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Scaling Up Affordable Lending: Inclusive Credit Scoring

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Executive Summary

Introduction: affordable lending, inclusive credit scoring and financial exclusion

The vision of affordable lenders is that everyone should have access to affordable and appropriate credit, delivered in a fair, respectful and responsible way. Affordable lenders are typically social purpose lenders, such as responsible finance providers and credit unions.

A known barrier to financial inclusion is the credit scoring approaches utilised by both mainstream and affordable lenders. Current approaches mean that there is an information gap and lenders do not always have the information they need to make a lending decision. Evidence in this report demonstrates the limitations of traditional credit scoring models in their ability to understand and capture the financial reality of consumers today to support full, fair and appropriate access to consumer credit markets. Increasing concerns with whether the current credit scoring methodology is fit-for-purpose for all segments of the consumer market is driving the development of new approaches, including what has been termed 'inclusive credit scoring'.

Inclusive credit scoring potentially closes the information gap by using alternative data that will predict a consumer's ability to repay. For lenders this means better underwriting when assessing a 'nonstandard' market. Following from this for consumers inclusive credit scoring means potential access to credit for those who would have scored poorly on a traditional credit check. For policymakers and regulators inclusive credit scoring has the potential to stimulate greater financial inclusion and fair lending. This report provides an overview of developments in 'inclusive credit scoring' including a set of seven case studies.

The traditional approach to credit scoring and its challenges

Credit scoring is a standard industry approach for a lender to assess the risk attached to a borrower, as the basis for the practice of underwriting and charging interest. It is a widely used process within financial services to make lending decisions that are within the business and organisational objectives. Credit scoring provision is dominated by a handful of companies globally, utilising similar data sources and similar scoring models.

However this traditional system is proving to be exclusionary for certain segments of the consumer markets as it lacks the capability to accurately assess the diversity of metrics that reflect the changing nature of people's financial and economic situations. This includes those consumers described as 'unscorable, invisible, underestimated, thin file, marginal, etc.' across consumer credit markets.

In a recent survey of over 300 US lending and consumer credit institutions, 87% reported that they declined applicants because they 'could not be scored', whilst 73% nevertheless agreed that there are many creditworthy consumers without access to credit.

As a result those without credit scores experience no or reduced access to credit, higher costs and greater risk in accessing credit through other channels. The implications of paying more for credit and being completely excluded on people's health and communities is well documented.

Approaches to inclusive credit scoring: comprehensive, alternative and inclusive

Inclusive credit scoring entails a variety of responses to traditional credit scoring practices and models in order to produce enhanced consumer access to finance markets. Such responses have

included different data sources, alternative forms of data, and the use of wider sets of financial and non-financial analyses to assess creditworthiness.

The aim of inclusive credit scoring approaches is not to ‘lower the bar’ for credit ratings but to address the shortfalls of traditional credit scoring models by making decisions based on a wider range of indicators that still indicate creditworthiness. Often, new approaches are being put forward using ‘alternative data’.

In a recent survey of over 300 US lending and consumer credit institutions, 34% reported that they used alternative data in some form (especially in new growth markets), and more than half of survey respondents believed alternative data would become widely used within the next three years.

Assessment of the value of alternative data is a fast developing arena, and many lenders continue to seek evidence that alternative data does improve risk assessments and support the building of profitable new markets.

Whilst the process can clearly support fairer access and financial inclusion, we cannot automatically assume positive financial outcomes. Recently, ‘predatory inclusion’ and ‘adverse incorporation’ has accompanied the extension of consumer credit markets. Alternatively, higher risk consumers can face ‘scoring inclusion’ but continued market exclusion, and struggle to improve a thick file of adverse data points. Although scoring inclusion would support the potential for such consumers to be targeted by mission-orientated affordable lenders and inclusion-driven policy initiatives.

Inclusive credit scoring: Case Studies

This report details seven case studies (summarised in Table ES1 overleaf) that illustrate how the credit scoring industry – mainstream, traditional, fintech, alternative, etc. – is seeking to generate new ways of understanding and capturing the financial worlds, behaviours and data of modern consumers. In seeking to support full, fair and appropriate access to consumer credit markets, **the case studies demonstrate the difference that inclusive credit scoring can make in achieving financial inclusion.**

About this report

Responsible Finance (RF) and Centre for Business in Society (CBiS), Coventry University have been funded by Oak Foundation to undertake a research programme to advance the supply of sustainable and affordable finance to consumers excluded from mainstream credit. The programme’s particular focus is to investigate how to overcome barriers to affordable lenders meeting consumer demand both at a national scale and sustainably.

Table ES1: Developments in Inclusive Credit Scoring

Case Study	Approach	Impact on Inclusion
VantageScore	Experian, Equifax and TransUnion To create consistency across scoring models To thicken credit files by using data already in credit files but which has not been used in dominant credit scoring models to date	Suggested that millions of near prime consumers who are 'unscorable' can achieve a score and default probability. Arguably accelerated other market leading bureau to consider and utilise alternative data, which generally sees enhanced inclusion
Aire	Fintech start-up that has just achieved credit bureau status Thicken credit histories and achieve scores for poorly served groups (young adults, migrants, etc.) Uses a 'virtual interview' to assess personal financial situation and personal maturity, alongside consumer contributed data, to create a FICO score	Company has scored over \$5billion of credit across a range of markets Seen credit approvals grow by up to 14% on average without increasing risk exposure, through thin-files made thicker
Trended Data	Experian Trended data (over time) rather than snapshots to deepen understanding of profiles and behaviour	Capability to score previously unscored consumers but broader distributional downsides also
Comprehensive Credit Reporting	The voluntary move from 'negative reporting only' of credit and payment activity to additional positive reporting in New Zealand, in 2012. Slow but accelerating uptake by banks, telecoms and other utilities	By 2012, 40% of open financial accounts reported – and CCR data highly predictive Substantial annual uplifts in lending made possible – inclusion and thickening – and prevention of bad debt costs and fraud Estimated contribution to New Zealand economy of \$328 million per annum
Alternative Data: Rental Payments	Experian and Big Issue Invest Thickening of credit files through the use of social tenant rental payments. Rental payments are treated as mortgage payment data Experian subsequently launched a private rental payments equivalent – reflecting, amongst other things, new millennial housing market dynamics	Social tenants are one of the most unbanked groups, high proportion of thin credit files – yet often regular payers on rent. Over 1 million tenants now joined, overall uplift in tenant credit scores plus other digital inclusion benefits
Social Media	Kreditch - 'Amazon of consumer finance' Scoring by using present, not historical, data as the basis for assessing credit risk; utilise social media as the data source Proprietary credit scoring technology based on AI and machine learning; algorithmic assessment of behaviour	'Financial inclusion for the underbanked' Loan book of 'middle two-digit million euros'. In 2017, secured EUR110 million investment from PayU to support PayU's global 300,000 merchant network
Psychometrics	Originally FICO Financial Inclusion Initiative with Entrepreneurial Finance Lab Low cost psychometric-based credit scoring, on-line tests and, increasingly, smartphone tests plus stored data Argued can provide stand-alone scores or boost predictive power of existing traditional models	To open up credit markets around the world to unbanked and underserved customers. See Sovcombank in Russia, Compuscan in Africa Coremetrix provide examples of credit inclusion at no greater risk and uplifts through thicker files

1 Why this Report?

1.1 Affordable lending, inclusive credit scoring and financial exclusion

The vision of affordable lenders is that in the UK, wherever people live, they should have access to more affordable and appropriate forms of credit, delivered in a fair, respectful and responsible manner, and which support financial resilience and reduced financial exclusion¹.

Responsible Finance (RF) and Centre for Business in Society (CBiS), Coventry University have been funded by Oak Foundation to undertake a research programme to advance the supply of sustainable and affordable finance products to the millions of consumers and families excluded from mainstream credit and lending markets. Its particular focus is to investigate how to overcome a number of known barriers to affordable lenders meeting consumer demand at a national scale and in a sustainable manner. One of those identified barriers is the issue of credit scoring.

The Oak Foundation (<http://oakfnd.org/>) commits its resources to address issues of global, social and environmental concern, particularly those that have a major impact on the lives of the disadvantaged. Responsible Finance (<http://responsiblefinance.org.uk/>) are the voice of the responsible finance industry. They support a strong network of responsible finance providers who are increasing access to fair finance across the UK. At their heart is the idea of bringing social and economic benefits to people, places and businesses.

This Report provides an overview of developments in ‘inclusive credit scoring’ including a set of seven case studies.

1.2 Credit scoring and ‘inclusivity’

Credit scoring has become an almost ubiquitous approach for a lender to assess the risk attached to a borrower, as the basis for the practice of underwriting and charging interest. Credit scoring provision is dominated by a handful of companies utilising similar data sources and similar scoring models.

Increasingly this traditional system is being shown to be exclusionary on a number of dimensions. Due to differing lifestyles and forms of engagement with financial systems, products and services, large numbers of the population are being defined as ‘unscorable’ and ‘invisible’ for the purposes of credit provision and/or through ‘thin data’ being at best ‘underestimated’ and, at worst, defined as ‘marginal’ (for example see Ellis, 2013; PERC, 2015; Transunion, 2016; id:Analytics, 2017).

The problem is that recent testing of such scoring classifications reveals that these classifications are not directly related to creditworthiness in substantial and growing numbers of cases². The suitability and legitimacy of the underwriting model is coming under question as traditional methods of credit scoring are leading to increasingly more creditworthy loan applicants being turned down, or charged extra, for credit.

It is in response to these growing issues with the suitability (and legitimacy) of traditional credit scoring models that the concept of ‘inclusive credit scoring’ has been developed. The concept entails a variety of responses to traditional credit scoring practices and models in order to produce fairer consumer access to, and greater inclusivity of consumers in, finance markets. Such responses have included, for example, alternative

¹ See, for example, <https://www.carnegieuktrust.org.uk/project/affordable-credit/> and <http://responsiblefinance.org.uk/responsible-finance-providers/what-is-responsible-finance/>.

