**THE UNIVERSITY OF SYDNEY**

# The Impact of the Introduction of Positive Credit Reporting on the Australian Credit-seeking Population

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# Executive Summary

This report examines the introduction of Australia's comprehensive credit reporting (CCR) regime and its impact on the population of Australian credit applicants. Under the regulatory change, lenders will be able (and in some cases, are required) to share new sources of information about their borrowers with credit bureaus. In addition, credit scores, which under the previous regime incorporated only 'negative' information (such as loan defaults and credit enquiries) about a borrower, are now augmented with 'positive' information related to the granting of, and the servicing of these loans. Using data from one of the major credit bureaus in Australia, illion, we examine how the changes to the credit reporting regime  help lenders gain greater visibility to the creditworthiness of consumers and how this translates to the consumer gaining access to different types of credit. Consistent with predictions from prior literature, the changes to the credit reporting environment result in greater dispersion of credit scores among the population, potentially leading to lower adverse-selection risks for lenders. More than two-thirds of the population experience a score increase following the implementation of positive reporting, lowering their perceived credit risk by an average of 25-35%. The balance of the population experiences a score decrease of a similar magnitude, apart from a small subset for whom CCR results in a large decrease in credit score.

We examine the proportion of the population that crosses three key credit-score thresholds (480, 600, and 720) with the advent of CCR. A borrower crossing the 600 threshold may be broadly interpreted as moving towards a  'prime' credit risk , potentially providing access to an average 4.5% reduction in the interest rate on personal loans, and also up to a threefold increase in credit card limits (conditional on meeting lender credit servicing requirements). In aggregate,  we find that 8.02% of individuals cross the 600 credit-score threshold with the introduction of positive credit reporting, compared with 5.27% of individuals who fall below the threshold. We interpret the difference of 2.75% as a basic measure of the growth in the prime credit population following the regime change. A net difference of 11.13% is observed at the higher 720-score threshold, while a -3.03% difference at the lower 480 credit-score threshold.

Using demographic based information, we find that applicants who cross the 600 credit-score threshold are disproportionally younger, from higher-risk geographical areas, with lower estimated incomes and wealth, and from less established households. Arguably, this group represents borrowers that may have been traditionally underserved under the negative scoring regime. Following the introduction of positive reporting, they can demonstrate prudent credit behaviour and benefit from this. There is a lesser relationship between observed demographic characteristics and falling below

the 600 credit-score threshold. Applicants from higher socioeconomic areas, with higher estimated wealth and income, and more established households stand to benefit from a greater likelihood of crossing of the 720-score threshold, enabling access to premium credit products (and even lower priced credit as risk based pricing becomes more commonplace). Overall, the introduction of CCR benefits the population on average by providing a net increase in credit access, with further benefits expected in terms of more efficiently priced lending products (especially at the higher 720 score threshold) and greater borrower discipline in order to maintain a premium credit record.

## 1. Introduction

Australia's credit reporting system underwent a large structural change in 2018, as comprehensive credit reporting (CCR) was mandated by the Commonwealth Government. Under the new reporting regime, the major reforms include the reporting of information related to a borrower's history of loan repayments, and standardised reporting of borrower information to credit bureaus, allowing information to be shared across loan providers. This contrasts with the largely 'negative' information (such as historical defaults or the number of credit applications) that were previously reported to credit bureaus.

The 'positive' information in a borrower's credit report (and credit score) includes repayment history information (RHI) and account holding information. Thus, individuals can benefit from good behaviour, rather than being punished for bad behaviour (as under the negative reporting regime). From a credit provider's perspective, good borrower behaviour involves the consistent repayment of outstanding loan balances and holding a small number of accounts without excessive credit limits. Under the positive scoring regime, borrowers who service loans will see their scores gradually increase as they conform to the lenders' expectations. Their willingness to repay provides useful information for subsequent loan applications and should be rewarded by credit providers through lower-priced loan offers, as a reflection of their lower level of perceived risk. Borrowers are also encouraged to "treat their credit score as an asset," and a stronger linkage between credit provision and credit scores should instil a greater sense of discipline from borrowers.[1]

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[1] Prior research demonstrating the disciplinary effect on borrower behaviour includes Vercammen (1995), and Padilla and Pagano (1997, 2000) and Bennardo, Pagano and Piccolo (2015). Liberman (2016) exploits a natural experiment from Chile and finds that borrowers would be willing to pay 11% of their monthly income for a good credit reputation.

From the perspective of a credit provider, information sharing should prevent borrowers from being able to evade prior indiscretions by shopping around for a lender who is unaware of their poor credit history. As such, the comprehensive reporting environment should help to lower their adverse-selection costs incurred from the likelihood of lending to bad borrowers. A reduced cost to the creditor from loan delinquencies and defaults – as well as in the credit risk assessment process (potentially) – may then be passed on to borrowers of good credit standing in the form of lower interest rates.[2] In turn, lower interest costs for borrowers may lead to further decreases in loan delinquencies.

This study is the first to analyse the impact of CCR on the broad population of Australian borrowers.[3] Our data source is loan-applicant information obtained from illion, one of the three major credit bureaus in Australia. We observe data related to credit applications over a three-month period from July to October 2018, where a credit provider has checked or 'pulled' the applicant's credit file from illion. The data includes the borrower's credit score under the two regimes; the previous regime where only negative information was included in an individual's credit score, and the new 'positive' regime, where borrower's account holdings and repayment history is included. We will henceforth refer to these two regimes as 'negative' and 'positive.'

The question we aim to address in this study is how the aggregate change to the credit environment that occurs with CCR affects different sectors of the credit-seeking population. With the changing reporting system, it is important to note that credit scores are calibrated to ensure comparability between regimes. A credit score of 600 under negative reporting implies the same level of perceived risk to the lender under both positive and negative reporting. Thus, if there is a net upward trend in the credit score distribution due to positive credit reporting, we argue that this provides an aggregate benefit to the credit seeking population.

We examine the proportion of the population that increase above key thresholds on the credit spectrum, 480, 600, and 720. These thresholds are representative of points that reflect key access points in terms of credit pricing and availability. From a sample of credit products that use illion's

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[2] Stiglitz and Weiss (1981) provide a theoretical analysis of credit rationing by lenders with incomplete information about borrowers. Jappelli and Pagano (2002) and Djankov, McLiesh and Shleifer (2007) find higher lending volume and lower overall credit risk in countries with a greater level of information sharing.

[3] Some prior research has aimed at predicting the impact of CCR on Australian borrowers. This includes Barron and Staten (2003), who simulated the results by 'restricting' the positive information from the comprehensive set embedded into U.S. scores. Turner et al. (2012), using bureau information from 2008-09, demonstrated that one proposed version of positive reporting (not the version in its final form) would both lower default rates and increase loan acceptance rates among Australian consumers. This study is the first to examine the changes to credit reporting in their realised form.

credit scores as inputs into loan decisions, we demonstrate that increasing above the score of 600 would lead to a borrower being able to access more than twice as many personal loans, at 4 percent lower average rates. Crossing the 600 threshold also means a borrower would also be able to access more than seven times as many credit cards, with a more than threefold increase in their average credit limit. Thus, crossing the 600 threshold is economically meaningful for a borrower. The higher threshold of 720 is representative of a above-prime quality borrower. The advantage of crossing the threshold in this part of the spectrum is mainly reflected in a broader availability of credit products, such as credit cards with better rewards features and interest free days.

Utilising demographic information, we aim to determine factors that contribute to crossing the credit score thresholds, indicating enhanced (or reduced) access to credit (depending on the crossing direction). We explore how the change to positive reporting affects those who have traditionally been perceived as risky creditors, including applicants of a young age (30 and under), those in higher risk geographies, those from lower income and wealth brackets, and for a variety of household compositions (families, singles, home-sharers and so on).

The main findings of the study are that positive reporting, in aggregate, improves the availability of credit for the Australian population. While CCR itself does not change the underlying credit risk of the population, the augmented data set with positive scoring allows for better separation of 'good' credit risks from 'bad'. As a result, more than two-thirds (67.5%) of the sample experience a score increase; of those the average score increase is approximately 60 points. The remaining 32.5% of the population exhibit an average score decrease of approximately 92 points.

We report that a greater proportion of borrowers increase above the 600-score threshold (8.02%) than decrease below the 600-score threshold (5.27%) following the change to positive credit reporting. This 2.75 percentage difference can be construed as one estimate of the net benefit of the shift to positive reporting in terms of the number of people now able to access quality credit that were previously unable to do so.

Younger applicants, those in riskier geographical locations, those with lower incomes and wealth, and with less established family units are among those who stand to benefit the most from the changing credit scoring regime. These individuals were more likely to hold scores below the 600 threshold under negative scoring, and the addition of repayment history information yields consistent score increases for those with prudent credit behaviour. Score increases at a higher 720-score threshold also arise for a different segment of the population, appearing more likely to occur for those applicants in higher socioeconomic areas, and for applicants with higher estimated income and wealth. The benefits of

crossing this higher threshold include a wider array of available credit card products, and typically better perks for cardholders.

The factors determining falls in credit scores below the thresholds are appear to vary less with structural factors like geographical risk or income, and more with observed credit behaviour (such as number of credit applications, number of outstanding products, and  missed credit repayments).

The report proceeds as follows. Section 2 explains the data used in the report. Section 3 analyses differences in the credit score distributions for the population. Section 4 discussed the economic benefit of crossing the key thresholds of 480, 600, and 720. Section 5 shows the proportion of the population crossing the key thresholds and provides statistical tests in the case of the 600 threshold. Section 6 examines the likelihood of crossing the thresholds by socioeconomic area.  Section 7 explores the impact on consumers with a different numbers of credit cards on crossing the threshold. Section 8 examines some case studies (younger individuals, those in non-metropolitan areas). Section 9 considers the effects of CCR on wealth and income groups, Section 10 looks at the impact of CCR on various household compositions, and Section 11 concludes.

## 2.  Data.

We obtained data from illion (formerly known as Dun and Bradstreet), one of the three major credit bureaus in Australia. The data set contains de-identified characteristics and geo-demographic information of all credit applicants from the banking and finance sectors in Australia over the three-month period from July 18 2018 until October 17 2018, containing a total of 383,221 unique applicants. The data sample is limited to applicants for whom a comprehensive record was available and is recorded at the consumer level to avoid duplication. This time period is relatively early in the CCR transition period (between 2018-2020), with some providers (such as smaller financial institutions) and some products (outside of credit cards and personal loans) not yet transferred over, which may skew the data towards larger banks. The data set also does not include information on applicants who did not apply for credit over this time period (i.e. those without a need for credit) but may be considered a representation of the 'credit-seeking population' at that point in time. Moreover, the characteristics of credit-seeking applicants likely differs from the broad population (i.e. those who do not require credit), and so references we make to the sample should reflect this fact.

The sample includes applicants for credit cards (including store credit cards), personal loans, automotive finance, and 'quick cash' or other payday-type products, where the consumer's credit score is checked by the credit bureau. The data set does not include applicants seeking service from utilities or telecommunications firms.

Among the key variables typically used in assessing the creditworthiness of a consumer is the frequency of credit applications in the recent past. The data set therefore includes variables related to recent applications made to 'prime' and 'subprime' lenders,[4] where a large number of recent applications might indicate that the applicant is in financial trouble, or has unsuccessfully applied for credit at one provider and sought alternative sources of funding. We observe the total number of credit applications made (including the application from which this dataset is generated) in the previous 1 and 3 months, respectively. For 87.62% (335,776 out of 383,221) of individuals, the application represents the only application that they have made in the prior month, while for 71.02% of borrowers, the application is the sole credit enquiry in the prior 3 months. The average number of enquiries is 1.15 and 1.40 over these two periods, respectively. When considering only subprime applications in the previous month, 89.47% of applicants made no subprime applications, while the average number of enquiries is 0.018 and 0.044 in the one and three previous months, respectively.

