aren't the most honest. Conversely, when considering default risk, the lowest risk entrepreneurs also tend to score higher on the integrity assessment, as well as register higher levels of conscientiousness. Digit span (fluid intelligence), controlling for level of education, is negatively related to profit levels, but is not related to default risk. When combined, these relationships with conscientiousness, honesty, and level of education have an AUC (a common metric of credit score predictive power) of 0.57–0.66, which is not extraordinarily strong when compared to credit scoring models in high-information countries and market segments, but it is sufficient to add significant value to the risk analysis task facing banks lending to SMEs in emerging markets. We show that for one of the sample banks, risk of default for low-scoring clients is 50% higher than it is for high-scoring clients. Furthermore, we show that these results can be improved by customizing models to each country and financial institution, which isn't surprising given the cultural differences between Peru, Colombia, Kenya and South Africa. While traditional methods of model building suffer challenges of doing this customization without large amounts of data, new methodologies such as Bayesian methods are shown to offer promise to improve results even further, making customization without over-fitting possible and further strengthening the case for using psychometric tools for credit risk analysis.

Chapter 5

While these current and potential entrepreneurs face numerous hurdles, the evidence clearly shows that the difficulties of financial intermediation for small and medium-sized enterprises are both significant and costly. Overcoming this barrier represents both a major profit opportunity for lenders and a major development opportunity for society at large, including of course entrepreneurs themselves. New tools that allow for screening and risk evaluation for small and medium-sized enterprises with low transaction costs and without depending on pre-existing information like borrowing history or business plans could represent a breakthrough in solving this problem. We have proposed one such tool, the use of psychometric tests, and evaluated its potential both conceptually, based on past studies, and based on a newly collected international dataset. The results show that there are some psychometric dimensions that have statistically and economically significant relationships with business profitability, which is of significant interest to investors, entrepreneurs, and capacity builders, and also that have significant relationships with default risk, which is of significant interest to lenders. Some of them are found to hold with surprising stability across a wide variety of countries, cultures, and business types. These questions could provide the boost to predictive power needed to bring millions of striving small business owners into the formal financial system and give them the capital they need to grow their businesses, if they can be successfully leveraged for credit screening. The Entrepreneurial Finance Lab (or EFL for short) is a company set up to work with banks to deploy this technology and realize this potential. Since 2010, the company has been implementing a credit-screening tool including psychometric content similar to that reviewed above, and modeled using the Bayesian hierarchical methodology.