² <http://www.experian.com/blogs/insights/2016/12/benefits-credit-scoring-options/>;
<http://www.idanalytics.com/press-release/id-analytics-use-alternative-credit-scoring-can-increase-financial-inclusion/>

forms of data, different data source infrastructures and the use of wider sets of financial (and non-financial) indicators.

Critically, the aim of inclusive credit scoring approaches is not to 'lower the bar' for credit ratings but, rather, for the full and fair consideration of the widest possible of the population for credit based on accurate and timely provision of data on financial health, ability and propensity to pay back (and, thus, creditworthiness and affordability of borrowing).

Inclusive credit scoring can:

- **For lenders**, increase underwriting efficiency, support better market segmentation and development and has been shown to allow more inclusive lending without increasing risk, delivering greater numbers of the population that can access credit and financial services in a fair and affordable manner
- **For consumers**, provide enhanced and fairer access to credit, allowing greater choice across the most appropriate products and reducing consumer detriment (such as avoidable costs, restrictive terms and, potentially, financial distress); and,
- **For policymakers**, see unmet but viable consumer credit needs met appropriately, both enhancing economic and social benefit for consumers, local economies and communities and avoiding the potential economic and social costs of financial exclusion.

1.3 The structure of this Report

Following this Introduction, Section 2 provides a short overview of traditional credit scoring approaches, and evidence of growing issues of suitability and legitimacy given growing demands for access to consumer finance.

Section 3 introduces the concept of inclusive credit scoring and presents a series of case studies to illustrate different development approaches being taken forward, and the difference they can make for inclusive finance.

2 The 'Traditional' Approach to Credit Scoring

2.1 What is credit scoring

Credit scoring is a system used by creditors to decide how much of a risk it is to lend to a potential borrower. In other words, the lender needs to assess the likelihood that the money lent will be paid back (ideally on time, to the full amount and allowing for costs of disbursement and loan management). It is a calculation of the probability that a credit holder will default, generally given their employment and financial history (Ritzer, 2001; Robinson and Yu, 2014); it supports 'risk based pricing' (Langley, 2008b).

It is argued that the history of 'credit-scoring models in some form' goes as far back as the history of borrowing and repaying itself. It reflects the desire to issue an appropriate rate of interest for undertaking the risk of giving away (one's own) money³. This assessment underpins the practice of underwriting and charging interest and, traditionally, often relied on an existing relationship between the borrower and lender. Through familiarity the lender could make a 'judgement call' about the credit worthiness of a potential customer (Langley, 2008c; Robinson and Yu, 2014).

With the advent of modern statistics in the 20th century, and greater data availability, the innovative development of credit scoring has supported the widespread expansion of consumer credit products and services across financial populations and geographies. From a lender's perspective, credit scoring has allowed a complex process to be simplified because it reduces the individual quality of risk to a single, simple number that strongly guides the decision as to whether someone should be offered credit. By providing a single number credit can be offered 'at a distance' and lending no longer need be based on an already existing personal relationship between the borrower and lender (Langley, 2008a).

It is important to note, however, that under regulatory rules, such credit risk analysis **must** sit alongside an additional assessment of 'affordability' by the lender⁴.

Credit scoring, then, is a widely legitimated and widely used process within financial services to ensure appropriate lending, in line with business and organisational lending objectives. It is a set of decision models and their underlying techniques that aid lenders in the granting of consumer credit. These techniques determine who will get credit, how much credit they should get, and on what basis, and guide operational strategies to enhance the profitability of different borrowers to lenders. As an enhancement to the credit analysis process, credit scoring is championed to provide statistically validated, objective and independent assessment of lending risk through a streamlined, efficient, quick and cost effective process.

2.2 How credit scoring works

When a person applies for credit, they complete an application form which tells the lender lots of things about them. Each fact about that potential borrower is given points. All the points are added together to give a score. The higher the score, the more credit worthy that person is. Creditors set a threshold level for credit scoring dependent on their lending

³ Deloitte (2016) Credit Scoring: Case Study in Data Analytics, April; <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-be-aers-fsi-credit-scoring.pdf>

⁴ In the UK it is the combination of these analyses that comprise a 'creditworthiness assessment' under FCA regulation. See FCA (2017) Preventing Financial Distress by Predicting Unaffordable Consumer Credit Agreements: An Applied Framework, July; <https://www.fca.org.uk/publication/occasional-papers/op17-28.pdf>; and for detail on the processes involved across lenders see FCA (2017) Assessing Creditworthiness in Consumer Credit: A Summary of Research Findings; <https://www.fca.org.uk/publication/consultation/cp17-27-research-findings.pdf>

objectives and business model. If the score is below the threshold they may decide not to lend or to charge more interest if they do agree to lend (Citizens Advice Bureau, 2017; Consumer Financial Protection Bureau, 2017)⁵.

In the UK, companies called 'credit reference agencies' (CRAs) compile information on how well a person manages credit and makes their payments. Their 'creditworthiness' is supplied to banks, building societies, retailers or other providers of credit. All CRAs hold similar information about individuals, and which fall into two main categories – public information and credit account information⁶.

Public Information consists of: Electoral Roll information gathered from the records of those eligible to vote compiled annually by local authorities, County Court Judgments and Scottish Decrees supplied by the Registry Trust, which holds a list of judgments on behalf of the Lord Chancellor's Department, Bankruptcies, Individual Voluntary Arrangements and Administration Orders obtained from the official London, Edinburgh and Belfast Gazettes or the Insolvency Service.

Credit Account Information consists of Account information (on a variety of accounts) which the major lending companies in the UK have agreed to share with each other. Thus, on a monthly basis, lenders will supply to the agencies details of their customers namely:

- Personal details, name, date of birth, etc.;
- Type of account held;
- Date agreement commenced;
- Current arrears status;
- Historic arrears status – the balance and amounts outstanding by duration; and,
- A range of indicators to indicate the management of the account.

This information is retained by the CRA for six years. This lets lenders check, when someone applies for credit, that the person applying has repaid other lenders in the past and the size of any outstanding loans. Lenders are bound in what they can provide to CRAs and the use they make of it by the Standing Committee on Reciprocity (SCOR). This is an industry group whose purpose is to define the rules regarding the reciprocal use of information. Whilst a company can refuse to supply information to a CRA it cannot refuse and have access to CRA's records.

Credit reference agencies also keep details of people an applicant is financially connected to, through joint credit applications or joint accounts. They also record any addresses a person has lived at and have details of previous credit searches on an account in the last 12 months (Robinson and Yu, 2016; Citizens Advice Bureau, 2017).

In the UK, until recently there have been three very dominant CRAs – CallCredit, Equifax and Experian – with new 'fintech' entrants now appearing such as Aire.

The most widely used credit scores worldwide are 'FICO'® Scores, the credit scoring algorithm created by Fair Isaac Corporation (hence FICO) (see Box 1). The FICO developed the formula used by all three major credit reporting agencies in the U.S.A. Base FICO Scores have a 300–850 score range. The higher the score, the lower the risk. But no score says whether a specific individual will be a "good" or "bad" customer. While many lenders use FICO® Scores to help them make lending decisions, each lender has its own strategy, including the level of risk it finds acceptable for a given credit product. There is no single "cut-off score" used by all lenders and there are many additional factors that lenders use to determine peoples' actual interest rates for lending products.

⁵ <https://www.citizensadvice.org.uk/debt-and-money/borrowing-money/how-lenders-decide-whether-to-give-you-credit/#h-credit-scoring>

⁶ House of Commons Library (2014) Credit Reference Agencies Briefing Paper 04070, March; <file:///C:/Users/ab5841/Downloads/SN04070.pdf>

Box 1: Tradition, Credit Scoring and the FICO way

The most widely used credit scores globally are 'FICO'® Scores, the credit scoring algorithm created by Fair Isaac Corporation (hence FICO).

The FICO credit score model is based on information contained in an individual's credit report, and is divided into five categories:

- Payment History - 35%
- Amounts Owed - 30%
- Length of Credit History - 15%
- New Credit - 10%
- Types of Credit Used - 10%

The formula used is the cumulative success of a number of calculative 'score card' techniques developed by FICO. In retail banking, 'scorecards' are the predictive statistical models used to assign customers to classes, and hence to appropriate actions⁷.

Score developers build credit models by comparing snapshots of data from the same group of individuals at different moments in time (typically, two years apart). Score developers attempt to isolate characteristics that correlate with the risk of default by analysing differences between the two snapshots. For example, 'a score developer may detect that customers who were using a majority of their available credit at the time of the initial snapshot are more likely to have defaulted two years later ' (Robinson and Yu 2016).

The FICO algorithm is kept secret, but most believe that it is based upon the ratio of debt to available credit; this denominator, in most cases, is a direct function of income. The score is then adjusted for payment history, number of recent credit applications, and negative events such as bankruptcy/foreclosure, as well as changes in income caused by changes in employment or family status (Arya et al, 2013).

Base FICO Scores have a 300–850 score range. The higher the score, the lower the risk. But no score says whether a specific individual will be a “good” or “bad” customer. Outlined on <https://www.experian.com/blogs/ask-experian/infographic-what-are-the-different-scoring-ranges/>, the scores are:

800 +: Indicates an exceptional FICO Score and is well above the average credit score. Consumers in this range may experience an easy approval process when applying for new credit. Approximately 1% of consumers with a credit score of 800+ are likely to become seriously delinquent in the future.

740 to 799: Indicates a very good FICO Score and is above the average credit score. Consumers in this range may qualify for better interest rates from lenders. Approximately 2% of consumers with a credit score between 740 to 799 are likely to become seriously delinquent in the future.