The other key credit-related variables relate to the number of outstanding loan products an applicant holds. Variables reflecting the average number of credit card, personal loan products, and subprime products outstanding are used. We do not have data on the size of the loans outstanding or credit limits for cards but consider these a proxy for credit appetite or utilisation.

In Table 1, we report some basic statistics for our sample, sorted by the number of applications in the previous month. It is noticeable that the number of subprime applications also increases as the overall number of applications increases. This is consistent with subprime applications being made mainly following a rejection from a prime lender. Broadly, the appetite for credit is consistently higher for those with a greater number of recent applications. For instance, those consumers in the sample who have made 5 applications in the past month hold an average of 32% more credit cards, 205% more personal loans and 20 times as many subprime products than those with only a single credit application.

There is also a striking difference in changes to credit scores based on the number of applications. The final column of Table 1 reports the Average Score Change, or the difference in the average credit score under the two regimes (i.e. positive minus negative). Conditional on only making a single application for credit in the past month, the average score increases by nearly 13 points, but declines monotonically with the number of applications. The vast majority of the population (over 98%) made

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[4] Definitions of 'prime' and 'subprime' lenders are as made by the bureau.

either 1 or 2 credit applications in the previous month, and experience, on average, a mild increase in their credit score. The few individuals making many applications are penalised more under positive reporting than negative reporting, likely this reflects other risky credit behaviour. It is not credit applications alone that drive the perceived risk of an applicant, but a set of correlated behavioural factors as well.

*Table 1: Descriptive Statistics by Number of Applications in Previous Month.*

| Number of Applications in Past month | Number of Individuals | Average Subprime Applications in Past Month | Average Credit Cards | Average Score Change |
|---|---|---|---|---|
| 1 | 335,776 | 0.000 | 1.289 | 12.785 |
| 2 | 40,373 | 0.089 | 1.497 | 5.215 |
| 3 | 5,483 | 0.313 | 1.683 | -16.027 |
| 4 | 1,099 | 0.747 | 1.681 | -36.016 |
| 5 | 311 | 1.289 | 1.704 | -61.376 |
| 6 or more | 179 | 2.268 | 1.883 | -70.765 |
| Overall | 383,221 | 0.018 | 1.318 | 11.336 |

Geodemographic information is added to the dataset, where it has been provided by illion; this is available for 259,995 out of the 383,221 consumers (around 68% of the sample). This includes aggregated data based on marketing databases (i.e. collected by a direct marketing arm of illion) which infers the type of household to which the consumer belongs. The data in this includes household type (single, couple, family, extended family, homesharers, or unknown), the income band of the household, and the relative wealth level of the household (Very low, Low, Below Average, Average, Above Average, High, Very High). Although these variables are not typically included in the calculation of credit scores, they are of interest in examining the demographics of the beneficiaries of the shift to comprehensive credit reporting.

## 3. Changes to the Credit Score Distributions

The addition of new information relating to a borrower's credit history should allow for credit scores to better discriminate between individuals with high and low credit risk. The rationale is that low-risk individuals who were penalised under negative reporting due to a lack of information should experience an upward shift in their score. Similarly, the revelation of, say, overdue repayments for high-risk individuals should be reflected by a decrease in score under the positive regime. As the score distributions are calibrated to reflect similar population risk, we would not expect much change to the

mean, but an increase in standard deviation for the distribution of credit scores among the population. In this section we examine whether this is indeed the case.

Overall, we find there is an increase in dispersion in credit scores with the shift to positive reporting, consistent with the findings of Landgraf's (2016) report on CCR's implementation in NZ. An examination of the cumulative distribution (see Figure 1) of credit scores shows that the bottom 15% of the credit-seeking population – the lower crossing point of the two curves on the graph (at a score of around 560) – tends to have a lower credit score under positive reporting than negative reporting. Above this point, the rightward shift of the cumulative distribution is indicative of a slightly higher score for the remainder of the population, supporting the contention that positive reporting will increase the dispersion of credit scores. This corresponds promisingly with academic theories that suggest that comprehensive credit reporting will lower adverse selection costs by excluding low-quality borrowers from the marketplace.



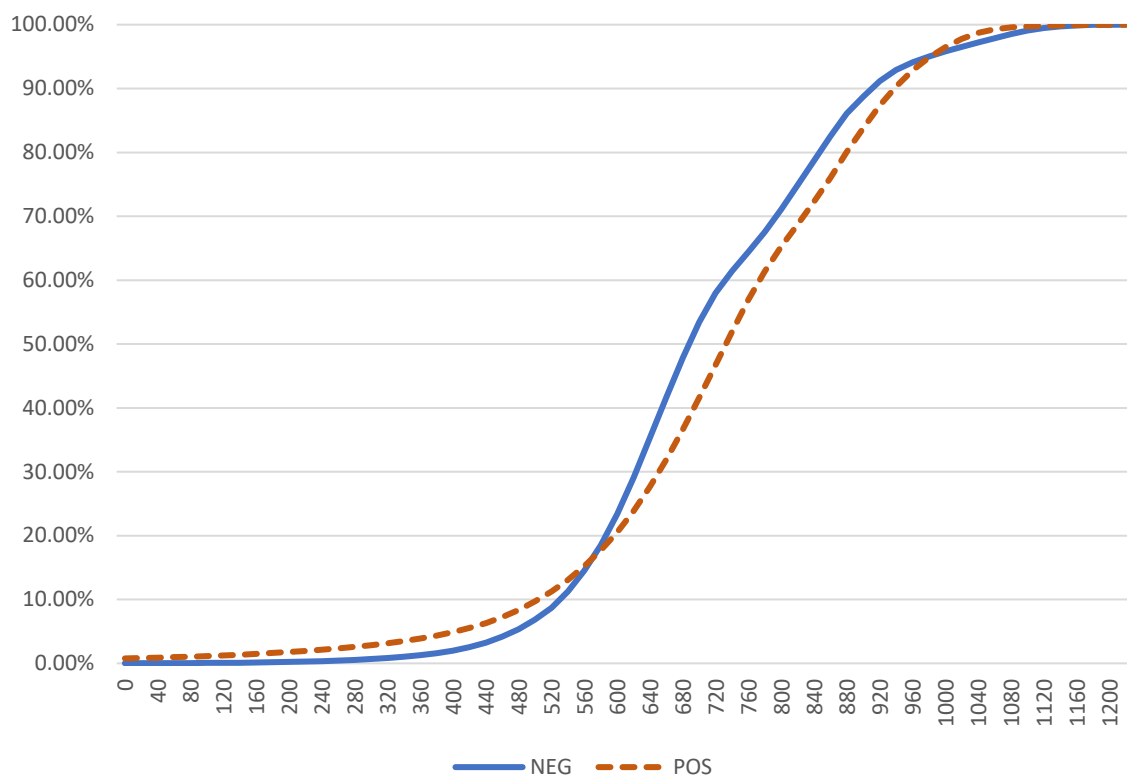*Figure 1: Cumulative Distribution of Credit-seeking Population Under Negative and Positive Credit Regimes*

In Table 2, we analyse the change in credit scores under the two regimes partitioned into those who experience an increase and decrease in credit score. Around two-thirds of the population (67.5%) experience an increase in credit score, and this increase average 61.22 points. The majority of

individuals who service their loans adequately exhibit an increase in credit score, with an average move from 697.43 to 758.64. This is a substantial increase in perceived credit quality, at a relatively crucial point in the distribution of access to credit (as we will discuss later). This corresponds with a decrease in the predicted default rate of approximately 25%-35%, depending on where an individual was positioned in the negative score distribution. The remaining 32.5% of the population experiences a decrease, and conditional on a decrease, the average decline is 91.84 points, at average levels moving from 733.59 to 641.75.

The second column of Table 2 reports the standard deviation of the credit score distributions. This provides an indication of the dispersion of the population. Interestingly, the standard deviation of the negative and positive score distributions is almost identical for those that experience an increase in credit scores. For increasing scores, the positive news affects the population in a consistent fashion, reflecting the uniformity of information related to those who are servicing their loans. As this positive repayment history information is a feature of CCR only, this largely uniform increase would be expected.

For those individuals who exhibit a score decline, there is a marked increase in standard deviation (from 202.24 to 267.09) under the positive scoring regime. This indicates that the 'bad news' provided by the new information can be "differing degrees of bad." Depending on the information uncovered from the repayment history information and additional sharing among creditors, the news can drastically (negatively) alter the perceived creditworthiness of the individual. The increase in discrimination, based on this sample of applicants at least, is mainly driven by the effect on those with declining creditworthiness.[5]

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[5] There are a few issues for discussion to this point, largely beyond the scope of this study. Discussions with the bureau stress that RHI is an early indicator of risk and the change in risk is gradual, whereas the appearance of a good account (from the information sharing provided by CCR) is somewhat binary; especially during the early stages of CCR where visibility to an account of good credit standing may materially change the estimate risk of the consumer. One can imagine a shift with less variance to better scores but a shift with greater variance to lower scores since the data identifying higher risks is more graduated.

This may be more a function of the type of information held under CCR. If CCR had included balance data then that would provide a more graduated positive behaviour as well as negative behaviour, and the variance of the two distributions would be more similar.

| | Mean | Std. Dev |
|---|---|---|
| | Increasing Scores (n = 258,495, 67.5% of population) | |
| **Negative Score** | 697.43 | 127.58 |
| **Positive Score** | 758.64 | 128.04 |
| **Difference (Positive – Negative)** | 61.22 | 0.46 |
| | Decreasing Scores (n = 124,726, 32.5% of population) | |
| **Negative Score** | 733.59 | 202.24 |
| **Positive Score** | 641.75 | 267.09 |
| **Difference (Positive – Negative)** | -91.84 | 64.85 |

To further investigate those individuals whose credit score declines as a result of positive reporting, we note that, conditional on a score decrease, those in the lowest decile of the negative score population decline by an average of 154 points – these are people with negative scores below 530 who are largely excluded from the prime credit population to begin with (with the remaining 90% of the population experiencing a drop of 87 points conditional on a decrease.) For those with declining scores, the largest 10% of declines experience a drop of 407 points on average, with the remaining 90% of declining individuals exhibiting a drop of around 57 points. In other words, for those who exhibit a score decrease, a small minority exhibit large score drops. These are likely driven by the revelation of a default, and more likely to be observed amongst those who are already excluded from the credit market. The remainder of the declining population decline by a similar amount to the average score increase.

To illustrate further, we examine credit score changes by quintiles of the negative score distribution in Table 3. For the lowest 4 quintiles of negative credit scores, the median change in credit is an increase between 46 and 59 points. For the top quintile of negative credit scores, there is a moderate median score decrease of around 7 points (as there is little room to move upwards, but the possibility of a downward shift). Largely, a positive score change is indicative of a lack of information in the negative regime penalising the applicant due to data limitations – from being unable to identify prudent credit behaviour. The highest quintile does not change scores to the same degree as they were not being penalised by limited data (due to a longer credit history). In fact, the top quintile may have been benefiting slightly from a lack of available data on repayment histories.

