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CONSULTING ACTUARIES

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Mr Philip Johns  
Vice-President  
National Financial Services Federation  
C/- PO Box 140  
**REDCLIFFE QLD 4020**

Dear Phil,

**Subject: Annual Percentage Rates and Comparison Rates**

As requested, we are pleased to provide the attached document, discussing the background, implications and limitations of the current and proposed methods for calculating Annual Percentage Rates and Comparison Rates.

The document has been divided into the following sections, for ease of reference:

1. Executive Summary
2. Background
3. Annual Percentage Rate Formula
4. How the APR is Calculated
5. How the Formula Works as Loan Characteristics Vary
6. Suitability of the Formula

If you have any queries regarding this letter please do not hesitate to contact me.

Yours sincerely,

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## 1 Executive Summary

Recently the Queensland government has proposed legislation and accompanying regulations to introduce a 48% cap on the Annual Percentage Rate (APR) for loans subject to the consumer credit code.

However, the operation of the required formula for calculating the APR leads to anomalous results in many instances.

### Key findings:

- The 48% cap on the APR is very restrictive on credit providers who offer loans for small amounts and/or short durations.
  - For these loans, the inclusion of reasonable fees combined with very low (or even zero) rates of interest can result in very high APR's (well in excess of the proposed 48% cap).
  - For example: On an *interest free* loan of \$100 repayable via a single repayment in one week, the maximum fee chargeable in order for the loan's APR to remain within 48% is only 91 cents. That is, the single repayment at the end of the week can be no more than \$100.91. It is difficult to envisage that 91 cents would be sufficient to cover the costs of providing such a loan (which include costs to the lender for documentation, credit checks, processing, etc).
- The calculation of the APR includes government fees, charges and duties on the loan. Their inclusion in the calculation of the APR is inconsistent with the calculation of Comparison Rates under current regulations, which specifically exclude these charges.
  - Credit providers have no control over these costs.
  - Government fees and charges on a loan make the 48% cap on its APR significantly more onerous to satisfy.
  - It would seem more logical to *include* government fees and charges in the calculation of the Comparison Rate (which must be disclosed to consumers, in an attempt to guide them on the total cost of the loan), but to *exclude* them from the APR (which must be within the proposed 48% cap). Otherwise credit providers may be unreasonably constrained by government fees and charges which are beyond their control.
- The size of the APR for loans of small amounts and/or short durations is likely to mislead consumers.
  - For example: A \$100 loan repayable via six equal weekly instalments with total repayments of just \$120.78 can have an APR of almost 300%. An APR of 300% is likely to mislead consumers into perceiving that such a loan is unreasonably costly. They would not expect that the total dollar cost includes just \$20.78 in fees and interest.

## 2. Background

Recently the Queensland government has proposed legislation and accompanying regulations to introduce a 48% cap on the Annual Percentage Rate of consumer credit loans (i.e. the Maximum Annual Percentage Rate is to be set at 48%).

The cap is intended to limit the cost of credit, and is motivated by a desire to protect consumers taking out (apparently) high-cost loans. The proposed regulations also specify the method that is to be used to calculate the Annual Percentage Rate for a particular loan. This formula is very similar to the formula used to determine the Comparison Rate under the current regulations.

The intention appears to be that the annual percentage rate calculated using the proposed formula can be regarded as an indication of the cost of a loan. By placing a cap on this rate, the government intends to put an upper limit on cost of loans. However, as discussed below, the operation of the calculation formula, when combined with an approach of setting a cap on the resulting annual percentage rate across all loans (each with very different characteristics), leads to anomalous results in many instances.

### 3. Annual Percentage Rate Formula

Under the consumer credit code, a Comparison Rate must generally be disclosed when a loan contract is prepared. The formula used to determine the Comparison Rate is very similar to the formula in the proposed regulations for determining the Annual Percentage Rate (APR). The main difference between the two is that for calculation of a Comparison Rate, government fees, charges or duties are excluded from the calculation, whereas these will be included in the calculation of the APR. Generally, if these charges exist for a loan, the calculated APR will be higher than the corresponding Comparison Rate.