670 to 739: Indicates a good FICO Score and is in the median credit score range. Consumers in this range are considered an “acceptable” borrower. Approximately 8% of consumers with a credit score between 670 to 739 are likely to become seriously delinquent in the future.

580 to 669: Indicates a fair FICO Score and is below the average credit score. Consumers in this range are considered subprime borrowers and getting credit may be difficult with interest rates that are likely to be much higher. Approximately 28% of consumers with a credit score between 580 to 669 are likely to become seriously delinquent in the future.

579 and lower: Indicates a poor FICO Score and is considered to be poor credit. Consumers may be rejected for credit. Credit card applicants in this range may require a

⁷ See <https://www.youtube.com/watch?v=SOTj66g85OA> for a brief introduction into the development of a scorecard.

fee or a deposit. Utilities may also require a deposit. A credit score this low could be a result from bankruptcy or other major credit problems. Approximately 61% of consumers with a credit score under 579 are likely to become seriously delinquent in the future.

Sources:

Arya, S., Eckel, C., and Wichman, C. (2013). Anatomy of the credit score. *Journal of Economic Behavior & Organization*, 95: 175-185

Brinkley- Badgett, C. (2017). What Does FICO Stand For? What is a FICO Score? Available at <https://www.credit.com/credit-scores/what-does-fico-stand-for-and-what-is-a-fico-credit-score/>

Plug&Score - Credit Scoring Software. (2014). Scorecard Development Process. [online] Available at: <https://www.youtube.com/watch?v=SOTj66g85OA>

Poon, M. (2007). Scorecards as devices for consumer credit: the case of Fair, Isaac & Company Incorporated. *The Sociological Review*, 55(s2), 284-306.

Robinson and Yu. (2016). Knowing the Score: New Data, Underwriting, and Marketing in the Consumer Credit Marketplace. A Guide for Financial Inclusion Stakeholders. Ford Foundation.

2.3 The problem with traditional approaches to credit scoring

Credit scoring is designed to prevent some customers, and sections of the population, from accessing credit (Havard, 2010). For the most critical of voices, then, credit scoring itself is a problem for the democratization of credit because it is seen as intrinsically exclusionary (Kear, 2013). **On industry terms, however, and within the credit industry, what is become increasingly questioned also is the suitability of traditional models.**

In 2013, for example, 66 million Americans – or around a quarter of the adult population - were estimated by Experian to be ‘unscoreable’ through traditional credit scoring models:

‘...and without a credit score, they can’t get loans to buy cars, start businesses, get mortgages, rent apartments, or even get jobs’⁸ (Ashoka ,2013; Hurley and Adebayo, 2016)⁹.

Those without credit scores are locked out of the mainstream credit system or face reduced choice, higher costs and possibly greater risk in accessing credit through alternative lending provision. Most recently ‘credit deserts’ have been mapped (PERC, 2017)¹⁰, mirroring the earlier literature on ‘food deserts’¹¹.

The issue is that this ‘locking out’ has been shown to be increasingly only ‘loosely related’ to ability to pay for any lending. On closer inspection, of these 66 million ‘unscoreable’ adults, 10 million were, in fact, prime or near-prime consumers, the largest segments held professional jobs, more than 40% were shown to be homeowners and income distribution was in line with those who had been scored¹².

⁸ <https://www.forbes.com/sites/ashoka/2013/03/25/why-our-economy-needs-inclusive-credit-scores/#7e363e9e50d3>

⁹ See also Consumer Financial Protection Bureau (2015) Data Point: Credit Invisibles, http://files.consumerfinance.gov/f/201505_cfpb_data-point-credit-invisibles.pdf

¹⁰ PERC (2017) Changing the Lending Landscape: Credit Deserts, the Credit Invisible, and Data Gaps in Silicon Valley; http://www.perc.net/wp-content/uploads/2017/11/Credit_Desert.pdf

¹¹ <http://www.researchcatalogue.esrc.ac.uk/grants/L135251002/read>

¹² Ellis, B (2013) “Millions without credit scores not so risky after all,” <http://money.cnn.com/2013/08/14/pf/credit-scores/index.html>

Similarly, exemplifying the issue in specific markets, in August 2017, a new piece of legislation, the Credit Score Competition Act was put forward in the US Senate to include some of the 26 million 'credit invisibles' individuals in the US housing market. The current scoring models used by Fannie Mae and Freddie Mac (government sponsored mortgage providers) are over a decade old and do not consider rent, utility and mobile phone payments. It is argued this disproportionately hurts African Americans, Latinos and young people who are otherwise creditworthy¹³. Applied in South Carolina, the old credit models only score 77% of adults, whereas an additional 16% of adults have been shown can be scored using newer credit models.

In the UK, Aqua's Mind the Credit Gap report in 2012 surveyed 2,000 consumers and found that 57% were at risk of being turned down for credit. This included a third who were in full time jobs and a third who earned more than £50,000 per year. The most affected simply didn't have a credit history but other reasons included not being on the electoral register or a homeowner, alongside more expected reasons such as missing payments or having too many cards¹⁴.

In 2016, PWC (2016) estimated that between 10 – 14 million UK adults (or roughly 25% of the adult population) would be defined as 'near prime' credit consumers who may find it difficult to access credit from mainstream sources due to 'relatively minor blemishes' on their credit history¹⁵. This could be because of missing small numbers of payments but, equally, was identified as simply 'thin' credit histories (through lack of applications, potentially because they expected rejection, and/or incomplete credit records through inconsistent address histories or other anomalies). Indeed, even concerning late payments, supplementary research by Aqua with this 'near prime' group revealed that that 43% had never missed a payment in the past three years and, of the 57% remainder, the substantial majority had missed only one or two payments in the previous three years¹⁶.

Hence it was evidence such as this which led PWC (2016) to conclude how such 'near primes', roughly 25% of the UK adult population and growing, remain 'large and underserved' by the financial industry, accounting for only 8% of the credit cards held in the UK and with a choice of only four providers at the time of the research.

Thus, in a recent survey of over 300 US lending and consumer credit institutions, 87% reported that they declined applicants because they 'could not be scored', whilst 73% nevertheless agreed that there are many creditworthy consumers without access to credit¹⁷.

2.4 The issues of 'unscorable, invisibles and thin files'

Existing models of credit scoring are, then, exclusionary, creating 'invisibles', 'unscorable' and 'thin file' rated individuals. Indeed, this is being shown as an increasing problem as 'millennial' lifestyles almost 'sidestep' credit scoring models developed on lifestyles, financial systems and payment flows from a different era (PWC, 2015; ID Analytics, 2017)¹⁸:

¹³ <https://financialregnews.com/sens-scott-warner-see-inclusive-credit-scoring-model/>

¹⁴ <http://uk.creditcards.com/credit-card-news/consumers-swallowed-by-credit-gap-1356.php>

¹⁵ <https://www.pwc.co.uk/industries/financial-services/insights/uk-consumer-credit-outlook/banking-the-underbanked-the-near-prime-segment.html>

¹⁶ <https://newday.co.uk/media/32466/research-on-the-near-prime-credit-market.pdf>

¹⁷ <https://www.transunion.com/resources/transunion/doc/insights/research-reports/research-report-state-of-alternative-data.pdf>

¹⁸ <http://www.idanalytics.com/press-release/id-analytics-use-alternative-credit-scoring-can-increase-financial-inclusion/>

- **Life histories and lifestyle today:** This refers to a number of structural changes in the economy and society which are seemingly making individuals connections to the traditional information infrastructure of credit scoring ever more distant. One simple example would be 'migration', with 'portability' of credit histories across national borders rare and difficult. On landing on new shores, individuals have to rebuild credit histories. This sense of 'building credit histories' highlights that individuals need to undertake activities or 'touch' financial systems aligned to credit scoring models - and increasingly they often don't. Self-employment, the rise of the 'precariat' (Standing, 2014)¹⁹, and the 'gig economy' all illustrate changing forms of economic life history, and often delayed purchasing decisions – of cars, houses, insurances and, indeed, credit applications. Furthermore, increasingly precarious life histories imply much greater variegation, volatility and, at times, impairment in credit histories – and again, and in contrast to the implicit life course histories and behaviours sitting within traditional credit scoring models;
- **Data and indicators:** In parallel, and intertwined with such divergent histories and lifestyles, is the creation of new data sources, new data and new indicators which do reflect financial engagement and consumer behaviour – but which are simply not part of traditional models. Possibly the most striking example would be mobile/cell phones. Millennials may not own houses, for example, but penetration rates for telephones (and the credit contracts that go with them) are almost wholesale, yet such data is not generally part of traditional credit scoring models. Here, the issue is not only of 'unscorable' and 'invisible' but, also, 'thin' files – whereby limited information on credit files leads to declines, underestimation of creditworthiness or increased lending costs to overcome information deficiencies;
- **Poor, out of date and inaccurate data:** moreover, as the accountability and transparency of credit scoring systems have begun to be questioned what has become evident also is the simple partiality and inaccuracy of data that is being used as the basis for credit scoring. Inaccuracies can range from misspelt names, wrong addresses and inaccurate payment information to fraud and identity theft. In 2013, for example, a Federal Trade Commission report in the USA found that 20% of consumers had at least one error on one of their three major credit reports and that in 5% of cases this could have led to paying more for their credit²⁰. Similarly, in the UK, a Uswitch research investigation found that 38% of an on-line survey of consumers who had checked their credit reports in the previous 2 years had found an error, equating to nearly 5 million UK consumers²¹. These, however, were outnumbered by those who had never checked their credit report, or even knew that they were able to do so – the equivalent of 15 million consumers.

In a recent investigation of credit score reporting, the FCA (2017) examined the credit files of the same individuals from two CRAs, seeking as much as possible to control for time lags and so forth to ensure comparison²². The comparison of credit file debts was made for 1.2 million individuals who had taken out a high cost short term loan between January 2014 and June 2015.