*Table 3: Credit score changes by Negative Score Quintile*

| Neg. Score Quintile | Neg. Score Range Lower | Neg. Score Range Upper | Ave. Score Change | Median Score Change | Ave. Neg. Pct Rank | Ave. Pos. Pct Rank | Pct. Of Increases in quintile |
|---|---|---|---|---|---|---|---|
| Q1 (Lowest) | -270 | 587 | -19.28 | 46 | 0.095 | 0.136 | 0.604 |
| Q2 | 588 | 655 | 20.31 | 48 | 0.295 | 0.316 | 0.748 |
| Q3 | 656 | 732 | 28.37 | 59 | 0.495 | 0.475 | 0.755 |
| Q4 | 733 | 847 | 29.43 | 51 | 0.695 | 0.682 | 0.817 |
| Q5 (Highest) | 848 | 1256 | -1.85 | -7 | 0.895 | 0.866 | 0.449 |

For the lowest quintile of negative credit scores, the average score change is a decrease of 19 points, while the other quintiles see either an average increase in credit score (by 20 – 30 points for quintiles 2, 3, and 4), or a negligible change (average decrease of less than 2 points for those in the top quintile). As explained previously, a large average decline for those in the lowest negative score quintile is driven by a large decrease for a relatively small number of individuals. The final column of Table 3 demonstrates that in each of the lowest four negative score quintiles, an increase is more likely to be observed than a decrease (with approximately equal likelihoods in the top quintile). Nearly three quarters (74.8%) of individuals in the second quintile of negative scores, for instance, exhibiting a 'near prime' or 'prime' credit score around the 600 threshold, experience a score increase for example. The relatively small change for those in the top quintile tends to indicate that the majority of above-prime individuals do not tend to lose this status.

In our following examination of crossing key thresholds, we note that the negative scores of 480, 600, and 720 correspond, respectively to the 5th, 23rd and 58th percentiles of applicants in our sample. Under positive scoring, those same percentiles would represent scores of 419, 616, and 765. The greater degree of dispersion under positive reporting (lower value for the 5th percentile, and higher value for the 58th percentile) indicates the potential for lowered adverse selection risk. Removing higher credit risks from the pool of potential borrowers has lowered the score attributable to the left-tail, allowing for greater credit access to the remainder of the population. The advantage of CCR is in validating the risks observed in negative reporting, leading to declining creditworthiness for already-marginal applicants. On the whole, however, there is a shift to better scores at 600 and 720, indicating that for the vast majority of consumers there is a clear personal benefit from CCR.

## 4. The Economic Value of Crossing Key Thresholds

While the change in credit scores are meaningful at the overall population level, there are also substantive differences in economic outcomes at certain key points of the credit score spectrum. To illustrate this we note that the credit scores are calibrated so that a particular credit score under the negative regime reflects a similar perceived credit risk under the positive regime. Therefore, we can interpret increases in the score as an increase in creditworthiness and then also as potential growth in the borrower's opportunity set. For instance, an individual who held a credit score below 480 under the negative scoring regime would most likely have been largely excluded from Australian credit markets. An increase above this score under the positive credit scoring system would now see them included in a more substantial part of the market for credit. We analyse the proportion of the sample that increases their score above three key thresholds 480, 600, and 720, indicating varying degrees of credit quality. For instance, a score increase from below to above the level of 600 indicates that the applicant has moved roughly from 'below prime' into a 'prime borrowing' status, based on the estimates of available offers.

To provide evidence on the economic value of the thresholds we examine a cross-section of provisional credit offers that are made available by a representative selection[6] of Australian lenders to consumers that meet the relevant product's threshold credit score (noting that these are provisional offers that still require necessary financial and identity checks to take place before they can be fulfilled). We separate products into two types, personal loans and credit cards, both of which are generally unsecured products. Where personal loans and credit cards are unsecured products, credit providers weigh the credit score heavily in the loan underwriting process. The information is presented in Table 4.

For personal loans, crossing the threshold from below 480 to between 480-600 is economically meaningful. The number of loan offers they could be eligible for – bearing in mind that the loan decision process is reliant on more information than a credit score alone – increases from 2 to 5 (250%) among the products sampled, while the average interest rate on a personal loan declines sharply from 27.50% to 16.84%. This indicative rate reflects the borrower's movement from the 'sub-prime' or 'super sub-prime' category to a 'near prime' category of risk. Similarly crossing the threshold from

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[6] This is a sample of offers using the illion score as part of their decision criteria. While not an exhaustive list of products available across all credit providers, it is intended to provide an indication of the value of crossing these key thresholds. We report the percentage increase in the number of products available, while noting that the sample is more likely to capture some types of lenders than others; subprime lenders specialised in 'credit-repair' products are included but many consumers may not utilise such credit products even if eligible.

below 600 to above 600 sees an expanded opportunity set for the borrower (from 5 to 11 offers, an increase of 120%) and lowered average loan price (from 16.84% to 12.13%).

Applicants crossing these thresholds also benefit in the credit card market, although the channel is different. Interest rates on credit cards reflect not only the credit risk of the borrower but are selected by the borrower based on their perceived likelihood of paying interest. A borrower who expects to pay off the outstanding balance on their credit card each month (also known as a 'transacter') might care less about the interest rate – which they do not expect to pay – than a borrower who does not expect to pay their entire balance each month (also called a 'revolver'). Transacters mainly use their credit card for convenience and rather than pay hefty interest costs, pay a larger annual fee and receive the perquisites of rewards points or frequent flyer miles. The different offers made to customers at higher credit scores appear to bear this out. From Table 4 we can observe that individuals with higher credit scores have a wider range of products available to them, from a larger number of distinct credit providers. For example, crossing the score threshold from below to above 600 leads to an increase from 5 to 36 credit card offerings (an increase of 620% in the number of available products). The credit limit, on average, increase from a minimum of $2,000 to $6,889 (a 244% increase) and a maximum of $20,000 to $64,444 (a 222% increase), although the latter feature is likely assessed differently than the former.

The lower rates on offer to individuals with lower credit scores (Below 480 and from 480-600) indicate that these borrowers are closer to the 'revolver' type. This is also evident from the annual fees, and points earned per dollar spent. Although the latter are not directly comparable across providers, applicants with higher credit scores (above 600) are able to access credit cards with higher rewards point earning potential. For example, credit card users with scores in the 720+ range are able to earn more than 1.02 point per dollar spent on average, compared with those with scores in the 480-600 range of 0.45 points per dollar. They also pay higher annual fees (nearly quadrupled in this case, from $53 to $193), noting that these fees are aligned to the financial benefits of the card and the low likelihood of ever incurring interest charges. Thus, it appears that crossing the key thresholds of 600 or 720 in the credit card market offers borrowers more benefits. Rather than selecting into 'no-frills' or 'low-rate' credit cards, these higher-scoring borrowers can take advantage of increased borrowing flexibility, increased rewards and increased interest free days from card providers reflecting their overall lower risk of default. We argue that crossing these crucial thresholds represents an increase in the opportunity set available to the applicant.

*Table 4: Opportunity sets and loan pricing by ranges of credit scores.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Panel A: Personal Loans** | | | | | | | |
| Range | Num. Offers | Unique Providers | Ave. Rate | | | | |
| Below 480 | 2 | 2 | 27.50% | | | | |
| 480-600 | 5 | 5 | 16.84% | | | | |
| 600-720 | 11 | 11 | 12.13% | | | | |
| Above 720 | 13 | 12 | 12.28% | | | | |
| **Panel B: Credit Cards** | | | | | | | |
| Range | Num. Offers | Unique Providers | Ave. Rate | Ave. Min. Credit Limit | Ave. Max Credit Limit | Points / Dollar | Ave. fee |
| Below 480 | 3 | 3 | 12.67% | $1,000 | $15,000 | 0.33 | $ 45.00 |
| 480-600 | 5 | 5 | 14.15% | $2,000 | $20,000 | 0.45 | $ 53.00 |
| 600-720 | 36 | 10 | 18.23% | $6,889 | $64,444 | 0.76 | $ 161.47 |
| Above 720 | 46 | 11 | 18.26% | $5,913 | $64,143 | 1.02 | $ 193.04 |

## 5. Crossing of the Key Thresholds

In Table 5 we report the proportion of the sample that crosses the key thresholds of 480, 600, and 720. We focus on applicants that exhibit a score increase above the threshold (a negative score below the threshold, and a positive score above the threshold) or vice-versa (a negative score above the threshold but a positive score below). Of course, in order for an applicant to be able to cross the threshold of, say, 600, they needed to exhibit a negative score below this value. Thus we consider two cases:

i) The 'unconditional' case: where the proportion is the number of individuals crossing relative to the entire population is reported (the baseline is 383,221 applicants for all cases).

ii) The 'conditional' case: where the proportion is the number of individuals crossing relative to the number of people with a negative score in the appropriate range (the baseline varies according to the negative score distribution).

For example, the full sample consists of 383,221 applicants, of whom 1.47% experienced a change credit score under the shift to positive reporting that lead their score from below 480 to above 480. Hence, 1.47% is the proportion that unconditionally increase above the threshold, which can be considered reflective of the probability of any individual in the population crossing the threshold. However, given that only 20,297 of these individuals held credit scores that were below 480 under the negative regime, this fraction represents 27.74% of the people who could have potentially crossed the threshold. We label this 'conditional' crossing; the probability of an individual with a credit score below the threshold crossing the threshold. Likewise, 362,924 applicants held negative credit scores that were at 480 or above, and 4.75% of these individuals exhibited a credit score change that led them to fall below this threshold.

It is apparent from examination of the conditional row of Table 5 that a greater proportion of individuals in the sample increase above rather than fall below each of these critical thresholds. Thus, the impact of positive credit reporting is a clear net increase in the proportion of the population that will be eligible for financial products (as seen in Table 4). In aggregate, the change to positive credit reporting allows for a greater number of individuals to access credit than it does to being newly excluded.

*Table 5: Proportion of sample crossing thresholds from below and above. Unconditional percentages refer to the entire sample, whether the individual's negative score was able to cross the threshold. Conditional proportions require that the negative score was in the appropriate range to cross the threshold.*

| | Increase above threshold | | | Decrease Below Threshold | | |
|---|---|---|---|---|---|---|
| | 480 | 600 | 720 | 480 | 600 | 720 |
| Unconditional | 1.47% | 8.02% | 13.58% | 4.50% | 5.27% | 2.45% |
| Conditional | 27.74% | 34.65% | 23.50% | 4.75% | 6.86% | 5.79% |

We further analyse the proportion of applicants whose score crosses the 600-score threshold. A total of 30,732 (8.02%) applicants exhibited an increase from below 600 under the negative reporting system to above 600 in the positive reporting system; 20,191 (5.27%) of applicants exhibited a decrease from above 600 to below this threshold. Unconditionally, the mean difference in these proportions (2.75%) is significantly positive, broadly demonstrating the improved access to prime credit for a representative sample of the credit-seeking population. The impact is even more pronounced at the 720 threshold – closer to the median score – where a significant difference of proportions of 11.13% of the sample increase above compared with fall below the threshold. Thus, a large proportion of the population has improved access to lower-cost (in the case of personal loans)

or more flexible (in the case of credit cards) credit options. This mainly comes at the cost of some in the lower score categories; a greater number of individuals fall below 480 than increase above it (4.50% vs. 1.47%) but this is mainly driven by a relatively low number of high risk individuals in this range of the credit spectrum.