The APR is based on the solution for “r” in the formula below:

$$\sum_{j=0}^t \frac{A_j}{(1+r)^j} = \sum_{j=0}^t \frac{R_j + C_j}{(1+r)^j}$$

$A_j$ ,  $R_j$ ,  $C_j$ ,  $j$  and  $t$  are defined in detail in the proposed regulations. In broad terms,  $A_j$  is the amount(s) borrowed,  $R_j$  is the repayment(s) and  $C_j$  represents any charges (which are “ascertainable” at the time of the calculation) that must be met by the borrower. The time elapsed since the commencement of the loan is represented by “ $j$ ”, and “ $t$ ” is the term of the loan (both as multiples of the time interval between repayments).

To determine the APR, “r” is multiplied by the annualised number of repayment periods (so the APR is an annualised rate) and expressed as a percentage. For example, if “ $j$ ” is counted in weeks, then “r” is multiplied by 52.18 (the number of weeks per year).

The effect of this formula is to calculate an annualised rate of interest that equates the present value of the amount(s) of credit received by the borrower with the present value of the repayment(s) and any ascertainable fees or charges required from the borrower. The APR allows both for the cost of interest rates and for fees or charges imposed.

The formula used to determine “r” is typical of how the finance industry determines the per-period compounding “yield” on financial products (i.e. “r” is a per-period compounding rate). The relative attractiveness of financial products is usually determined with reference to such yields. Hence the APR formula is soundly based at least in this respect. Additionally, from the standpoint of ensuring the integrity of the 48% cap, the inclusion of fees and charges in the calculation is sensible.

However, the method used to annualise “r” (i.e. the per-period compounding yield) has limitations. The annualising formula stipulated in the regulations is one that is typically used for annualising per-period “simple” interest rates, whereas “r”, as calculated using the main formula above, is a per-period “compounding” interest rate. Hence the annualising methodology is inconsistent with the underlying main calculation formula. In our opinion a compounding method for annualising “r” would be preferable.

#### 4. How the APR is Calculated

To illustrate the calculation of APR's using the proposed formula, we will work through an example calculation for a simple loan. The main calculation formula is also reproduced below for easy reference:

$$\sum_{j=0}^t \frac{A_j}{(1+r)^j} = \sum_{j=0}^t \frac{R_j + C_j}{(1+r)^j}$$

##### *APR Calculation Example*

Suppose we have a \$1,000 loan repaid over 2 weeks with equal repayments of \$501.44. An application fee of \$10 is charged at the commencement of the loan. A \$5 processing fee is also charged at the time of the final repayment.

In the table and comments below, we have described the calculations for this loan in detail.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
t (weeks)	A <sub>j</sub>	$\frac{A_j}{(1+r)^j}$	R <sub>j</sub>	C <sub>j</sub>	R <sub>j</sub> + C <sub>j</sub>	$\frac{R_j + C_j}{(1+r)^j}$
0	1,000	1,000	0	10	10	10
1	0	0	501.44	0	501.44	495.50
2	0	0	501.44	5	506.44	494.50
<b>Total</b>	1,000	<b>1,000</b>	1,002.88	15	1,017.88	<b>1,000</b>
The solution of the formula for this loan is: r = 0.0119965 and APR = 62.60%						

For this loan, the time unit (j) is one week.

Inputting our loan values into the formula:

- A<sub>j</sub> at time 0 (A<sub>0</sub>) is our initial loan amount of \$1,000. [Column (2) above]
- R<sub>j</sub> at times 1 and 2 (R<sub>1</sub> and R<sub>2</sub>) are both equal to the level repayment amount of principal and interest of \$501.44 at each repayment date. [Column (4) above]
- C<sub>j</sub> at time 0 (C<sub>0</sub>) is equal to the application fee amount of \$10. [Column (5) above]
- C<sub>j</sub> at time 2 (C<sub>2</sub>) is equal to the processing fee amount of \$5. [Column (5) above]

Firstly to calculate the left hand side of the equation, we calculate A<sub>j</sub>/(1+r)<sup>j</sup> for all time periods j. In this instance, the only calculation required is for time period j=0. Noting that (1+r)<sup>0</sup> is always equal to 1, regardless of the value of r, the value of A<sub>0</sub>/(1+r)<sup>0</sup> is \$1,000 / 1 = \$1,000. [Column (3)]

For the right hand side of the equation we firstly sum R<sub>j</sub> and C<sub>j</sub> for all time periods j. [Column (6)]

We then calculate (R<sub>j</sub> + C<sub>j</sub>)/(1+r)<sup>j</sup> for all time periods j, for a specified value of "r". [Column (7)]

The value of "r" is calculated so that the totals of columns (3) and (7) [representing the values of the left and right hand sides of the APR formula respectively] are equal (in this instance with a

value of \$1,000). The value of “r” that satisfies this condition for this loan is 0.0119965. Note that the only way to calculate “r” is by trial and error – that is, to keep adjusting “r” until the totals in columns (3) and (7) are equal.