FCA reported that the differences found in credit files were “substantial” – a difference of 24% or £1.6bn in total outstanding non-mortgage debts for the individuals in the group. Furthermore, large differences in the median reported debts were found, at £1,200 per consumer, and similar differences were observed for the numbers of products – a

¹⁹ Standing, G. (2014) *The Precariat: The New Dangerous Class*, Bloomsbury Academic

²⁰ FTC (2013) <https://www.ftc.gov/news-events/press-releases/2013/02/ftc-study-five-percent-consumers-had-errors-their-credit-reports>

²¹ https://www.uswitch.com/media-centre/2014/12/more-than-one-in-three-credit-reports-contain-errors/?ref=affilinet-473347&utm_source=Affilinet&utm_medium=Affiliate&utm_campaign=473347

²² <https://www.fca.org.uk/publication/occasional-papers/op17-28.pdf>; p.34 -35

difference of 21%, or 1.6 million credit items, in the total number of active non-mortgage and non-HCSTC credit items appearing on different credit files.

And examples reveal what the cumulative impact of this 'uneven' reporting can mean in consumer credit markets. Aside from simple decline or lack of choice of provider or particular products, an analysis of 5.2 million UK middle income households in 2014 calculated that the annual cost of having a poor credit score was £1,770 extra, on average, per year for basic, everyday goods and services per household, or £3.5 billion a year in total additional costs²³.

Or, Fair for You, a recently launched affordable finance rent-to-own offer, has reported substantial problems with lack of up-to-date and misreported data for customers and especially those who have previously used high cost short term ('payday') lending²⁴. The outcome has been that over a quarter of applicants have been turned down due to 'lack of information' by an organisation wholly committed to inclusive finance.

Given all of the above it is both 'no wonder', and extremely important, that Credit Reference Agencies, financial advisory and advocacy agencies and stakeholders for financial inclusion more broadly continue the recent and substantial drive for financial education around credit scores for consumers, and encouragement of their active management of this critical, but often hidden, process in their financial lives.

²³ Aqua (2014) The Cost of a Poor Credit Rating Report; <https://www.aquacard.co.uk/press-room/how-a-poor-credit-rating-can-cost-you-an-extra-1-200-a-year/>

²⁴ Angela Clements in Big Issue. Fair for You: "In the UK 15m adults can't access mainstream credit", 23 November 2017. <https://www.bigissue.com/opinion/fair-for-you-in-the-uk-15m-adults-cant-access-mainstream-credit/>.

3 Developing inclusive credit scoring

In recent years the disconnect between traditional credit scoring models and many and growing numbers of financial lives has triggered a rapidly emergent investigation of both the developments required of existing current credit scoring models and the search for new approaches. Taken forward by existing credit reference agencies and new entrants, these approaches are being driven by the development of 'big data', 'digital infrastructure' and the associated opportunities of disruptive new business models ('fintech').

3.1 Comprehensive, alternative and inclusive

Inclusive credit scoring is designed to address the shortfalls of traditional credit scoring by making decisions based on a wider range of indicators that still indicate creditworthiness.

Sharing an overarching methodology of using a more comprehensive data set than that employed in the traditional FICO system, there are a variety of developing approaches to inclusive credit scoring. Such responses have included, for example, different data source infrastructures, different types of data, and the use of wider sets of financial and non-financial analyses to assess creditworthiness.

The challenge of comprehensiveness is for scoring models and the data upon which they are based to be reflective of, and capture, creditworthiness within the diversity of contemporary lifestyles - and the financial and consumer behaviours they entail.

Both data and deeper challenges are reflected in the case studies put forward within this Report.

3.1.1 Alternative data

Often, new approaches are being put forward under the common label of 'alternative data'.

'Mainstream alternative data' generally refers to data that closely resembles baseline credit data due to it being similar to a monthly stream of payment information (say mobile phone contracts), obtained directly from the businesses that receive those payments from the consumer. This supports especially greater incorporation of individuals in to core lending markets through thickening of files, potential 'upscoring' and, in some cases, greater visibility and ability to score.

'Fringe alternative data' generally refers to new types of data about a consumer's behaviour – often non-financial data (such as local public records), and a growing array of forms of consumer-contributed data which individual consumers may or may not be fully aware of (for example, social networking patterns and social media interaction and psychometric test results) (Aitken, 2017; Robinson and Yu, 2014).

In particular, it is the accessibility to substantial and growing streams of fringe data which is driving new forms of behavioural analysis in scoring models such as through psychometric testing. Partly developed precisely in response to the problems for excluded consumer groups (young, migrant, emerging economies, etc.), these approaches have the greatest potential to bring large numbers of consumers in to credit markets through the ability for them to be made scoreable.

In 2016, a survey of 317 lenders found that while only 34% of those lenders currently used alternative data, more than half of survey respondents believed alternative data would become widely used within the next three years (TransUnion, 2016).

Differentiation was also evident across markets with 75% of surveyed credit card lenders reporting the adoption of alternative data into their loan decision making process. Rapid growth market lenders such as those in the automotive and consumer finance sectors were

reported also to be some of the first companies to go on record in either using or evaluating the use of alternative data, with 53% of surveyed lenders in both of those sectors reporting using alternative data (Lutz, 2015; TransUnion, 2016).

3.2 The potential impact on financial inclusion: ‘included, upscored, appropriate’

At one level the drive for inclusive credit scoring is simple and widely agreed across credit providers²⁵; its aim is to reflect more accurately a ‘true’ – or at least commonly recognised - creditworthiness rating of an individual consumer allowing ‘appropriate’ provision of credit. ‘Appropriate’ is, of course, in the eye of the beholder – whether that be the lender, consumer, regulator, or affordable lender.

For the credit market, the economic rationale is that the inclusion of additional data provides a fuller picture of a consumer’s likelihood and ability to repay. In other words it supports more informed risk based pricing and underwriting. Fuller (thick) files can support higher credit scores, and which generally equate with better lending access, terms and conditions. More fundamentally, they create visibility, the ability to be scored and, therefore, inclusion for consideration by credit market providers as new market opportunities.

In similar vein the process supports fairer access and financial inclusion – but care must be taken in assuming subsequent financial outcomes. ‘Sub-prime’ lending and all that it has entailed, including ‘predatory inclusion’ and ‘adverse incorporation’²⁶, has accompanied the extension of consumer credit markets. Alternatively, thicker files can also imply that higher risk becomes visible leading to scoring inclusion but continued market exclusion. Nevertheless this allows the individual consumer to be ‘framed’ within the credit market, positioning the individual in terms of ‘appropriate’ provision, including opening up the potential to be targeted by mission-orientated affordable lenders and inclusion-driven policy initiatives.

Assessment of the value of alternative data, then, remains a fast developing arena driven by a core requirement to understand its empirical validity in better understanding (segments of) financial consumers. Yet, as recently expressed by FICO when discussing its new XD credit scoring system inclusive of alternative data, it is suggested that:

“Only time will tell whether the quality of the data will be consistent enough to be included in scoring models”²⁷.

Similarly, in a recent survey for most non-users of alternative data, they sought data on outcomes such as evidence that alternative data does improve risk assessments and that alternative data builds profitable new markets²⁸. Yet that same survey also revealed over a third of lenders were already using alternative data and the case studies in this report demonstrate other examples which are driving market development and lending decisions.

More broadly, a growing number of recent reports have demonstrated in detail the potential impact of inclusive credit scoring on market provision and financial inclusion, including across different population and consumer segments.

²⁵ FICO and all the main credit reference agencies and bureaus are actively involved in developments as well as new fintech entrants and a broadening affordable lender sector.

²⁶ Indeed such has been the growth of these lender types that terms such as ‘predatory inclusion’ and ‘adverse incorporation’ have been coined to describe a situation where ‘fringe finance has become mainstream’ (French, 2014; Kear 2013; Aitken, 2015).

²⁷ <https://www.creditcards.com/credit-card-news/vantagescore-credit-score.php>

²⁸ See <https://www.transunion.com/resources/transunion/doc/insights/research-reports/research-report-state-of-alternative-data.pdf>

In 2012, the think tank Policy and Economic Research Council (PERC) put forward a post-financial crisis investigation of the use of utility bill data (energy and telecommunications) within existing consumer credit files in the USA. Through a detailed analysis, and working with existing credit bureau, the analysis showed how the inclusion of this alternative data helped low income individuals in credit scoring models whether the metric was a credit score change, a change in credit score tier or changes in portfolio acceptance given a target default rate²⁹.

Subsequently, in 2015, PERC brought together the range of early investigations in to the impact of alternative data in the USA³⁰. Reviewing a half dozen or so pieces of evidence across alternative data such as utilities, telecoms, pay TV and rent payments, and in various credit markets, PERC suggested that the results show:

- Consistently around 1 in 4 or 1 in 5 of the US population are credit invisible, and disproportionately comprise those of lower income, minority communities, both younger and elderly, and immigrants;
- Their risk profile is simply not monolithic, and certainly not monolithically high – some are high risk, some are low risk, and a large segment are of low to moderate risk highlighting a key group who are experiencing reduced access to credit, despite their creditworthiness;
- Minimal inclusion of alternative data could have substantial impact on making this population ‘visible’ – crudely, always the majority however minimalist the enhanced data approach taken³¹; and,
- Critically, “There is considerable evidence that the data is predictive for the previously unscorable population, as well as for others.” (PERC, 2015, p.16).

Similarly recent work by ID Analytics has revealed the potential impact on inclusion of alternative data across different market and population segments. Working with the data of ten lenders, covering the period 2012 – 2016, and across markets such as automotive, telecommunications and credit cards, their work focused firstly on ‘thin-file and no hit consumers’ and, secondly, on marginal or sub-prime consumers who are ‘included’ but suffer ‘underestimated’ creditworthiness³².