We next examine the mean values for those crossing the threshold by number of applications in the past 1 month. As the number of recent credit applications can materially influence credit decisions, we are particularly interested to see the impact of CCR on applicants with multiple recent credit applications. Figure 2 shows the unconditional proportion of applicants increasing above and decreasing below the 600 threshold by the number of credit applications (up to 5) in the previous month. The figure demonstrates that increasing above the threshold is more likely than falling below it, with benefits declining once more than three applications are made (with evidence of a growing credit appetite or increased likelihood of credit rejection). The net difference is maximised at around 7% for those with two applications, declining to around 4% for those with five of more recent applications. Comprehensive credit reporting should help to discern the cases where credit applications are made responsibly or to mask further problems; even individuals with multiple recent applications are able to benefit.
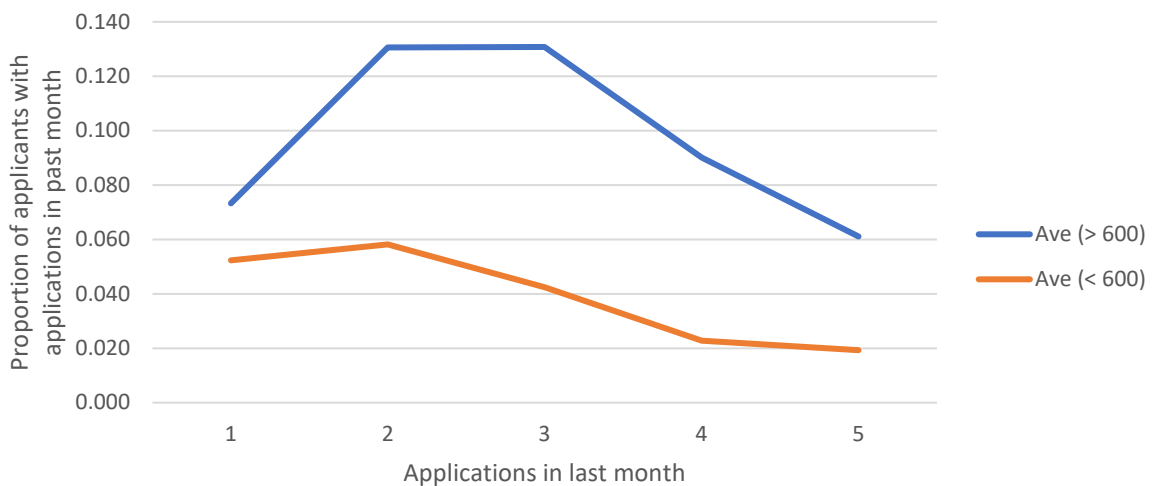


*Figure 2: Proportion of population crossing the 600 threshold by number of applications in the previous month.*

*Table 6: Proportion of applicants crossing 600 threshold by number of credit applications in the prior month. Panel A reports the proportion of applicants increasing above and decreasing below the credit score threshold of 600 with positive reporting by the number of credit applications made in the previous month. Panel B reports the average scores under negative and positive credit reporting for those that increase above and decrease below the 600 threshold.*

| | Applicants Moving Above Threshold | | | Applicants Moving Below Threshold | | | Difference | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Panel A: Proportion Crossing Threshold | | | | | | | | | | |
| Applications in last month | N | Ave (> 600) | Std. Dev | N | Ave (< 600) | Std. Dev | Ave Diff | Sp | T-stat | P-value |
| 1 | 24,619 | 0.073 | 0.261 | 17,578 | 0.052 | 0.223 | 0.021 | 0.202 | 10.516 | (0.000) |
| 2 | 5,273 | 0.131 | 0.337 | 2,349 | 0.058 | 0.234 | 0.072 | 0.282 | 10.349 | (0.000) |
| 3 | 717 | 0.131 | 0.337 | 233 | 0.042 | 0.202 | 0.088 | 0.294 | 3.987 | (0.000) |
| 4 | 99 | 0.090 | 0.286 | 25 | 0.023 | 0.149 | 0.067 | 0.256 | 1.176 | (0.242) |
| 5 | 19 | 0.061 | 0.240 | 6 | 0.019 | 0.138 | 0.042 | 0.208 | 0.429 | (0.672) |
| Total | 30,727 | 0.0802 | 0.272 | 20,191 | 0.0527 | 0.223 | 0.027 | 0.214 | 14.132 | (0.000) |
| | | | | | | | | | | |
| Panel B: Positive and Negative Credit Score Averages of Threshold Crossers | | | | | | | | | | |
| Applications in last month | Neg. Score | Pos. Score | Difference | Neg. Score | Pos. Score | Difference | | | | |
| 1 | 572.68 | 637.23 | 64.54 | 660.27 | 486.90 | -173.37 | | | | |
| 2 | 570.82 | 634.25 | 63.42 | 642.25 | 501.44 | -140.81 | | | | |
| 3 | 566.81 | 630.05 | 63.23 | 635.30 | 512.86 | -122.44 | | | | |
| 4 | 563.90 | 627.74 | 63.84 | 634.24 | 513.96 | -120.28 | | | | |
| 5 | 561.89 | 627.05 | 65.16 | 625.50 | 487.67 | -137.83 | | | | |
| Total | 572.19 | 636.51 | 64.32 | 657.84 | 488.92 | -168.92 | | | | |

We report the proportions of applicants crossing the 600-score threshold based on the applications in the prior month in Table 6. Panel A shows the results of tests of whether the proportion of applicants increasing above a 600-score is statistically different to those decreasing below the 600-score, for a given number of applications in the prior month.

The rightmost column of Table 6 shows the P-value of a test that the proportion increasing above 600 equals the proportion decreasing below 600. A number less than 0.05 indicates that there is statistical difference, which we observe for the full sample, and for those that have made 1, 2, or 3 credit applications in the prior month. Thus, a significant number of consumers are expected to benefit from CCR (30,727 out of 383,221 or 8.02% will have a score increase) in terms of increasing above the 600-score threshold. But around 5.27% (20,191 out of 383,221) will be penalised, due to some risky credit behaviour. The net result is an increase in scores (and so in opportunity) of around 2.75% of the population. The additional data provided in CCR allows for those consumers below the 600 threshold to be rewarded for their good credit standing.

To be eligible for one of the two groups, it is likely that a borrower is close to the threshold to begin with. Panel B of Table 6 thus presents the average credit scores under the two regimes for those that cross the threshold. Borrowers who increase above the threshold held an average score of 572.2 under negative scoring and 636.5 under positive scoring. Borrowers falling below the 600 threshold held average credit scores of 657.8 under negative reporting and 488.9 under positive reporting. The average decrease of 168.9 is much greater than the average increase of 64.3 points for the improving borrowers. For increasing borrowers, a fairly consistent jump of around 65 points was made in all cases. For those falling below the threshold, the relative drop as a result of positive reporting did not follow a consistent pattern based on applications. In fact, the largest drop was for those who had made only a single application in the previous month (173.4 points). These applicants benefited from few applications under the negative scoring system, but the revelation of bad information under CCR has a particularly negative impact on their positive score. In part, this reflects the ability of CCR to discern behavioural attributes that were missing under negative reporting.

## 6. Geographic Risk Index and Crossing the 600 Threshold

Next, we examine the proportion of applicants crossing the 600-score threshold (upwards and downwards) based on the bureau's own Geographic Risk Index (GRI), which indicates the perceived level of risk at the meshblock level, a localised area of approximately 30 households. In urban areas this is a significantly smaller size, geographically, than in rural areas. The GRI is based on the average level of credit default within the meshblock but does not utilise information specifically related to an applicant's personal risk. It can be thought of as an indicator of the localised propensity to default. A score of 1 indicates that the household is in the lowest risk geographical area while a score of 13 indicates the highest risk areas.

The question of interest here is whether borrowers in riskier socioeconomic areas (measured by the GRI) benefit from the change to CCR. With a dearth of information available to the lender under negative reporting (in some instances), there has been a perception that lenders may, in part, use a borrower's address to assist in assessing creditworthiness. Although this might be reasonable risk management based on historical default frequencies, it does mean that responsible consumers were potentially under-banked due to their 'inferred' risk. As CCR focuses on the individual's credit behaviour, and provides better information to lenders, there is the potential to reward those previously under-banked (even under privileged) consumers that are better able to demonstrate a good credit record. Thus, we might expect a larger relative gain in terms of creditworthiness from the introduction of CCR to those borrowers in higher GRI areas.
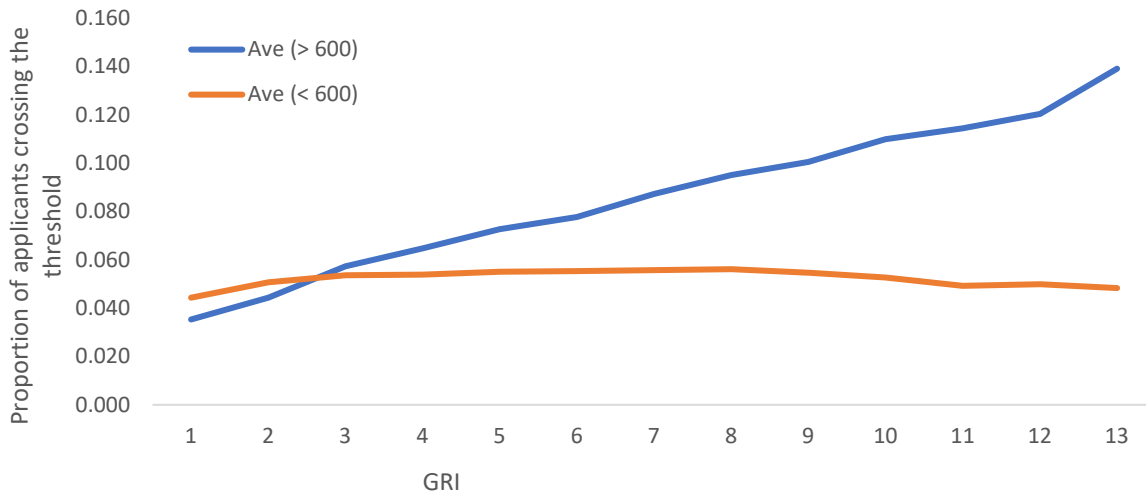
*Figure 3: Geographic Risk Index and Crossing the 600 Threshold.*

Figure 3 shows the proportion of individuals increasing above and falling below the 600-score threshold by GRI. Recalling from Table 6 that the overall likelihood of crossing the threshold is 8.02% upwards, and 5.27% downwards, there is a noticeable positive relationship with crossing above the threshold as GRI increases. There appears to be little relationship between GRI and falling below the threshold of 600.

*Table 7: Applicants moving above and below the 600 threshold by local geographic risk (GRI). The table reports the proportion of applicants increasing above and falling below the 600-score threshold with the introduction of CCR, by GRI.*

| | Applicants Moving Above Threshold | | | Applicants Moving Below Threshold | | | Difference | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| GRI | N | Ave (> 600) | Std. Dev | N | Ave (< 600) | Std. Dev | Ave Diff | Sp | T-stat | P-value |
| 1 | 978 | 0.035 | 0.185 | 1,228 | 0.044 | 0.206 | -0.009 | 0.127 | -1.656 | (0.098) |
| 2 | 1,597 | 0.044 | 0.206 | 1,830 | 0.051 | 0.220 | -0.006 | 0.145 | -1.300 | (0.194) |
| 3 | 2,208 | 0.057 | 0.233 | 2,066 | 0.054 | 0.225 | 0.004 | 0.171 | 0.704 | (0.482) |
| 4 | 2,314 | 0.065 | 0.246 | 1,926 | 0.054 | 0.226 | 0.011 | 0.185 | 1.900 | (0.058) |
| 5 | 2,465 | 0.073 | 0.260 | 1,865 | 0.055 | 0.228 | 0.018 | 0.199 | 2.897 | (0.004) |
| 6 | 2,530 | 0.078 | 0.268 | 1,803 | 0.055 | 0.229 | 0.022 | 0.208 | 3.490 | (0.000) |
| 7 | 2,809 | 0.087 | 0.282 | 1,794 | 0.056 | 0.230 | 0.032 | 0.223 | 4.677 | (0.000) |
| 8 | 2,828 | 0.095 | 0.293 | 1,670 | 0.056 | 0.230 | 0.039 | 0.235 | 5.368 | (0.000) |
| 9 | 3,022 | 0.101 | 0.301 | 1,644 | 0.055 | 0.227 | 0.046 | 0.244 | 6.130 | (0.000) |
| 10 | 3,270 | 0.110 | 0.313 | 1,566 | 0.053 | 0.223 | 0.057 | 0.259 | 7.203 | (0.000) |
| 11 | 2,770 | 0.114 | 0.318 | 1,194 | 0.049 | 0.217 | 0.065 | 0.267 | 7.032 | (0.000) |
| 12 | 2,019 | 0.120 | 0.325 | 836 | 0.050 | 0.218 | 0.071 | 0.275 | 6.239 | (0.000) |
| 13 | 1,270 | 0.139 | 0.346 | 441 | 0.048 | 0.214 | 0.091 | 0.299 | 5.494 | (0.000) |
| Total | 30,080 | 0.080 | 0.271 | 19,863 | 0.053 | 0.224 | 0.027 | 0.213 | 13.942 | (0.000) |