To calculate the APR we multiply “r” by the number of weeks per year (52.18) and then by 100 (to convert the figure to a percentage). So the APR is 62.60% (i.e.  $0.0119965 \times 52.18 \times 100$ ).

Finally, we note that this loan of \$1,000, on which the total interest and charges over the life of the loan amount to just \$17.88, would not be permitted under the proposed legislation, because the APR exceeds the proposed cap of 48%.

## 5. How the Formula Works as Loan Characteristics Vary

The calculated APR's will depend on not just the interest rates applied and other charges levied, but also on the term of the loan and the repayment frequency. Some loans that at first sight appear quite similar can have very different APR's. This may be best illustrated by a few examples. In each of the examples below, the borrower is lent \$1,000.

1. First, consider a very simple loan - an interest rate of 10% pa applies, there are no fees and charges, and the loan is to be repaid in exactly 1 year with a single repayment of \$1,100.

In this case, applying the formula above produces an APR of 10% pa.

2. Next consider another loan – in this case, no interest is payable, but a charge of \$100 is applied. Again, the loan is to be repaid in exactly 1 year with a single repayment of \$1,100.

Again, the formula produces a APR of 10% pa. This is to be expected, as the financial obligations on the borrower are, in practice, the same.

3. Now consider a loan which is to be repaid by 26 equal fortnightly instalments (ie. it is paid off gradually over 1 year). For this loan, there is no interest payable, but a charge of \$100 is levied. The repayments are \$42.31 per fortnight, and so the total dollar amount the borrower must repay is  $26 \times \$42.31 = \$1,100$ . That is, this loan has the same total dollar cost as in the previous examples.

However in this case, the APR is 18.78% pa.

4. Next consider a loan which is to be repaid more quickly, with 13 equal *weekly* payments (so it is repaid in around 3 months). Again, there is no interest payable, but a charge of \$100 is levied. The repayments are \$84.62 per week, and the total dollar amount the borrower must repay is the same as before, ie.  $13 \times \$84.62 = \$1,100$ .

In this case, the APR is much higher, at 72.58% pa.

*Why is the APR higher in examples 3 and 4?*

The APR formula takes into account both the *amount* of the repayments and the *timing* of the repayments. In examples 1 and 2, both the amount of the repayment required and the timing of the repayment are the same, so the APR is the same.

In example 3, the repayments are spread over the year. So while the total amount of the repayments is the same, the timing of the repayments is not. On average, the repayments in example 3 are made about half way through the year. Therefore the APR in example 3 is close to the APR you would get for a \$1,000 loan that was repaid via a single repayment of \$1,100 half-way through the year (which would have an APR of 20% pa).

In example 4, the APR is much higher, because the time over which the loan is repaid is much shorter. The repayments in example 4 occur on average about 6 or 7 weeks after the commencement of the loan. Therefore the APR in example 4 is close to the APR you would get for a \$1,000 loan that was paid off via a single repayment of \$1,100 due 7 weeks after commencement, which would have an APR of around 75% pa ( $= 10\% \times 52.18/7$ ).

## 6. Suitability of the Formula

Both the APR and Comparison Rate are calculated using essentially the same formula, but with government fees, charges and duties excluded in the calculation of the Comparison Rate.

Currently, the Consumer Credit Code requires that in many circumstances, a Comparison Rate be disclosed to borrowers by credit providers. The objectives of the Comparison Rate include:

- To enable easy comparison between alternative loans and loan providers on a like-for-like basis;
- To strengthen competition in the marketplace;
- To help consumers understand the true cost of credit (by introducing a single figure that is easy to understand).
- To address consumer concerns regarding the increasing reliance of finance providers on fees and charges and the increasing complexity of financial products available.