Concerning unscorable, 10 – 25% of the participating lenders records were unscorable consumers. ID Analytics was able to predictively score 75% of this population using alternative data and, subsequently, demonstrate that between 10 and 40% of the newly scored population would have been credit eligible without an increase in risk, dependent on lender market. Applied directly to the records of a top 10 US credit card issuer, processing between 5 and 6 million applicants annually, 224,000 previously excluded applicants could have been activated, with no additional risk, by incorporating an alternative credit score. A quarter of a million applicants at one lender might have been granted access to credit, or significantly better priced credit³³.

Within scored segments, around a third of credit scored US consumers have a score that places them in a poor or bad credit class (‘subprime’). Those marginal consumers who fall on the threshold of financial inclusion can be the most difficult to assess. Alternative credit

²⁹ <http://www.perc.net/wp-content/uploads/2013/09/WEB-file-ADI5-layout1.pdf>

³⁰ <http://www.perc.net/wp-content/uploads/2015/03/ResearchConsensus.pdf>

³¹ In 2017, PERC showed how ‘credit deserts’ in Silicon Valley (underserved areas with a high propensity of high cost lenders and credit invisibles) could be virtually eliminated through the use of easily available alternative financial data, <https://www.prnewswire.com/news-releases/perc-releases-study-on-credit-deserts-in-silicon-valley-300549207.htm>

³² <http://www.idanalytics.com/press-release/id-analytics-use-alternative-credit-scoring-can-increase-financial-inclusion/>

³³ http://www.idanalytics.com/media/WP_Consumer-Inclusion-Study_FINAL_WEB_0060617.pdf?utm_campaign=Web_White%20Papers&utm_source=hs_automation&utm_medium=email&utm_content=52864802&_hsenc=p2ANqtz-8Svz4-MHVcKO3YYdRtQPnzT1fsYJwewfZCQaASZcpZvsaJX04FWIBN8JQhDlwwGYw_XKhR0d_XPWjHIBoR0SmEABnJHw&_hsmi=52864802

information can support the credit position of such consumers who are often 'underestimated' with ID Analytics demonstrating how, for example, broader and more consistent history management of credit responsibilities can be identified consistently amongst 'marginal groups, including those who are rebuilding poor credit scores but in lending markets not captured by traditional credit bureau files.

3.3 Case Studies

In summary, inclusive credit scoring is designed to address the shortfalls of traditional credit scoring by making decisions based on a wider range of indicators that still indicate creditworthiness, but can cover also a greater proportion of the population.

A variety of developing approaches to inclusive credit scoring exist, mostly understood and put forward under the label of 'alternative data'. Yet what sits behind 'alternative data' is potentially much greater. It is about the behaviours of (existing, different and new) types of consumers, who engage with certain financial and non-financial infrastructures through their increasingly variant lifestyles, and by so doing generate a multitude of 'data'.

The potential exists for (some of) this different data to be captured, and translated in to indicators (and scorecards), which predict borrowing behaviour by that individual and their associated creditworthiness in lending markets. To describe such behaviours in 2017, across economies, populations and markets, is very different to the 'implicit world view' of such behaviours held in traditional scoring models generated in previous times.

In the case studies below we illustrate how the credit scoring industry – mainstream, traditional, fintech, alternative, etc. – is seeking to generate new ways of understanding and capturing the financial worlds, behaviours and data of modern consumers to support full, fair and appropriate access to consumer credit markets.

3.4 Case Study 1: Thickening through VantageScore

VantageScore

Who are they?

The VantageScore has been developed by the three major credit bureaus, namely Experian, Equifax, and TransUnion. The model is managed and maintained by an independent company, VantageScore Solutions, formed in 2006 and jointly owned by the three bureaus (Vantage Score: n.d.)³⁴. The credit bureaus developed VantageScore so that consumer credit scores would be consistent among all three credit bureaus. Prior to VantageScore, each of the credit bureaus used their own credit scoring model which led to differences in credit scores even for the same credit report³⁵.

What are they doing?

VantageScore is the most prominent example of an alternative credit scoring model because it is the major alternative used amongst mainstream finance, and which is claimed to now hold a 10% market share³⁶. Some key basic principles of the traditional FICO credit scoring model still apply to Vantage Score - such as making all payments on time, keeping balances low and only applying for new credit when necessary – but otherwise its methodology differs in several key ways.

First, VantageScore makes use of data that is generally already in a consumer's credit report, and scores more people simply because it uses more of this credit file data than is considered by the FICO method. Second, the composition of the score differs. The different components of the two respective scoring systems are outlined in Exhibit 1. Experian (n.d.) argue that the most influential factor in determining a VantageScore credit score is payment history, while age and type of credit, and the percent of credit limit used are highly influential. Recent credit behaviour and inquiries and available credit are less influential. In comparison, FICO places greater emphasis on amounts owed (supposedly 30% of the formula).

Exhibit 1: FICO Score Components

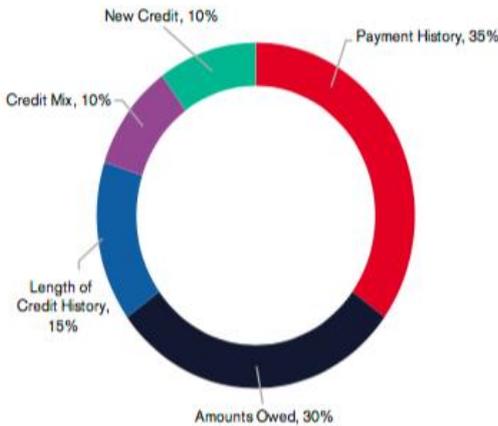
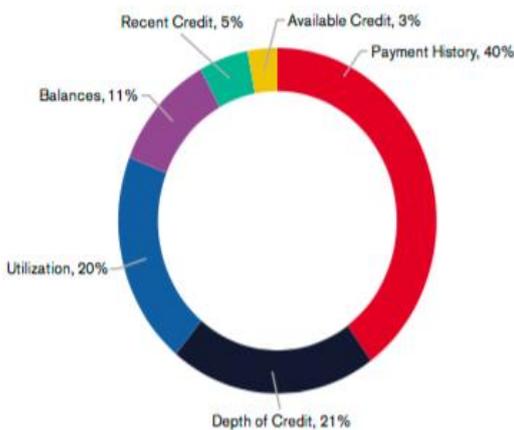


Exhibit 2: VantageScore Components



³⁴ See <https://your.vantagescore.com/why-we-exist>

³⁵ <https://www.thebalance.com/vantagescore-credit-score-overview-961140>

³⁶ See <https://www.vantagescore.com/scores-more-people>

Source: DBRS, 2017

Third, VantageScore can also take into account alternative data such as rent, if it is collected. In 2011, Experian became the first major bureau to include residential rental payment data into its credit reports. TransUnion began accepting rental payments in 2014 and Equifax not until early 2016. Most landlords, however, still do not report rental history to credit bureaus, so the amount of available data is limited. Fourth, VantageScore has a wider scoring range than FICO. For FICO scores range from 501 to 990, but for the more recent model - VantageScore 3 - scores range from 300 – 850. Fifth, another key difference is that FICO requires at least six months of history and at least one account reported in the past six months. In contrast, VantageScore only requires one month of history (useful for migrants and young adults) and allows for an up to two year period for an account to be reported to the bureau. Sixth, the two scores differ over which late payments are penalized. While FICO treats all late payments equally, VantageScore penalises late mortgage payments more than it does other types of credit. A seventh and final distinction between the two models is that while hard credit inquiries impact both VantageScore and FICO scores only minimally (especially when compared with other, more serious, scoring factors), each scoring model offers consumers a different benefit not provided by the other when multiple inquiries appear on a credit report for a single type of credit transaction. While both treat multiple inquiries posted within a focused period of time as a single inquiry, they differ in their “deduplication” methods. For example, FICO uses a 45-day span, while VantageScore uses 14 days. Crucially for the purpose of ‘thickening files’, VantageScore applies this special treatment across all types of credit (cards, autos, etc.), while FICO only applies it to mortgage, auto and student loans.

The difference it makes to financial inclusion

More than 6 billion VantageScores were pulled in 2014-2015, double the previous year. VantageScore (2014) claim that the most recent version of the model allows 30-35 million near prime consumers who are not normally scored by conventional methods to be scored and assigned a default probability³⁷. FICO remain to be convinced as to whether the quality of alternative data will be consistent enough to be useful for determining risk.

Consumer advocates do have concerns about alternative data also. For example, utility payments are often missed to a greater extent by thin file borrowers, thus inclusion as data and indicators might lead to greater flags, rather than fewer, on credit reports.

Major obstacles to the future widespread use of VantageScore exist. The first is the dominant market position of FICO. FICO remains the industry standard and its scores are used in "more than 90% of lending decisions," and by 95 of the top 100 largest U.S. financial institutions (FICO, 2017). A second obstacle is that it is costly for lenders to switch scoring models³⁸. Third, FICO has also begun competing with VantageScore's ability to score cardholders with little or no credit history, by introducing new credit scores that also incorporate non-traditional data (for example, XD)³⁹.

Arguably, VantageScore has already instigated major change in the industry by ‘pushing’ FICO to consider alternative data products, the provision of free credit scores and informing consumers about how to improve their credit scores, including by shopping around.

³⁷ See https://www.vantagescore.com/pdf/VantageScore_UniverseExpansion-WhitePaper_FINAL_032114.pdf

³⁸ <https://www.vantagescore.com/news-story/194/vantagescore-turns-10-what-it-why-it-matters>

³⁹ <https://www.vantagescore.com/news-story/194/vantagescore-turns-10-what-it-why-it-matters>

3.5 Case Study 2: Thickening the Aire way

Aire

Who are they?