Table 7 presents formal tests that the proportion of applicants increasing above the 600-score threshold is greater than the proportion of applicants falling below the 600 threshold by GRI. The rightmost column of Table 7 presents the P-value of a test that the proportion of applicants crossing above the threshold of 600 is equal to the proportion of applicants falling below the threshold of 600, for applicants within each GRI group. For instance, 3.5% of applicants in households located in a GRI-region of 1 increase past 600, while 4.4% of applicants in a GRI region of 1 fall below the 600-threshold. This difference is negative, with marginal statistical significance (at the 10% level). However, the proportion of applicants crossing the 600 threshold increases monotonically in GRI to be 13.9% of applicants located in a GRI region of 13. This is compared with the proportion of applicants dropping below the 600-threshold of 4.8%. For applicants in regions with a GRI of 5 or greater, the proportion of the population increasing is significantly higher than those decreasing below the threshold, at the 5% level of significance. Thus, it may be argued that applicants in riskier local areas benefit from the addition of positive information their credit score more than applicants in less riskier regions. These applicants are more likely those who are underserved in extant credit provision and thus the benefits of CCR can be expected to arise to a greater extent to those who are able to benefit from it.

Conversely, there is little relationship between GRI and falling below the 600-threshold. The proportion of overall applicants is 5.3%, and this varies only slightly with GRI (between 4.4% in GRI region 1 and 5.6% in GRI regions 5 and 6). The interpretation is that risks that were unobserved under the negative reporting regime are equally likely to affect customers from any socioeconomic area.

Table 8 shows the average credit positive and negative scores for those crossing the threshold by GRI. In a similar fashion to Table 6, there is little difference in the average score change for those increasing above the 600 threshold, it is close to 64 points for all GRI groups. For those dropping below the 600 threshold, there appear to be slightly larger falls for individuals in low GRI areas than high GRI areas (a 175 point drop on average for the GRIs 1-3 vs. 162.5 point drop for those in GRI 11-13). Interestingly, the effect of the large drop is to condense the groups together; conditional on falling below the threshold, individuals in GRI 13 are much closer to the average individual under positive scoring (484.8 vs 489.3) than negative scoring (643.5 vs. 657.8). This is supporting evidence to the suggestion that under CCR, one's own credit record is more important than the local demographics. CCR can largely help to alleviate concerns of worse credit behaviour from those individuals in higher risk areas, as more granular information offsets coarse population level signals.

*Table 8: Changes in credit score for applicants moving above and below the 600 threshold; based on geographic risk index.*

| Geographic Risk Index | Applicants moving above threshold | | | Applicants moving below threshold | | |
|---|---|---|---|---|---|---|
| | Neg. Score | Pos. Score | Difference | Neg. Score | Pos. Score | Difference |
| 1 | 574.64 | 638.61 | 63.97 | 665.54 | 487.66 | -177.88 |
| 2 | 574.35 | 637.46 | 63.11 | 665.66 | 485.09 | -180.57 |
| 3 | 574.65 | 638.19 | 63.54 | 663.70 | 490.04 | -173.67 |
| 4 | 572.87 | 636.90 | 64.03 | 658.81 | 486.95 | -171.86 |
| 5 | 573.45 | 637.03 | 63.58 | 659.86 | 492.55 | -167.30 |
| 6 | 572.86 | 636.86 | 64.00 | 658.78 | 489.94 | -168.84 |
| 7 | 572.65 | 636.80 | 64.15 | 654.14 | 492.75 | -161.40 |
| 8 | 571.85 | 636.51 | 64.67 | 656.00 | 486.37 | -169.63 |
| 9 | 571.45 | 635.83 | 64.38 | 653.12 | 491.27 | -161.85 |
| 10 | 570.99 | 635.62 | 64.62 | 653.01 | 491.70 | -161.31 |
| 11 | 570.92 | 635.80 | 64.88 | 652.30 | 488.58 | -163.73 |
| 12 | 570.01 | 635.26 | 65.25 | 651.22 | 488.38 | -162.84 |
| 13 | 569.84 | 635.71 | 65.87 | 643.51 | 484.80 | -158.72 |
| **Total** | **572.22** | **636.53** | **64.31** | **657.83** | **489.26** | **-168.57** |

Moreover, CCR does not reward those from higher risk areas more than lower risk geographies. Rather, there are just more high risk GRI consumers in the lower score-bands (below a score of 600, for example). Hence, the opportunity for good credit consumers in these geographies to shift up is greater.

## 7. Outstanding Credit Cards and Crossing the 600 Threshold

One of the key additions to the credit scoring models under CCR, along with the outstanding number of credit facilities, is the outstanding credit limit. Our data set does not contain the applicant's outstanding credit limit, but we proxy this with the number of credit cards held by the applicant. The number of credit facilities held by a borrower (particularly where held over multiple lenders) may, in fact, be more important than the total credit limit in understanding changes in the credit scoring regime.

While having a credit limit is likely to be perceived as generally good (relative to no information ), a large credit limit outstanding can be a sign of credit stress, and so may be negative information about an applicant. Complexity arises in the determination of the suitability of the credit limit; eligibility for credit is seen as good, but too much credit relative to affordability is bad. On its own, credit limits present some information about a borrower, but a wider set of information is required (i.e. in the form of a meaningful credit score) that takes into account multiple measures of a borrower's creditworthiness. Similarly, the revelation of previously unknown credit facilities can also impact an individual's score.

In Table 9 we report population statistics for the credit score distribution by the number of outstanding credit cards. The vast majority hold 2 credit cards or fewer, and it is on this group that score increases are largely observed. An interesting point from Table 9 is that, under negative reporting, the average score declines with the number of credit cards, whereas under positive credit reporting, a humped shape is observed: the average score for people who hold 1 credit card is higher than those that hold zero credit cards, but declines from that point onwards. This illustrates the complexity between credit limits and credit scores; provided that the card is being used responsibly it appears that the average person with a credit card appears more creditworthy than the average person without. The interpretation from this observation being that knowledge of responsible credit behaviour provides a sounder basis for improving ones ability to source further credit than a limited credit track record. Visibility to this responsible credit usage is important for both consumer and lender.

The results presented in Table 9 highlight the benefit of prudent credit management for an individual. Holding one or two credit cards likely means a borrower is more able to service their facilities, while too many credit cards potentially reflects a borrower with credit stress. Positive scoring appears to reward borrowers who are able to demonstrate responsible credit utilisation, but penalise borrowers exhibiting the capacity to over-extend. For example, under negative scoring, the difference in average scores between a borrower with one and five cards is around 90 points, under positive reporting, the difference is 125 points. Based on the evidence from Table 4, the average applicant with four or more cards would likely be restricted from obtaining further cards under positive scoring (exhibiting a score less than 600), but not negative scoring.

Table 9: Population Statistics by Credit Cards Held.

| Number of Credit Cards | N | Proportion with Score increase | Ave. Negative Score | Ave. Positive Score |
|---|---|---|---|---|
| 0 | 79,880 | 0.652 | 726.07 | 731.69 |
| 1 | 175,460 | 0.772 | 719.57 | 754.34 |
| 2 | 82,051 | 0.752 | 697.28 | 708.68 |
| 3 | 29,313 | 0.276 | 673.20 | 618.80 |
| 4 | 10,212 | 0.091 | 650.38 | 564.19 |
| 5 | 3,651 | 0.039 | 629.49 | 528.95 |
| 6+ | 2,654 | 0.017 | 614.08 | 501.60 |
| **Total** | **383,221** | **0.675** | **709.17** | **720.51** |

The relationship between the number of credit cards outstanding and the proportion of the population that increases above a score of 600 or decreases below the score of 600 is shown in Figure 4 below.
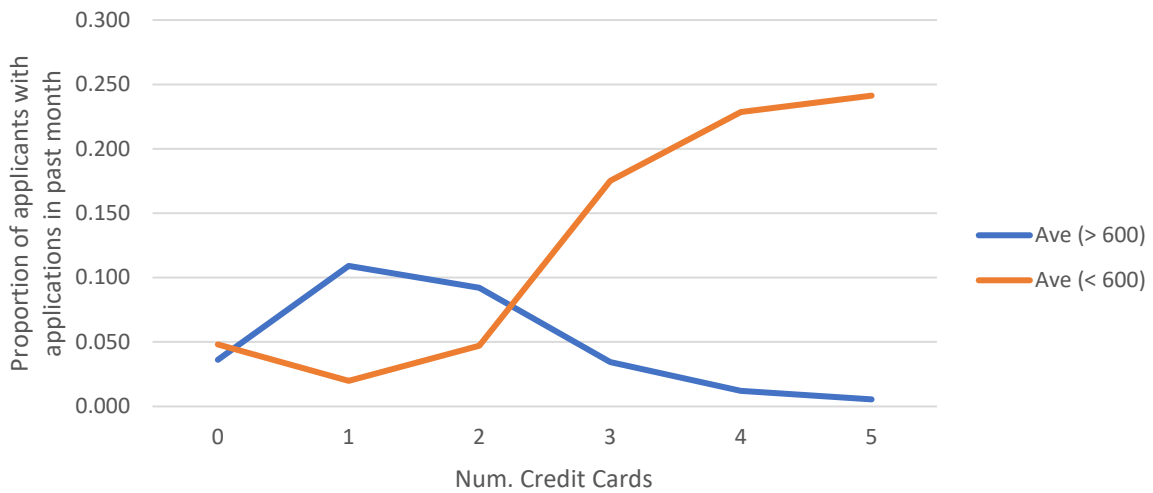


Figure 4: Number of Credit Cards Outstanding and Crossing the 600 Threshold

Table 10: Applicants moving above and below the 600 threshold based on the number of outstanding credit cards held.

| | Applicants Moving Above Threshold | | | Applicants Moving Below Threshold | | | Difference | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Num. Credit Cards | N | Ave (> 600) | Std. Dev | N | Ave (< 600) | Std. Dev | Ave Diff | Sp | T-stat | P-value |
| 0 | 2,886 | 0.036 | 0.187 | 3,838 | 0.048 | 0.214 | -0.012 | 0.128 | -3.793 | (0.000) |
| 1 | 19,142 | 0.109 | 0.312 | 3,483 | 0.020 | 0.139 | 0.089 | 0.287 | 16.888 | (0.000) |
| 2 | 7,550 | 0.092 | 0.289 | 3,863 | 0.047 | 0.212 | 0.045 | 0.237 | 9.598 | (0.000) |
| 3 | 1,007 | 0.034 | 0.182 | 5,132 | 0.175 | 0.380 | -0.141 | 0.176 | -23.167 | (0.000) |
| 4 | 124 | 0.012 | 0.110 | 2,334 | 0.229 | 0.420 | -0.216 | 0.224 | -10.481 | (0.000) |
| 5 | 20 | 0.005 | 0.074 | 881 | 0.241 | 0.428 | -0.236 | 0.239 | -4.366 | (0.000) |
| Total | 30,729 | 0.081 | 0.272 | 19,531 | 0.051 | 0.221 | 0.029 | 0.215 | 14.926 | (0.000) |

The results presented in Table 10 indicate a 'humped' relationship between the number of credit cards and the population increasing above the 600-score threshold. That is, applicants with 1 or 2 credit cards appear to benefit more than those with either 0 or 3 or more cards. Relatively few applicants with 0 outstanding credit cards (3.6%) cross the threshold above 600, with a greater number declining below the threshold (4.8%).[7] Applicants with either one or two outstanding credit cards are more likely than average to cross the 600 threshold (10.9% for those with 1 credit card and 9.2% for those with 2 credit cards). Those with three credit cards jumped above the threshold in only 3.4% of cases, and the proportion of cases with an increase beyond this number of credit cards decreases – perhaps driven by people with several low-limit cards and/or spreading their credit risk exposure over multiple lenders.