### 6.1 *Circumstances where the formula is useful*

In some instances, the rates calculated using the formula do achieve the desired objectives.

To illustrate:

Consumer advocates have always been concerned that some lenders tend to quote very low rates of interest on their products, but charge much higher fees on the loan to recoup profits. This may tend to mislead consumers attracted to the lower advertised interest rates, while not understanding the impact of the higher fees being charged. It may also have the effect of making lenders who offer higher rates of interest but lower fees (with possibly a lower cost of borrowing to the consumer) seem much less competitive in the terms they offer. The introduction of the comparison rate seeks to solve this problem by including fees in its calculation. Consumers will therefore be less likely to be misled, and loan providers can compete on a level footing where the costs of interest, fees and charges can visibly be compared by borrowers.

In essence, appropriate standardised disclosure of the cost of credit may assist consumers.

Suppose that:

- Lender A charges a fee of \$8 on its \$1,000 loans with a loan term of 1 week, and advertises an interest rate of 8% p.a.
- Lender B charges a fee of \$5 on its \$1,000 loans with a loan term of 1 week, and advertises an interest rate of 10% p.a.

Without the charges disclosed, a consumer would be attracted to Lender A. Even if they were disclosed, many borrowers would not understand the impact of fees on the total borrowing cost.

However if the consumer is informed that the loan from Lender A has a Comparison Rate of 50% p.a. whereas the loan from Lender B has a Comparison Rate of 36%, this may help them understand that Lender B's loan is cheaper (which it is).

## 6.2 Circumstances where the formula is not so useful

However, there are some important instances where the APR/Comparison Rate may produce undesirable results, or be misleading to consumers:

*Example 1: The magnitude of the APR may be well over 48% for small short term loans on reasonable contract terms.*

Under proposed regulations, the APR may be limited to 48% pa (i.e. the Maximum Annual Percentage Rate).

In many instances, particularly for short loan terms and/or small amounts, it may be very difficult to offer loans on reasonable, profitable terms which also keep the APR below 48% pa.

To illustrate this, in the table below, we have considered a few more examples, and calculated the APR's for them:

Loan Amount	Establishment Fee	Interest Rate (pa)	Term of loan (weeks)	Weekly repayments	Total amount repaid (\$)	APR (pa)
\$100	\$20	10%	6	\$20.13	\$120.78	296.09%
\$500	\$100	10%	20	\$30.60	\$612.00	104.74%
\$1,000	\$200	10%	26	\$47.34	\$1,230.84	83.69%
\$2,000	\$300	10%	39	\$61.25	\$2,388.75	47.94%

The examples above assume the establishment fee is charged at commencement of the loan, and no other fees or charges are payable.

Of the examples, only the loan for \$2,000 is (just) within the proposed limit on the APR. Therefore the loans with terms equivalent to the first 3 examples in the table above may not be permitted under the proposed regulations.

If any other fees or charges were introduced to the loan contract, or the interest rate was increased, the APR would increase further.

To fully appreciate the impact of fees and charges on the APR for loans of short duration and small amounts, consider the following examples. The loan examples below all charge a zero (0%) rate of interest. All fees are charged at commencement of the loan and the loan is repaid in a single instalment at the end of the loan term.

Loan Amount (\$)	Upfront Fees (\$)	Term	APR
100	20	1 week	1,044%
100	0.91	1 week	48%
500	4.59	1 week	48%
500	20.00	1 month	48%

As shown above, charging a \$20 fee on a \$100 loan to be repaid in 1 week's time will result in an APR of 1,044%, far in excess of the proposed cap. Such a fee would seem reasonable given the costs to the lender for documentation, credit checks, and processing etc, associated with a loan. Yet the cap on the APR of 48% would prevent such loans from being offered.

In fact, for the APR of such a loan to remain within the 48% limit, the maximum fee chargeable would only be 91 cents, and the lender would need to provide the loan interest free!

It is hard to imagine that 91 cents would be sufficient to cover the costs of providing such a loan.

For a loan of \$500, repaid by a single payment in 1 week, with no interest charged, the maximum fee possible would be \$4.59. For a loan of \$500, repaid by a single payment in 1 month, with no interest charged, the maximum fee possible would be \$20.00. Such loans are also unlikely to cover the costs of the lender.