Aire is a London based 'fintech' start-up which was founded in 2014 by Jon Bundy, Dr Srin Sundaram and Aneesh Varma⁴⁰. In 2016 Aire announced that it was authorised and regulated by the UK Financial Conduct Authority, placing Aire on the same playing field as the big three credit bureaus of Equifax, Experian and Creditcall. Aire has also announced strategic partnerships with P2P lender Zopa and the UK arm of vehicle finance company, Toyota Financial Services, who will leverage Aire's API (application programming interface) to enhance their underwriting and lending decision processes. In July 2017, Aire successfully raised \$5m through a funding call⁴¹.

What are they doing?

Aire argue that 'people should have equal opportunities for financial products despite changing realities of work, lifestyle and careers in this modern economy'⁴². Taking this approach, Aire aims to thicken the thin credit history of applicants such as young adults, the self-employed or those who have recently moved country – and all of whom are poorly served by the dominant credit scoring models, including being 'unscorable or invisible'.

Aire describe their product as an algorithmic credit scoring engine that 'emulates the human intelligence of underwriters'. Therefore, it is a form of machine learning where computers have the capacity to learn without being explicitly programmed. The firm states that they do not scrape social media data for credit analysis, all data is collected with the consent of the consumer and that there is 'no data bias such as gender or race.' Aire believes that looking at individuals who display a fundamental ability to comprehend their personal financial situation – those who show financial maturity – can be a powerful indicator of an individual's propensity to being able to handle debt responsibly.

Aire uses a *virtual interview*, which changes the respondent intelligently based on responses, to get a more accurate, nuanced picture of the person applying for credit. The credit interview tries to be like a traditional bank interview for credit. A score is then given on a FICO curve.

The difference it makes to financial inclusion

The company has already scored over \$5 billion of credit across various categories of consumer credit. Because Aire's credit risk analysis gives lenders access to a new pool of thin-file borrowers, the company has seen credit approvals grow by up to 14% on average, without increasing risk exposure.

⁴⁰ <https://www.crunchbase.com/organization/aire>

⁴¹ <https://www.finextra.com/newsarticle/30867/credit-scoring-startup-aire-raises-5m-wins-zopa-deal>

⁴² <http://www.p2pfinancenews.co.uk/2017/07/21/zopa-signs-up-to-artificial-intelligence-credit-scorer-aire/>

3.6 Case Study 3: Deepening through Experian's Trended Data

Trended Data

Who are they?

Experian are one of the 3 major credit reference agencies. Experian have two main market driven motivations for investing in 'trended data' approaches to credit scoring⁴³. Firstly, they argue that deepening through trended data is 'critical for portfolio growth'. As customers have already been acquired lenders should not waste the opportunity to maximize returns through further lending activity. Secondly, there is risk that a customer that is demonstrating improved credit behaviour could be attracted to another company due to high levels of competition in the consumer credit industry⁴⁴.

What are they doing?

Traditionally, credit scores have incorporated one snapshot in time of a consumer's history of credit usage. Experian advocates the use of trended data in credit scoring to deepen the understanding of a consumer's credit profile. Trended data incorporates past history connected over time to indicate risk level based on the trajectory of a consumer's debt balances, spending and actual payment amount. In other words, this data allows one to see *a general direction in which something is developing*. Trended data helps to provide an account of how a consumer uses credit, or pays back debt over time (Experian, 2016). Historical consumer credit behaviour is powerful information that can give a clearer indication of how consumers might pay off their financial debts in the future. Using a consumer's historical payment information provides a more accurate assessment of future behaviour, which in turn helps effectively manage changes in risk. The use of trended data is motivated by being able to ask certain questions, such as:

- Are the consumer's overall payments increasing?
- Is his/her credit card utilization decreasing?
- Are the overall card balances remaining consistent or declining?
- Could the consumer be within your credit score guidelines within a month or two?
- Could a competitor acquire the consumer a month or two after you declined him/her?

Experian's Trended Data is comprised of five fields of historical payment information over a 24-month period. It includes:

- Balance Amount
- Original Loan / Limit Amount
- Scheduled Payment Amount
- Actual Payment Amount
- Last Payment Date

Experian provides an example to show that by using trended data, customers who started out with the same credit score can have differential access to credit lines once trended data is included in the credit scoring calculation.

⁴³ https://www.experianplc.com/media/1323/8151-exp-experian-history-book_abridged_final.pdf

⁴⁴ <http://www.experian.com/blogs/insights/2017/07/using-trended-data-for-deeper-lending/>

	Credit Score	% aggregate change in total balances over 6 months	% aggregate change in bankcard balances over 6 months	% net change in scheduled bankcard payment over 3 months	Line increase (lender decision based on data)
Customer Sam	667	-12%	-26%	-11%	✗
Customer Bob	667	+22%	+33%	+14%	✓
Customer Patty	671	+19%	+19%	+12%	✓
Customer Linda	669	-9%	-36%	-21%	✗

The difference it makes to financial inclusion

A CreditVision study found that approximately 26.5 million previously "unscorable" U.S. consumers can be scored in the prime and near prime tiers using a risk score built on trended information.

However, Forbes does warn that trended credit scoring is likely to have distributional consequences, unless there is a widespread understanding of how trended data scores differ to FICO scores. Forbes argues that credit card customers who pay their balance in full every month, and do not use their credit card to borrow money, will benefit. Alternatively, people who are in debt but have tried to improve their credit score by getting into and managing further debt could be penalized by trended data scoring. This suggests limits to the inclusivity offered by trended data.

According to research published by Barclays in 2016, the 'limitations of technology have historically prevented its widespread use'. Change 'requires people, process and technology; and 'trended data' has historically been difficult to deploy with a lot of testing required.' Experian now believe that they are at a technological point where trended data can be used to deepen credit scoring. They argue that trended data does have predictive power and can provide additional insight and knowledge beyond the traditional credit report to drive additional understanding of credit behaviour across the customer lifecycle. Forbes does agree that the importance of trended data in credit scoring 'will likely increase over time'⁴⁵.

Experian do caution that trended data may only be viable for well-resourced credit reporting agencies. This is because an agency needs to be able to analyse an enormous amount of data. Five fields of data across 24 months on every trade is huge and can be difficult for lenders with limited analytical resources to manage. For example, a single consumer with 10 trades on file would have upwards of 1,200 data points to analyse. Multiply that by a file of 100,000 consumers and you are now dealing with over 120,000,000 data points. Given such a scenario, it is worth noting that a 2014 study by the National Consumer Law Centre found that even in a 'small sample' the consumer information housed by data brokers was riddled with errors. In other words, more data does not necessarily mean that the data is accurate (Yu and McLaughlin, 2014).

⁴⁵ <https://www.forbes.com/sites/nickclements/2017/05/03/how-to-ensure-trended-data-doesnt-destroy-your-credit-score/#571efa0c3940>

3.7 Case Study 4: Comprehensive Credit Reporting in New Zealand

Comprehensive Credit Reporting

Who are they?

Prior to 2012, in New Zealand information that could be shared about consumers by credit bureaus in the country was limited to 'negative' activity – number of credit applications made, defaults, bankruptcy, etc. and was known as 'negative credit reporting'. Aside from clearly providing only partial data on borrowing and payments behaviour the system had substantial issues with accuracy and timeliness of data⁴⁶.

In April 2012, New Zealand moved to a voluntary 'Comprehensive Credit Reporting (CCR)', or 'positive' credit reporting system, representing the development of 'full' credit files incorporating a range of positive and negative data⁴⁷. It is widely recognised that the 2012 Credit Reporting Privacy Code 2004 ("the Code") amendments are possibly the most significant changes ever made to New Zealand's credit reporting framework⁴⁸. Whilst adoption of reporting was initially slow, if steady, New Zealand consumers saw a nationwide uplift in credit scores when two of the largest banks began positive reporting in 2017, and with the remaining largest two expected to follow suit soon after⁴⁹.

Requiring substantial investment in collation and reporting infrastructure, it is argued by many within the sector that adoption would possibly have been faster and deeper if the scheme had not sat alongside one of the most intense periods of legislative and regulatory activity of banking and financial services ever, both globally and within New Zealand.

What are they doing?

CCR allows for more information to be collected and reported by credit reporters. It expands the information that credit reporters can collect and is argued to provide a more balanced view of an individual's credit history. In addition to the negative information such as previous credit enquiries, defaults, etc., CCR allows for the following account, lending and payment data to be collected and reported on:

- Type of account, e.g. credit card, personal loan, home loan, utilities, telecommunications service;
- Amount of credit extended, i.e. a credit limit, but not current balance;
- Status of account as open or closed (and dates opened and closed);
- Details of credit provider i.e. the lender of the account; and,
- 24 months repayment history.

It is clear that repayment history data offers credit providers valuable insights into their customers' (positive) credit behaviour. In addition, this information can alert credit providers to hardship or financial difficulty and ensure a customer isn't further indebted without having sufficient capacity to repay financial commitments. Repayment history also gives consumers the ability to demonstrate they have rehabilitated their credit behaviour following an adverse event; for example, a clear repayment history over a period of up to 24 months after a payment default.

⁴⁶ <https://www.harmony.co.nz/how-it-works/comprehensive-credit-reporting>

⁴⁷ For a 'first principles' overview and initial investigation of the impacts of a move from negative to full file reporting see PERC (2013) <http://www.perc.net/wp-content/uploads/2013/09/PERC-Report-Final.pdf>

⁴⁸ <https://www.privacy.org.nz/assets/Uploads/Veda.pdf>;
http://dnb.co.nz/_media/documents/DNB_Comprehensive%20Credit%20Reporting_WhitePaper.pdf

⁴⁹ <https://www.stuff.co.nz/business/money/89742012/Sudden-leap-in-NZ-credit-scores-but-we-re-no-better-with-money>

By 2016, it was estimated that two-thirds of New Zealand adults had CCR data loaded into their files, through the voluntary participation of more than ten banks, telecoms and utilities providers – and prior to the 2017 entry of New Zealand’s largest banks in to the scheme.