Applicants with more than 2 credit cards were significantly more likely to exhibit a credit score drop to below a score of 600 – 17.5% of credit applicants with 3 credit cards outstanding experienced a fall from above 600 to below 600 under positive credit reporting. Thus, positive scoring appears to better identify those borrowers who likely reflect higher credit risk in due to a greater number of credit cards held.

## 8. Case studies

### A. Borrowers in higher risk geographic areas and younger borrowers

It is of interest to see how the changing credit scores affect those for whom credit may have typically seemed difficult to obtain. Here, we report the proportion of applicants who cross the threshold by the two major age categories considered (older than 30 and 30 or younger.) Age is an important variable in the examination of credit scores; younger people are more likely to require credit in the future than older people, with less time to have accumulated savings, and so access to credit is paramount. The incorporation of outstanding credit accounts and repayment history information into comprehensive credit reports should benefit younger borrowers more so than older borrowers, as under negative credit reporting a good credit history may never be fully visible . Under positive

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[7] This result is possibly somewhat exaggerated as it is in part driven by the sample of CCR data available in 2018. These individuals have no credit card, yet held a CCR record at the time of the application, indicating that they likely held a personal loan or, in a small proportion of cases, a subprime product; likely making them riskier than the average consumer with no credit card. Nonetheless, we note that the result is intuitive and directionally consistent with the broad population as individuals with a sound credit card history are, on average, lower credit risks than those with no credit card experience (but with possibly some experience with less sophisticated credit products).

reporting, discipline in repayment of loans and account holdings provides a strong positive signal that is visible in a much shorter time frame.

Table 11 reports threshold crossing statistics (at levels 480, 600 and 720) for credit applicants by ranges of GRI (Low Risk, 1 -4; Medium Risk, 5-9, and High Risk, 10-13), separated into age categories. Statistics for those above the age of 30 are reported in Panel A, while statistics for applicants aged 30 or younger are reported in Panel B. It is most instructive to examine the differences between those who cross each threshold (moving above versus moving below each threshold) and then to compare across the two age brackets. As an example, considering the Total Row across the two panels, 6.15% of those aged greater than 30 move above the 600 threshold, compared with 5.67% moving below the 600-threshold. The corresponding figures for those aged 30 and younger are 13.73% and 4.05%. Both groups benefit from the introduction of positive reporting, but those in the lower age bracket appear to benefit much more (at least when considering crossing the 600 threshold).

*Table 11: Applicants increasing above and decreasing below thresholds by GRI and Age categories.*

| | Score increase above threshold | | | Score decrease below threshold | | | Average Score Difference | N. obs |
|---|---|---|---|---|---|---|---|---|
| **GRI** | 480 | 600 | 720 | 480 | 600 | 720 | | |
| Panel A: Applicants Older than 30 | | | | | | | | |
| 1-4 | 0.44% | 3.81% | 14.77% | 2.98% | 5.28% | 3.22% | 10.94 | 113,280 |
| 5-9 | 0.91% | 6.69% | 14.12% | 4.44% | 6.02% | 2.78% | 10.58 | 118,232 |
| 10-13 | 1.92% | 9.67% | 12.18% | 5.60% | 5.73% | 2.48% | 8.84 | 57,146 |
| **Total** | **0.93%** | **6.15%** | **13.99%** | **4.10%** | **5.67%** | **2.89%** | **10.38** | **288,658** |
| Panel B: Applicants Aged 30 and Younger | | | | | | | | |
| 1-4 | 1.81% | 10.79% | 16.60% | 4.39% | 4.41% | 1.15% | 20.90 | 31,809 |
| 5-9 | 3.00% | 14.34% | 11.68% | 5.75% | 4.15% | 1.06% | 13.98 | 40,096 |
| 10-13 | 4.93% | 16.79% | 7.36% | 6.85% | 3.36% | 1.00% | 5.45 | 22,658 |
| **Total** | **3.06%** | **13.73%** | **12.30%** | **5.55%** | **4.05%** | **1.08%** | **14.26** | **94,563** |

Perhaps it can be understood intuitively that applicants aged 30 or less are more likely to appear below the 600 threshold to begin with, and so are more likely to be in a position to cross this threshold. The magnitude of the difference (more than twice the proportion of younger applicants increase above the threshold compared to older applicants) demonstrates that the impact of CCR does help to benefit those who may have been traditionally disadvantaged. This observation is further validated when

considering particular consumer segments in the older population as well. To illustrate this point, we note a net increase of around 4% (9.67% less 5.73%) at the 600 threshold for older applicants in the higher GRI regions, compared with an overall figure of approximately 0.5%. So, whereas the younger population may generally benefit the most from the introduction of CCR, significantly large groups of older consumers also stand to benefit.

An examination of the lower threshold (480) shows that a greater number of people fall below the 480 threshold than increase above it in both groups. With the threshold of 480 representing the 5th percentile of negative scores, this is somewhat expected; the greatest proportion of increases (4.93%) above the 480 threshold is exhibited by the younger group in the high risk GRI areas. However, a much higher number of people cross the higher threshold of 720 than fall below. The net difference in borrowers crossing the 720 threshold is slightly above 11% for both age groups.

Overall, it appears that both age groups benefit from the introduction of positive reporting, but the relative size of the benefit is related to both the consumer's position in the risk spectrum and the magnitude of their score shift – i.e. The extent to which they were previously incorrectly penalised from the more opaque credit information held under negative reporting.

The younger group exhibit a greater benefit in terms of score differences (an average increase of 14.26 points compared with 10.38 points for the older group). When comparing across the GRI groups, it is noticeable that the largest score increases are for those in the low-GRI groups (who benefit more than their high-GRI counterparts), especially for the younger group. The differences in scores (Positive less Negative score) between the highest and lowest risk GRI categories are more extreme for younger credit-seekers (a spread of 20.90- 5.45 (15.45) for younger applicants, compared with 10.94 − 8.84 (2.10) for the older group). This then also translates into a greater proportion of young applicants from higher risk GRI catchments crossing the 600 pt threshold (16.79%-3.36% = 13.43%) than older applicants (9.67%-5.73% = 3.96%).  So the economic benefit from CCR is not just dependent on their score increase but also by their original position on the risk spectrum.

In terms of the crossing of the key thresholds therefore, younger individuals and those in higher risk GRI areas are more likely to cross the lower thresholds of 480 or 600, but less likely to cross the higher threshold of 720 – giving them access to greater credit opportunities, from lower priced credit and prime credit card products, but not necessarily more expensive super premium card products.

This reflects the composition of the groups; we are less likely to observe individuals in low-GRI areas with negative credit scores below 480 or 600. However, it does highlight that crossing these lower thresholds (which demonstrate improved economic outcomes) is particularly likely for the segments of the population for whom credit has been historically difficult to obtain. Taken at a broad level, it appears that the impact of CCR is to help correct some of the mis-pricing that occurs with less focus on the individual's detailed credit history and more on only extreme credit events and geographical and demographic attributes.

To further illustrate the impact of CCR for younger consumers, we report a case study of the crossing the thresholds of 480, 600, and 720 for those aged 30 or less, sorted by GRI and separated into two groups of credit card holdings, those holding 0 credit cards and those holding 1 or 2 credit cards. This case study reflects the impact of CCR for those that have demonstrated the capacity to obtain existing credit at a relatively young age, providing insight into whether CCR indicates prudent usage.

The results of this case study are reported in Table 12. At the aggregate level, it is noticeable that those in the sample of applicants aged below 30 with 1 or 2 credit cards increase above the 600 threshold on 19% of occasions, versus those with 0 credit cards on 5% of occasions . The rates for those falling below the 600 threshold are 2.7% and 4.2%, respectively. Applicants with 1 or 2 credit cards in this younger age bracket are also more likely than those without a credit card to increase above the 480 and 720 thresholds, while being less likely to fall below the thresholds.

While these differences are likely exaggerated due to the composition of the CCR data during its early adoption in mid 2018 (per footnote 7), it demonstrates that those that have a proven credit record at a young age will tend to benefit from the introduction of CCR. This is the case even if they have secondary, associated risk factors that traditionally affected their chances of getting credit. This pattern is consistent across the GRI segments, but most particularly pronounced in high geographic risk segments of the population.

*Table 12: Case Study – Crossing the 600 Thresholds for Applicants Aged Less Than 30, by GRI. Comparing Groups with 0 or 1&2 credit cards*

| | Score increase above threshold | | | Score decrease below threshold | | | Average Score Difference | N. obs | Average Subprime App's 1m |
|---|---|---|---|---|---|---|---|---|---|
| GRI | 480 | 600 | 720 | 480 | 600 | 720 | | | |
| Panel A: Applicants with Aged 30 or Younger with 0 Credit Cards | | | | | | | | | |
| 1-4 | 0.59% | 3.67% | 9.57% | 3.75% | 4.31% | 1.49% | 9.48 | 10,256 | 0.028 |
| 5-9 | 1.23% | 5.25% | 6.98% | 5.53% | 4.47% | 1.32% | -3.89 | 12,470 | 0.040 |
| 10-13 | 1.73% | 6.53% | 4.38% | 6.93% | 3.76% | 1.47% | -20.11 | 7,331 | 0.049 |
| **Total** | **1.13%** | **5.02%** | **7.23%** | **5.27%** | **4.24%** | **1.42%** | **-3.29** | **30,057** | **0.038** |
| Panel B: Applicants Aged 30 and Younger with 1 or 2 Credit Cards | | | | | | | | | |
| 1-4 | 2.55% | 15.02% | 21.61% | 3.28% | 2.93% | 0.69% | 36.16 | 19,657 | 0.021 |
| 5-9 | 4.01% | 19.71% | 15.04% | 4.21% | 2.68% | 0.81% | 32.20 | 25,034 | 0.027 |
| 10-13 | 6.84% | 23.39% | 9.56% | 4.91% | 2.47% | 0.72% | 28.10 | 13,925 | 0.037 |
| **Total** | **4.19%** | **19.01%** | **15.94%** | **4.07%** | **2.72%** | **0.75%** | **32.56** | **58,616** | **0.027** |

Table 12 also reports the proportion of individuals that have made at least 1 subprime application in the past month. In the higher GRI range (GRI of 10 to 13), subprime applications are significantly higher among the 0 credit card group compared with the 1 or 2 credit card group, suggesting that those with the ability to use credit cards are less likely to make subprime credit applications, further demonstrating the benefits of crossing the 600 threshold and thereby being eligible for prime credit products.

## B. Borrowers in Metropolitan vs Other areas

It might also be argued that there is a relationship between a borrower's location – in an urban or rural area – and the impact of positive credit reporting. We use geographic data to identify whether an applicant resides in an area surrounding one of the state capital cities (defined by the ABS as "Greater Adelaide" for the case of Adelaide and immediate surrounds, and similarly for other capital cities).