Example 2:     *The size of the APR or Comparison Rate may mislead consumers*

For short-term loans of small amounts, the calculated APR/Comparison Rate may appear very high. This may be because reasonable administration charges relating to such a loan can represent a significant proportion of the amount borrowed. So even if the interest rate imposed is quite low (or even zero), once the other charges are included, the APR/Comparison Rate is high.

While a high disclosed APR/Comparison Rate is theoretically correct, many consumers won't have an intuitive understanding of what it means. For example, a loan of \$100 with an interest rate of 10% pa and an establishment fee of \$20 repaid by 6 equal weekly instalments has an APR/Comparison Rate of nearly 300% pa. Yet apart from repaying the principal, the borrower only pays back an additional \$20 (the establishment fee) plus interest of just 78 cents (ie. total repayments of \$120.78).

In this example, an APR/Comparison Rate of 300% p.a. may appear quite unreasonable to consumers, and lead to concern that the terms of the loan are unfair. The consumer is unlikely to understand how an interest rate of 10% pa plus a \$20 fee leads to such a high APR/Comparison Rate. In this case, disclosing the APR/Comparison Rate to a consumer is unlikely to improve their understanding of the "true" cost of credit.

However, a consumer provided with the total amount of the repayments (in this example, \$120.78) is likely to have a much clearer intuitive understanding of the loan they are agreeing to. That is, they are borrowing \$100 and must repay, in total, \$120.78.

Example 3:     *The APR and Comparison Rate are not always good indicators of the cost of credit*

The logic of applying a cap on the APR and the use of the Comparison Rate assumes that the result of the calculation formula provides a good measure of the cost credit. Whilst this may be true in some instances, it is not always true – for example where a consumer is interested in the total dollar cost of their commitments.

Suppose we are told that the APR/Comparison Rate of a loan is 48% p.a. What information does this give us?

Assume a consumer borrows \$100 at the start of the year, to be repaid within 1 year. What total dollar amount must be repaid?

Intuitively a typical consumer would think that the answer is \$148. However, this is often not the case. If there is only one repayment under the loan, at the end of the year, then the total dollar repayment is \$148. However, if repayments under the loan are weekly, the total dollar cost over

the year would be materially lower, at around \$126. For fortnightly or monthly repayments, the total dollar cost would be between \$148 and \$126.

The APR does not always represent the true cost of a loan, as consumers may perceive it. For two loans with the same APR, the dollar cost of credit can vary materially from what is expected by consumers. This may distort competition in the marketplace.

Also note that the Comparison Rate formula excludes government fees and charges, and hence may tend to understate the true cost of credit.

*Example 4: The APR/Comparison Rate formula does not account for the likelihood of cash flows actually occurring*

The formula treats the repayment cash flows as if they were certain to occur. The result of this is that both high risk loans (where repayment is less certain) and low risk loans (where repayment is more certain) will produce the same APR/Comparison Rate.

The practical implication of this is that the 48% cap will be much more onerous on providers of high risk loans, where they have very legitimate reasons to charge higher rates of interest on their loans relative to low risk loans.

From the consumer's perspective, two loans with the same APR/Comparison Rate may actually include very different financial commitments, because of the nature of the security required by the lender. That is, the APR/Comparison Rate also takes no account of the risks for the borrower.

*Example 5: The APR/Comparison Rate formula does not account for non-cash-flow aspects of a loan*

The calculation formula ignores other aspects of loans, such as whether it is secured or unsecured, has fee-free banking, low cost transactions, fee-free refinancing, no early repayment fees, deferment periods or other flexible repayment arrangements.

These aspects will make the APR/Comparison Rate less useful in comparing the attractiveness of differing loans. The disclosed rates may even mislead consumers if warnings mandated by the legislation are ignored, or not fully appreciated.

*Example 6: The APR/Comparison Rate formula excludes fees and charges that are not ascertainable*

The calculation formula for both the APR and Comparison Rate excludes fees and charges that are not ascertainable at the time of calculation (for example, a charge that is payable only on the occurrence of an event which may or may not happen). The imposition of a limit on the APR may therefore have the perverse effect of encouraging loan providers to increase such charges.