Critically, the point at which there was sufficient CCR data loaded to become highly predictive was reached in March 2014 when 40 per cent of open financial accounts were reported under CCR⁵⁰.

The difference it makes to financial inclusion

In 2016, two of the three credit bureaus in New Zealand stated:

“Even at this early stage of adoption in New Zealand, the benefits observed from Comprehensive Reporting are compelling” (Dun and Bradstreet, 2016, p.2&p.3)

“Veda supports the 2012 reforms and the evidence to date reinforces credit reporting information's role in responsible lending, credit rehabilitation and consumer protection. We welcome participation with the OPC on how best further refinements can be achieved” (Veda, 2016, p.4)

More specifically, Veda (2016) noted the introduction of comprehensive credit reporting information into a range of lenders' internal risk models had demonstrated a significant improvement in the ability for a credit provider to distinguish true credit risk, including:

- for one lender, a potential uplift of \$200m in net borrowing, increased loan approval rates of 7% with no additional risk and a potential 15,000 additional people lent to given their credit rehabilitation track record;
- for another lender, a quarter of the worst scoreband population being reassessed as having reasonably good credit risk; and,
- for the most deprived postcode areas in New Zealand based on the Index of Multiple Deprivation, 29% of postcodes reassessed as having good or reasonable credit scores, equating to a gain of a net six per cent of people living in these postcodes who now had credit scores likely to secure mainstream credit.

Similarly, Dun & Bradstreet (2016) noted:

- the greater revealing of credit risk leading to the prevention of \$108m per annum of bad debt costs, alongside further closing of obvious loopholes for active fraudsters amounting to circa \$100m saved per annum;
- in contrast, identifying that circa 17% of credit active New Zealand consumers are very low risk but previously hidden in their behaviour, allowing an additional circa \$1b to be responsibly lent per annum, and resultant income for banks of circa \$100m p.a.; and,
- equating to economic benefits of \$328million p.a. to the New Zealand economy.

Nevertheless, whilst seeing net lending gains under current lending models, CCR transparency has revealed also substantial numbers of the population missing payments in any past 24 month period (possibly up to a third), rates of undisclosed debt as high as 20 to 25% and continued issues of mismatched and accurate data.

⁵⁰ <https://www.privacy.org.nz/assets/Uploads/Veda.pdf>

3.8 Case Study 5: Alternative data: Rental Payments, Big Issue Invest, Experian and the Rent Recognition Challenge

Rental Payments as Alternative Data

Who are they?

In 2010, Big Issue Invest partnered with Experian and created The Rental Exchange to help tackle the credit market challenges faced by rental tenants in the UK. Big Issue Invest is a social enterprise which was set up in 2005 as the social investment arm of The Big Issue, best known for its magazine. The Big Issue Group's mission is to dismantle poverty by creating opportunity through self-help, social trading and business solutions⁵¹. Experian are one of the 3 major credit reference agencies. The partnership offered a market expansion opportunity but, also, a corporate social responsibility avenue given Experian's view that everyone should be treated equally, whether a homeowner or tenant⁵².

What are they doing?

The initiative is geared towards thickening credit files. The project has focused on social housing tenants as a major 'unscorable' or 'thin file' group in credit scoring. Social housing tenants are significantly poorer than the population average, have been shown to be the most unbanked, and are therefore often excluded from the credit mainstream – and the ability to build a credit history (Forster and Wilkinson, 2010)⁵³. Experian found that nearly 30 per cent of social housing tenants had thin/empty credit files (i.e. they had limited or no information recorded with a credit reference agency), which is very high – nearly twice the UK average for the credit active population. Nevertheless, as tenants, generally they are making regular and often long term payments, but rent payment is not part of traditional credit scoring models, leaving them unable to 'prove' themselves as 'reliable payers' (or creditworthy). Sharing 'alternative' data, such as rent-payment data, could help bridge this information gap by providing a fuller picture of people's payment behaviour, facilitating their inclusion into mainstream finance.

The principle behind The Rental Exchange is that rental payment data can be analysed in the same way as mortgage payment data⁵⁴. The Rental Exchange will incorporate a tenant's payment history in their credit file. A tenant pays their rent to a third party called Credit Ladder, which in turn passes on the payment to the landlord or lettings agency. Credit Ladder then reports the timely payment to Experian, which updates the tenant's file.

All information is held by Experian and treated in accordance with the Data Protection Act, in a secure and compliant way. Data cannot be used for marketing purposes and can only be made available to a company or organisation if the tenancy information is relevant and if the tenant has agreed to a credit check (Big Issue Invest, 2017). Experian first tests out the value of adding rent data to tenants for each housing provider that comes on board and then works with the provider to ensure the rent payment data is cleaned and all records are accurate before transferring it to live data sharing.

⁵¹ <https://bigissueinvest.com/about-big-issue-invest/>

⁵² <http://www.experian.co.uk/rental-exchange.html>

⁵³ Forster, S and Wilkinson, G. (2010) The impact of social housing rent payment data on credit scoring, Big Issue Invest; <https://www.experian.co.uk/assets/rental-exchange/bii-rent-data-report-dec-2010.pdf>

⁵⁴ <https://bigissueinvest.com/the-rental-exchange/>

The difference it makes to financial inclusion

Over 1 million tenants have now been signed up to The Rental Exchange. A white paper by Big Issue Invest found that in over 70% of cases, tenants with no significant arrears saw a positive increase in their credit score. It has also offered the ability for tenants to create an on-line proof of identity. The result is increased access to, and affordability of, credit and other basic goods and services (Big Issue Invest 2017)⁵⁵.

The main obstacle is, however, rent arrears – which are growing – and which will damage a credit record. Similarly, the suggestion that Council Tax is a further alternative data source that could be included in credit scoring models has been met with some alarm. It is generally recognised that when in financial stress, Council Tax is one of the last payment duties to be fulfilled by households. The total amount of council tax arrears outstanding in early 2017 was £2.8 billion, an increase of £179 million in two years⁵⁶.

Experian has moved on to create a further rental payments database – for private rental payments, and which illustrates the need to move credit scoring systems to reflect the new economic and social dynamics of modern economies. Experian's RentBureau database is a system that holds records of over 12 million residents and allows rental payments to be systematically recorded and made available to financial services firms (Aitken, 2017). Rental payment records are of particular interest to alternative credit scoring experiments because they offer a long and consistent pattern of payments involving a relatively large proportion of income (PERC, 2015). RentBureau receives updated rental payment history data from property owners/managers, electronic rent payment services and collection companies every 24 hours. It then makes that information available immediately to the rental industry through its resident screening partners⁵⁷. Again, however, a growing obstacle is the rising trend in missed rental payments and arrears⁵⁸.

Most recently the UK Government has launched the Rent Recognition Challenge: Using Fintech to Help Renters – a £2 million Prize Fund, open to all, challenging firms to develop new applications, or build on existing ones, to enable rental tenants to record and share their rental payment data with lenders and credit reference agencies (see <https://www.gov.uk/government/publications/rent-recognition-challenge-using-fintech-to-help-renters>) .

⁵⁵ <https://images.bigissueinvest.com/2017/04/bii-rental-exchange-white-paper.pdf>

⁵⁶ <https://www.stoptheknock.org/storage/app/media/downloads/money-advice-trust-stop-the-knock-2017-report.pdf>

⁵⁷ <http://www.experian.com/rentbureau/renter-credit.html>

⁵⁸ <http://www.letalliance.co.uk/2015/09/the-rising-problem-of-rent-arrears/>

3.9 Case Study 6: A New World of Social Media

Kreditech

Who are they?

The aim of Kreditech is 'financial freedom for the underbanked'. Founded in 2012, Kreditech is a German fintech start-up from Hamburg, whose founders Alexander Graubner-Müller and Sebastian Diemer previously worked at German tech startup Rocket Internet. Interested in providing financial services to e-commerce customers in emerging markets, the company states that its mission is to improve financial freedom for the underbanked through the use of technology. The company's core markets are Russia, Czech Republic, Poland, Mexico and Spain⁵⁹. In 2016, Kreditech Russia achieved microfinance company status.

What are they doing?

Kreditech is attempting to thicken or create credit files by moving beyond a reliance on historical data. The principle is that present behaviour, and the way this is developing, can be considered a better indicator of credit risk. And the data source for such behaviour can be social media. Kreditech's approach is that they see social media as a repository for unprecedented amounts of information that can support decisions about an applicant's creditworthiness⁶⁰. Social media channels include blogs, wikis, social bookmarking, social networking sites, status update services and media-sharing sites. Such channels allow users to participate in online exchanges, join online communities or contribute user created content (Dewing, 2012). The data has abundant social parameters like trust, interaction intensity between the users, and the social groupings found in these forms of networking. This offers an arena for the capture of the 'soft factors' key in the default process of a loan portfolio (Ntwiga and Weke 2016). Harvesting such data 'in the form of unstructured text' is also known as site scraping, web harvesting and web data extraction (Batrinca and Treleven, 2014).

Data can be aggregated in a straightforward fashion, while the social interactions over time leave a trail of history that informs others about our abilities and behaviours (Jackson, 2008; Chen et al, 2008). The lofty ambition for such techniques is that 'all data' could become 'credit data' (Aitken, 2017). For example, data provided by a borrower such as education or employment history can be validated using social media. Social media posts can verify the stated loan purpose. A lender could also gain information about spending habits by checking social network check-ins (PwC, 2015).

Kreditech use a proprietary credit scoring technology based on artificial intelligence and machine learning, processing up to 20,000 data points per application, the majority of which is drawn from social media in one form or another⁶¹. As such, an algorithm is used to estimate human behaviour.