Statistics for crossing the key thresholds for applicants in metropolitan and non-metropolitan areas are reported in Table 13. There is not a large difference between applicants crossing thresholds based on their geographic location – both metro and non-metro applicants exhibit similar frequencies in crossing the relevant thresholds. For instance, in metro areas 8.09% of applicants increase above the 600 threshold, compared with 7.79% in non-metropolitan areas, with the respective proportions of those falling below the 600 threshold of 5.31% and 5.21%. The largest difference is observed at the higher 720 threshold (13.85% vs. 12.94%), with the differences likely reflecting unrelated characteristics (such as the higher GRI typically observed in rural areas). This demonstrates that it is

not a geographic disadvantage to borrowers outside major cities from the inclusion of positive information in credit scores.

*Table 13: Crossing by applicants in Metropolitan and Non-Metropolitan areas.*

| | Score increase above threshold | | | Score decrease below threshold | | | Average |
|---|---|---|---|---|---|---|---|
| | 480 | 600 | 720 | 480 | 600 | 720 | Score Difference |
| Metro | 1.40% | 8.09% | 13.85% | 4.52% | 5.31% | 2.48% | 11.69 |
| Non-Metro | 1.63% | 7.79% | 12.94% | 4.45% | 5.21% | 2.39% | 10.64 |

## 9. Household Income and Wealth

The changes to the credit reporting system do not include variables that are related to a household's wealth or income (directly). However, under negative reporting lower socioeconomic groups may be disproportionately stigmatised by limited access to credit data. We examine the impact CCR on income and wealth groups crossing the key thresholds to examine whether positive reporting significantly benefits lower-socioeconomic households.

Table 14 examines the unconditional likelihood of households increasing above or falling below the thresholds of 480, 600, and 720 based on their (bureau-estimated) household income, which is modelled for 263,726 households of the sample of 383,221 (68.8%) which we have thus far considered.

Considering firstly the 600 threshold, we notice a monotonic decrease in the likelihood of increasing above the threshold with wealth; the higher the wealth, the lower the likelihood of increasing above the threshold. However, there is little difference in the likelihood of falling below the 600 threshold across the different wealth buckets. Similar structural patterns can be observed for the other two thresholds, although the direction is reversed for the 720 threshold. The average score difference across the buckets is relatively consistent, suggesting that the likelihood of crossing a threshold is driven by an individual's treatment under the negative scoring system.

Across all the income brackets, the likelihood of crossing both the 600 and 720 thresholds are more likely than falling below the threshold. For example, any applicant with an income below $65,000 has a more than 9% likelihood of exhibiting a score increase above 600, and only a 5.2% chance of falling below the same threshold. This 3.8% difference exceeds the aggregate difference of 2.7% (as reported in Table 6). It is possible under the positive scoring system that even low income applicants cross high

credit thresholds, and high income borrowers fall below low barriers. There are broad economic benefits of crossing these thresholds in terms of access to credit, and CCR particularly benefits those in the lower income brackets.

*Table 14: Crossing Thresholds by Household Income*

| | Score increase above threshold | | | Score decrease below threshold | | | | Average Score Difference |
|---|---|---|---|---|---|---|---|---|
| | 480 | 600 | 720 | 480 | 600 | 720 | N | |
| Under $20,799 | 2.45% | 10.59% | 11.81% | 5.38% | 5.19% | 2.08% | 19,628 | 8.28 |
| $20,800 - $41,599 | 1.90% | 9.06% | 12.74% | 5.05% | 5.21% | 2.25% | 34,788 | 9.32 |
| $41,600 - $64,999 | 1.88% | 9.33% | 12.77% | 5.23% | 5.27% | 2.23% | 42,983 | 9.67 |
| $65,000 - $77,999 | 1.51% | 7.84% | 13.48% | 4.75% | 5.59% | 2.47% | 37,748 | 9.80 |
| $78,000 - $103,999 | 1.43% | 7.58% | 13.12% | 4.53% | 5.54% | 2.54% | 32,953 | 10.02 |
| $104,000 - $155,999 | 1.07% | 6.58% | 13.89% | 4.26% | 5.49% | 2.81% | 47,250 | 9.70 |
| $156,000+ | 0.57% | 4.62% | 15.57% | 2.93% | 4.83% | 2.75% | 35,218 | 12.67 |
| Unknown | 1.70% | 8.97% | 12.69% | 5.13% | 5.92% | 2.55% | 13,158 | 10.39 |
| Total | 1.49% | 7.82% | 13.41% | 4.58% | 5.35% | 2.48% | 263,726 | 10.02 |

We similarly find the impact of household wealth on crossing the key thresholds of 480, 600, and 720 in Table 15. Where available (for 67.8% of observations) household wealth is ranked into one of seven categories (Very High, High, Above Average, Average, Below Average, Low, Very Low) or unranked as "Other." Here, we observe a similar trend with income; for the higher thresholds of 600 and 720 households are more likely to increase above the threshold than to decrease below it, regardless of wealth level (the exception being those with Very High wealth at the 600 threshold.) Those with higher wealth are more likely to increase above the higher threshold of 720, while those with lower wealth are more likely to increase above the thresholds of 480 and 600. The average change in score declines slightly with reduced wealth, although is positive across all wealth buckets. This suggests that riskier credit behaviour might be more likely to be observed in lower wealth individuals overall, but not overwhelmingly so. It however then also suggests that many lower wealth individuals may be unfairly penalised without this visibility to their credit history.

To verify this observation we note that there are aggregate benefits at the two higher thresholds for all consumers from the introduction of CCR, with those with Average wealth levels or lower particularly benefiting from a higher likelihood than the average consumer of crossing the 600 threshold and thereby moving enhancing their ability to source cheaper prime credit.

*Table 15: Crossing Thresholds by Household Wealth*

| | Score increase above threshold | | | Score decrease below threshold | | | | Average |
|---|---|---|---|---|---|---|---|---|
| | 480 | 600 | 720 | 480 | 600 | 720 | N | Score Difference |
| Very High | 0.48% | 4.34% | 15.70% | 2.76% | 4.62% | 2.81% | 29,118 | 12.97 |
| High | 0.82% | 5.49% | 14.40% | 3.52% | 5.19% | 2.75% | 38,616 | 11.03 |
| Above Average | 1.49% | 7.64% | 13.56% | 4.13% | 5.07% | 2.30% | 21,500 | 11.30 |
| Average | 1.59% | 8.25% | 13.35% | 4.87% | 5.38% | 2.43% | 28,422 | 9.85 |
| Below Average | 1.45% | 7.96% | 13.30% | 4.86% | 5.73% | 2.62% | 36,336 | 9.91 |
| Low | 1.77% | 8.94% | 12.66% | 5.25% | 5.63% | 2.36% | 56,359 | 8.61 |
| Very Low | 2.42% | 10.47% | 11.86% | 5.62% | 5.25% | 2.15% | 34,754 | 7.77 |
| Other | 1.74% | 8.99% | 12.91% | 5.27% | 5.85% | 2.57% | 14,890 | 10.19 |
| Total | 1.48% | 7.80% | 13.41% | 4.58% | 5.35% | 2.49% | 259,995 | 9.98 |

## 10. Household Types

We examine the proportion of applicants across various types of household. In Figure 5 we present the proportion of applicants by household type. The most common types of households are Single (25%) and Family (23%), followed by Couples (17%), Homesharers (13%), Extended Families (12%), and Single Parents (10%).
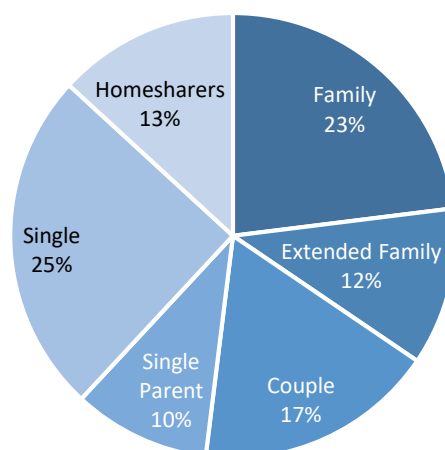


*Figure 5: Proportion of applicants by household type, for applicants with known household type only.*

While applicants at different stages of life may be more likely to appear in one category than others (e.g. older applicants are more likely to appear in Family than in Homesharers), it is of interest to know whether certain household types are more likely to be included or excluded from the credit market

following the shift to positive scoring. In Table 16, we show the crossing the key thresholds by household type. Panel A reports the key statistics for all households (including those with unknown household type) and Panel B reports the statistics for households in high GRI (10 to 13, inclusive) areas only.

The results reported in Table 16 show that there is little effect of the household composition on the likelihood of a score increase; and there is relatively little variation in the proportion of applicants making subprime applications (with the highest being observed for Single Parents among those with a known household status). It is also apparent that it is much more likely for all groups to increase above the thresholds of 600 and 720 than to fall below these thresholds, while it is less likely to increase above the 480 threshold. Couples (2.55%), single parents (2.42%), singles (3.78%) and homesharers (2.44%) have the highest differences in the proportions crossing the threshold of 600 (Increase less Decrease). These groups stand to benefit the most from the shift to positive reporting, likely because these groups have less established credit records than families, or extended families, who are likely at later stage in life. This should help those who are most likely to need credit to obtain it at relatively lower costs (shifting from a subprime provider to a prime provider saving substantial interest costs). Moreover, these household types may have traditionally found it more difficult to obtain credit (for example, with only a single household income), but with an ability to demonstrate prudent credit usage.

From the examination of Table 16, Panel B, which focuses on households in high GRI areas only, an even greater likelihood of crossing the 600 threshold is observed. Again, the largest differences in increase vs. decrease proportions are seen for couples, single parents, singles and homesharers, highlighting that it is not simply those in low geographical risk areas, and those with settled household characteristics (i.e. families) that stand to benefit from the shift to positive reporting. These pronounced benefits to less-established households in higher risk areas highlight the economic opportunity provided to those who may have been traditionally marginalised in the credit market, as well as to the credit industry from enabling prudent lending to new consumer groups.