The difference it makes to financial inclusion

Kreditech's products include consumer loans, a digital wallet and a personal finance manager designed to help customers manage their credit score and plan their spending. Kreditech also offers a "Lending as a Service" model, allowing partners to integrate

⁵⁹ <https://www.kreditech.com/what-we-do/>

⁶⁰ <https://www.pwc.com/us/en/consumer-finance/publications/assets/pwc-social-media-in-credit-underwriting-process.pdf>

⁶¹ <https://www.kreditech.com/what-we-do/>

Kreditech's credit products via an API into their own platform and services⁶². They report that they aim to become an 'Amazon for consumer finance'⁶³.

Kreditech is much smaller than a bank with a loan book in the "middle two-digit million euros", (FT.com)⁶⁴. At present the company is lossmaking, estimating its revenues for 2015 at about €41m. However, this is typical of a new tech startup and in 2017 KPMG and fintech investor H2 investors announced that Kreditech was ranked 7/100 in their shortlist of the top 100 international fintech startups. In May 2017 Kreditech announced that they had secured EUR 110 million investment from global online payment service provider PayU. As part of the deal, Kreditech and PayU have agreed a global partnership to deliver a joint proposition for Point of Sale Finance. Kreditech will expand its Lending as a Service (LaaS) offering and deliver its unique AI and machine-learning credit underwriting and loan management technology to PayU's 300,000-strong network of merchants⁶⁵.

Overall, this innovation is not, at face value, geared towards making credit cheaper. Kreditech's interest rates are similar to fringe finance lenders, charging a standard interest rate of 0.8 per cent to 1 per cent a day on a microloan, which is repayable over 30 days⁶⁶. What it does aim to do, however, is provide access to credit for those with little or no credit history by creating a fast, technology-based scoring system using alternative and recent data sources.

The use of social media data as a credit scoring tool remains an emerging technology; indeed, the impact of social media on how people interact and share personal information is not fully understood. The reliability of an algorithm depends on the quality and expanse of the data set it has been trained on (Forbes, 2017)⁶⁷. Software also needs to be developed to account for social profile manipulating that occurs within social media, to ensure that profiles and activity closely represent the individuals being scored for credit. There is, then, some concern that attempts to 'know the unbanked' could create 'troubling new kinds of social sorting and segmentation' (Aitken, 2017).

⁶² <https://www.crunchbase.com/organization/kreditech>

⁶³ <https://www.ft.com/content/12dc4cda-ae59-11e5-b955-1a1d298b6250>

⁶⁴ Its loan book is in the "middle two-digit million euros", (FT.com).

⁶⁵ https://www.kreditech.com/press_release/largest-ever-equity-investment-german-fintech-company-kreditech-receives-eur-110-million-investment-payu-expands-strategic-partnership/

⁶⁶ ⁶⁶ <https://www.ft.com/content/12dc4cda-ae59-11e5-b955-1a1d298b6250>

⁶⁷ Such 'Deep learning' algorithms have many parameters that need to be tuned and therefore need a lot of data in order to arrive at generalizable models. See <https://www.forbes.com/sites/quora/2017/01/26/is-data-more-important-than-algorithms-in-ai/#42cb143d42c1>

3.10 Case Study 7: Credit Where Psychometrics is Due

Alternative Data through Psychometrics

Who are they?

Psychometric scoring for credit decisions is predominantly being developed for emerging markets where there is less historical data available for credit applicants. There are 2 billion unbanked adults in the world and a credit gap for micro, small and medium sized enterprises estimated at \$2 trillion dollars in emerging markets (Lee and Deng, 2017).

The Entrepreneurial Finance Lab (EFL) is a private company that is at the forefront of psychometric insights into credit scoring⁶⁸. EFL first pioneered psychometric credit scoring through research at the Harvard Center for International Development⁶⁹. This project set out to develop low-cost credit screening tools to help stimulate entrepreneurial finance in emerging markets, by addressing the substantial information asymmetry of little to no data and credit histories.

The scoring methodology developed by EFL Global has been adopted and marketed by FICO as part of the FICO Financial Inclusion Initiative⁷⁰. This adoption has included the extension of the model beyond entrepreneurial finance ('microfinance') to explicit personal finance markets, designed to open up credit markets around the world to a larger number of unbanked and underserved consumers⁷¹. For example, Russian bank Sovcombank, with more than 2 million customers, are utilising the model for 'first credit card' markets with young Russians⁷².

A further example is Compuscan, one of the largest independent credit bureaus in Africa. It has established a strategic partnership with Coremetrix, a UK-based company. Coremetrix has access to Creditinfo, which is a leading creator of psychometric data for consumer risk assessment⁷³.

What are they doing?

Psychometric testing means that a creditor incorporates psychological variables such as intelligence, aptitude, and personality traits into the lending decision. Psychometric testing tends to rely on a written test including image based questions⁷⁴.

Economic sociology suggests that credit risk can be linked to a range of psychological factors (Rogers et al, 2015). It is argued by providers that psychometric tests can greatly assist with predicting credit risk as well as being able to more effectively isolate less financially sophisticated consumers, and who are often expected to be the highest borrowing risk⁷⁵. Providers state that they are able to predict risk on previously 'unscorable' populations using psychometric information in its stand-alone form or boost the predictive power of traditional scores.

The commercial EFL model is based on the same quantitative methods used to generate traditional credit scores⁷⁶, and can be broken down into several stages. First, an unscorable applicant takes the EFL assessment on the web, mobile or SMS. The EFL credit application

⁶⁸ https://www.fomin.org/Portals/0/impact%20evaluation/Brief_psychometrics.pdf

⁶⁹ <https://www.eflglobal.com/about/>

⁷⁰ <http://www.fico.com/financialinclusion/>

⁷¹ <http://www.fico.com/en/blogs/risk-compliance/a-new-way-to-score-credit-risk-psychometric-assessments/>

⁷² <http://uk.businessinsider.com/the-pros-and-cons-of-psychometric-credit-scoring-2017-4>

⁷³ <https://www.compuscan.co.za/psychometric-scoring-to-advance-sa-credit-industry/>

⁷⁴ See <http://coremetrix.com/our-product/> for an example psychometric quiz

⁷⁵ <https://www.usaid.gov/div/portfolio/settling-score-psychometric>

⁷⁶ https://www.fomin.org/Portals/0/impact%20evaluation/Brief_psychometrics.pdf

takes, on average, 25 minutes to complete and can be administered online or offline using a PC or Android-based mobile or tablet. The technique is moving in a less hands on direction, because psychometric data about borrowers in developing countries is increasingly being gathered from borrowers' smartphones when borrowers give lenders access to a smartphone's stored data. Second, the EFL algorithms analyse the answers and determine the applicant's risk level. Third, upon completion, the application produces a 3-digit score for each applicant; the score is a relative risk score of the applicant against the applicant population. To be approved for a loan, the entrepreneur has to earn a score above a threshold defined by the implementing institution. Fourth, EFL receives monthly loan repayment data which is used to constantly customize and improve models.

The difference it makes to financial inclusion

Psychometric credit scoring for personal finance remains as a new technique under testing and development; nevertheless, this is increasingly taking place in the market place. The FICO/EFL partnership is focused on Turkey, Russia and Mexico and FICO estimate that more than 3 billion consumers globally could gain access to credit at affordable rates if there were an effective way to assess their ability and willingness to repay loans⁷⁷.

The Compuscan and Coremetrix partnership aims to impact the lives of nearly 20 million South Africans who are largely excluded from the credit active population due to thin or empty credit files. Additionally, Compuscan's database currently lists 10 million consumers who are considered to be 'very high risk' or 'high risk' borrowers. Psychometric testing provides financial institutions with an additional means of assessing these consumers, thus enabling them to potentially expand their client base⁷⁸, and Coremetrix provide a number of case study examples of the impact of psychometric testing⁷⁹. For example, through a 'hybrid model' where traditional and psychometric data was combined greater acceptance rates with no additional risk were achieved⁸⁰. Similarly, in a thin / bad file credit card case example, significant increases in lending and no additional risk was achieved through a small uplift in acceptance rate in a critical borrower segment⁸¹.

It remains an issue, however, that though psychometric testing is thought to remove human bias in loan decisions, such methods still do have built-in biases. Psychometric tests, which largely assess individuals on verbal and arithmetical skills, assume a certain level of education among respondents, skewing them toward the better-educated. Moreover, such tests can be manipulated, as certain answers — like proficiency with technology and a tendency to save money — are obviously preferred by a lender (Business Insider, 2017)⁸². Similarly, the FCA (2017) argues that psychometric tests may also be especially vulnerable to being gamed by consumers working out what answers they need to give to increase their chances of their credit application being accepted, as opposed to what their true response would be. Whilst tests can incorporate responses to such gaming activity, and broader issues of identity fraud, this all adds to the length of time taken for a consumer to complete such a test or quiz. In similar vein, EFL have noted how applicant answers will change dependent on the (high or low stake) context – say between a customer satisfaction survey or a job application – requiring substantial testing of models.

⁷⁷ <https://www.pymnts.com/news/partnerships-acquisitions/2016/fico-and-efl-team-to-include-psychometric-scoring/>

⁷⁸ <https://www.compuscan.co.za/psychometric-scoring-to-advance-sa-credit-industry/>

⁷⁹ <http://coremetrix.com/case-studies/>

⁸⁰ <http://coremetrix.com/case-studies/thick-file/>; though arguably the addition of further data – psychometric or not – might achieve an equivalent uplift through the thickening process

⁸¹ <http://coremetrix.com/case-studies/first-case-study/>

⁸² <http://uk.businessinsider.com/the-pros-and-cons-of-psychometric-credit-scoring-2017-4>

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