*Table 16: Threshold crossing by type of household. Panel A reports the proportion of applicants who cross the 480, 600 and 720 thresholds (increase above and decrease below) and the proportion of increases within each household type. Panel B reports the same statistics for households in High GRI areas (GRI scores from 10 to 13) only.*

| Panel A: All Household Types | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Increase Above Threshold | | | Decrease Below Threshold | | | | |
| | 480 | 600 | 720 | 480 | 600 | 720 | N | Prop. Increase |
| Family | 1.31% | 6.77% | 12.86% | 4.22% | 5.40% | 2.70% | 57,770 | 65.30% |
| Extended Family | 1.23% | 6.56% | 14.11% | 4.09% | 5.27% | 2.58% | 28,767 | 64.26% |
| Couple | 1.35% | 7.59% | 13.59% | 4.28% | 5.04% | 2.44% | 43,819 | 66.62% |
| Single Parent | 1.74% | 8.32% | 12.81% | 5.11% | 5.91% | 2.66% | 24,988 | 66.78% |
| Single | 1.65% | 9.11% | 13.65% | 4.88% | 5.33% | 2.24% | 62,474 | 68.41% |
| Homesharers | 1.54% | 7.71% | 13.66% | 4.63% | 5.27% | 2.44% | 33,058 | 67.14% |
| Unknown | 1.64% | 9.51% | 12.67% | 5.13% | 5.32% | 2.44% | 9,663 | 68.30% |
| **Total** | **1.47%** | **7.82%** | **13.40%** | **4.55%** | **5.34%** | **2.49%** | **260,539** | **66.64%** |
| **Panel B: Household types in High GRI areas 10 – 13** | | | | | | | | |
| | Increase Above Threshold | | | Decrease Below Threshold | | | | |
| | 480 | 600 | 720 | 480 | 600 | 720 | N | Prop. Increase |
| Family | 2.55% | 10.55% | 10.54% | 5.76% | 5.38% | 2.38% | 12,451 | 68.56% |
| Extended Family | 2.65% | 10.47% | 10.67% | 5.95% | 5.20% | 1.86% | 4,688 | 67.81% |
| Couple | 2.61% | 11.36% | 10.58% | 5.94% | 4.84% | 2.14% | 7,940 | 68.70% |
| Single Parent | 3.10% | 11.69% | 10.78% | 6.76% | 5.56% | 2.29% | 7,171 | 68.40% |
| Single | 2.90% | 12.34% | 10.60% | 6.21% | 5.02% | 2.03% | 14,744 | 69.28% |
| Homesharers | 2.91% | 10.96% | 10.79% | 5.94% | 4.97% | 1.86% | 6,840 | 69.11% |
| Unknown | 2.68% | 12.91% | 9.53% | 6.89% | 4.41% | 1.98% | 2,424 | 67.04% |
| **Total** | **2.78%** | **11.42%** | **10.59%** | **6.12%** | **5.13%** | **2.12%** | **56,258** | **68.69%** |

Figure 6 shows the differences graphically in the likelihood of crossing the 600 threshold by household groups, for those in all areas (darker blue), and those specifically in high GRI areas (light blue). The relative differences for those in high GRI areas are fairly consistent across household types, but clearly greatest for the smaller household sets as discussed previously. Based on their demographic profile, those in smaller households in riskier geographical areas likely form those who are traditionally underserved by credit providers. Positive scoring helps to redress the balance.
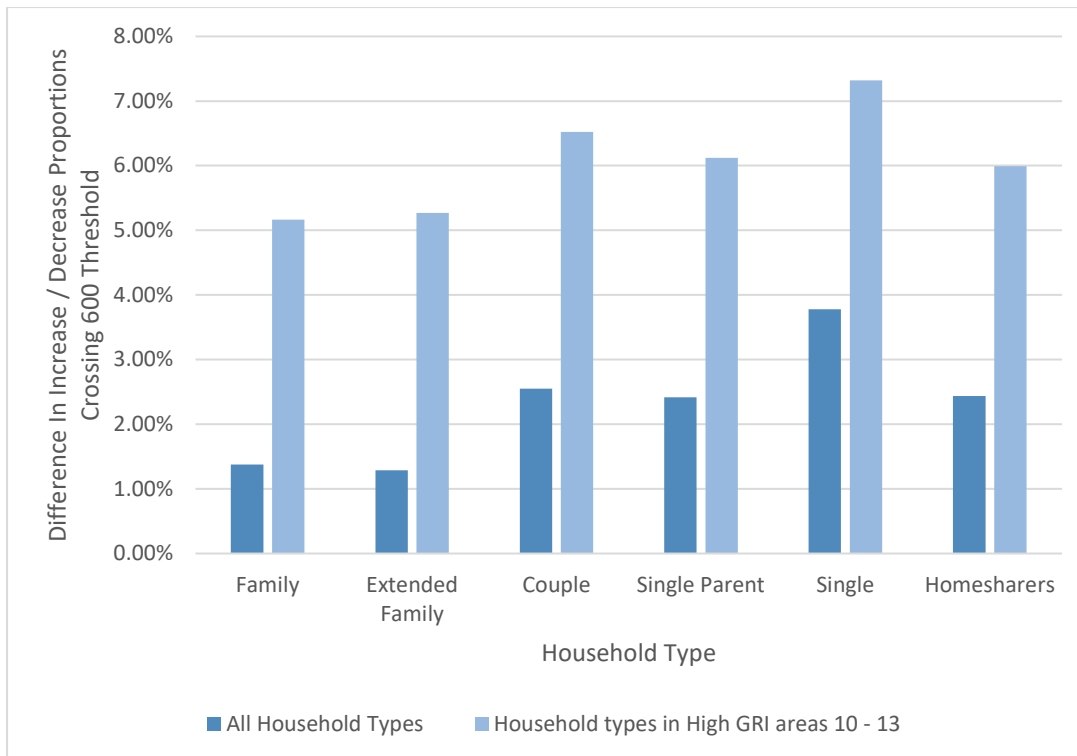
*Figure 6: Difference in proportions of those crossing the 600 threshold by household types. The left column reports the difference in the proportion of applicants increasing above the threshold and decreasing below the threshold with the change from negative to positive reporting, for all applicants in a household type. The right column reports the difference in proportion of applicants crossing above and below the threshold by household type, for households in high GRI (10 to 13, inclusive) areas only*

## 11. Conclusion.

This report has explored a number of aspects of the impact of the shift to positive credit reporting on the access to credit for the Australian population. The key takeaway is that the shift to positive reporting provides more opportunities for credit take-up rather than places impediments to gaining credit (particularly prime-level credit). The broad economic argument of comprehensive credit reporting is that by being able to better identify risky consumers, loans can be priced more competitively. The costs of default borne by lenders, and passed onto other borrowers are able to be reduced by more accurate pricing. Our results indicate that 67.5% of individuals exhibit a score increase, rising by an average of 61 points. The remaining 32.5% of individuals experience a decrease in score, averaging of around 92 points. The largest score decreases are exhibited by those on the lower end of the negative scoring credit spectrum; a large proportion of the borrowers who were unable to obtain credit under the negative scoring system remain unlikely to obtain credit under CCR, as it has confirmed the high risk nature of their credit utilisation.

We examined the economic benefit of the change in reporting regime by examining the proportion of the population that increases above and falls below representative thresholds. In considering crossing the key threshold of 600, below which an applicant is broadly 'below-prime' (corresponding to around the 23$^{rd}$ percentile of the sample), we find, in aggregate that a greater proportion of the population (8.02%) increase above the threshold than fall below it (5.27%). This 2.75 percentage difference could be considered the baseline figure for the relative benefits of positive reporting. These numbers are early indicators based on data contributed in the nascent stages of the shift to CCR between July and October 2018. As the volume and coverage of data increases (as it has over 2019) we would expect to see these benefits extend to more people across different parts of the credit spectrum.

Our evidence finds that crossing the 600 threshold brings access to more than twice as many personal loans and seven times as many credit cards. The interest rates offered on the personal loans average 4.5% lower, and potential credit card limits are around 2.25 times as large for those with credit scores above 600. We also considered a higher threshold of 720 (at the 58$^{th}$ percentile of the negative score distribution), finding that 13.58% of the population experience a score increase above this threshold, while only 2.45% fall below it. This threshold provides consumers with access to a larger range of credit products, mainly in terms of better rewards offered on credit cards as well as better priced credit facilities that are aligned to the consumer's risk, as already implemented in some credit sectors, such as the Fintech sector today.

Moreover, our analysis shows that the benefits of positive reporting – as measured in terms of increasing above the 600 threshold – accrue disproportionately in favour of those who might be excluded from gaining credit under conventional metrics. Where CCR is able to demonstrate a consumer's proven credit track record groups, such as younger applicants, those in riskier geographical locations, those with lower incomes and wealth, and with less established family units are among those who stand to benefit the most from the changing credit reporting regime where they are able to demonstrate prudent management of credit. The higher threshold of 720 tends to be more likely to be crossed by those in higher wealth and income brackets, and in lower risk areas confirming that consumers from a lower economic base are not likely to be suddenly inundated with a multitude of credit offers. Their opportunities will be commensurate with their credit standing.

There is now a clear opportunity to serve newly creditworthy individuals; the change to credit scoring benefits those particularly in traditionally underserved demographics. As greater discrimination in credit scores abounds, credit providers will be able to finely tailor their products to different segments of the population. Consumers will be encouraged more by frequent, positive feedback from

repayment history information, and thus more likely to treat their credit score as an asset, fuelling more prudent behaviour.

Overall, we provide empirical evidence that CCR will on average improve the risk profile of consumers from all demographic groups: across income wealth brackets, in high and low socioeconomic areas, younger and older, in metropolitan and rural areas, and for established and less-established household types. The economic benefit is realised to a larger extent by those consumers that have been traditionally excluded from access to credit. These consumers are more likely to cross the 600-threshold allowing them access to prime credit and better pricing.

For the historically well banked, their benefits from CCR are less to do with access to prime credit products (as they already have these). It will come from personalised pricing that is reflective of their personal risk and for this, CCR will need to be a key driver.

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## Appendix: Interpreting Credit Scores as Default Probabilities

It is useful to understand the meaning of credit scores from the perspective of a lender. Based on the modelling of illion, a score of 200 indicates 1:1 odds against (50% chance) a borrower defaulting on credit in the next twelve months. Each additional 100-point increase in score halves the odds of a borrower defaulting. Thus, a score of 300 would be equivalent to 2:1 odds against the borrower defaulting (33.3% chance), a score of 400 would be equivalent to 4:1 odds against the borrower defaulting (20% chance) and so on. The general form of the default probability calculation involves a base-2 exponential transformation of the score. We discuss the process here to present an alternative to viewing scores statistically.

In order to estimate the probability of default, we start with the credit score, and divide by 100 and subtract 2. For ease of discussion, define this linear transformation of the score, $x$, as follows

$$x = \frac{Score}{100} - 2$$

So, a credit score of 200 corresponds to a value of $x$ of 0, and a score of 620 corresponds to $x = 4.2$. This is then converted to the "odds against default" measure ($Odds$) by taking the value of $x$ to the base 2 exponential, i.e.

$$Odds = 2x$$

So, the odds against at a score of 200 would be $2^0 = 1$, the odds against at a score of 620 would be $2^{4.2} \approx 18.38$. The probability of default is then calculated in the usual fashion based on the odds.

$$P(Default) = \frac{1}{(1 + Odds)},$$

from which we can infer that $P(Default)$ at a score of 200 is $1/2 = 50\%$, and similarly, at a score of 620, the probability of default is $\frac{1}{19.38} = 5.16\%$.

Table 17 presents a translation of credit scores to default probabilities. A fifty-point score increase from 450 to 500 would lower the perception of default from 15.02% to 11.11%, whereas a 50 point increase from 850 to 900 would lower the perception of default from 1.09% to 0.78%. At the point around the 600 threshold considered in the paper, a score increase from 572 to 636 (based on the average increase for those that cross the 600 threshold in Table 8) would lower the default probability from 7.05% to 4.64%, a 34% difference.

| Credit Score | Score/100-2 | Base 2 Exponential | Probability of Default |
|:---:|:---:|:---:|:---:|
| 100 | -1 | 0.50 | 66.67% |
| 150 | -0.5 | 0.71 | 58.58% |
| 200 | 0 | 1.00 | 50.00% |
| 250 | 0.5 | 1.41 | 41.42% |
| 300 | 1 | 2.00 | 33.33% |
| 350 | 1.5 | 2.83 | 26.12% |
| 400 | 2 | 4.00 | 20.00% |
| 450 | 2.5 | 5.66 | 15.02% |
| 500 | 3 | 8.00 | 11.11% |
| 550 | 3.5 | 11.31 | 8.12% |
| 600 | 4 | 16.00 | 5.88% |
| 650 | 4.5 | 22.63 | 4.23% |
| 700 | 5 | 32.00 | 3.03% |
| 750 | 5.5 | 45.25 | 2.16% |
| 800 | 6 | 64.00 | 1.54% |
| 850 | 6.5 | 90.51 | 1.09% |
| 900 | 7 | 128.00 | 0.78% |
| 950 | 7.5 | 181.02 | 0.55% |
| 1000 | 8 | 256.00 | 0.39% |