Credit Card

How to apply and how to issue credit card

Author: WSN (Wall Street Newbie)

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A lot of material can be found on the [the points guy](), this model only used to determine whether to apply for certain card or not

Background

Credit card can be a **double-edge sword**,

- On one hand, it can help you accure credit, which in turns help you **buy properties, build your business**.
- On the other hand, it can drag you into debt quagmire.

So, the purpose of this modeling is to find a good credit card, just good for your buying power, and not drag you to over-purchase.

Without SSN?

Some credit card doesn't **require SSN**, for example, BOA's credit card.
The good side of it was, you can apply it and use it for oldest credit line,
and when you get SSN, you can link the card to it.

Overview of credit line

Credit line is composed of several parts:

- **On-Time Payments**: a lot impact

- **Oldest Credit Line**: a lot impact
- **Credit Used**: moderate impact
- **Recent Inquiries**: small impact
- **New Accounts**: small impact
- **Available Credit**: small impact

More can be found on the app: Capital One CreditWise

Profit = Revenue - Cost <=> Basepoint

- Basepoint: 0

Credit Card Model

$$Total\_revenue\_points = new\_account\_bonus + referral\_bonus + (annual\_expense * points\_per\_expense * annual\_boo * year)$$

$$Total\_costs = annual\_fee * year * points\_per\_dollar$$

Let profit = 0 be the breakeven point, so total_revenue_points = total_costs

$$annual\_expense = \frac{annual\_fee * year * points\_per\_dollar - new\_account\_bonus - referral\_bonus}{points\_per\_expense * annual\_boost * year}$$

```
def base_point(new_account_bonus, referral_bonus=0, num_referral=0):
    # base point is calculated by how many points you earn with new account bonus
    # plus how many people you refer, and in total how many points you earn in referral

    return new_account_bonus + referral_bonus * num_referral


def calculate_expense(points, points_factor, annual_fee, year=10, annual_boost=1.0, new_account_bonus=0, referral_
    '''
        points: the best category you will earn, i.e., the best power the card can give you
        for example: you name it gasoline card, since the card provides 4x points when you purchase gas.
```

```
    points_factor: how many real money does each points worth, usually 1 cents
    However, some rewards program makes each of your points 1.25x worth, i.e., 1 point 1.25 cents.
    We use cash back to demostrate.

    annual_fee: annual fee


    annual_boost: sometimes the card provides annual boost on points, for example 10% increase
    year: a scale of time, use 5 year to illustrate
'''
total_return = base_point(new_account_bonus, referral_bonus, num_referral)
print("total return in points: ", total_return)

# To determine whether to apply for a credit card,
# your category expense should be enough to cover annual fee
# points_factor = 1 / points_per_dollar
total_cost = annual_fee * year / points_factor
print("total cost in points: ", total_cost)


buffer = total_cost - total_return

annual_expense = (buffer / (points * annual_boost * year))

return annual_expense
```

Discover It Cash Back

Restaurant

Points: 5x quarterly rotational

- Earn 5% Cash Back on everyday purchases at different places each quarter like Amazon.com, 6 grocery stores, restaurants, gas stations and when you pay using PayPal, 8 up to the quarterly maximum when you activate.
- Easy to apply: this is my first credit card, but not every store takes dicover : (

- Cash back needs to be activated manually : (

Points factor: 1 cents

Annual Fee: 0

Carrier: Discover

```
points = 5
points_factor = 0.01
year = 30 # 30 years is a span
annual_fee = 0
annual_boost = 1.0
new_account_bonus = 0

annual_expense = calculate_expense(points, points_factor, annual_fee, year, annual_boost, new_account_bonus)
print("You need to spend ${:.2f} in category annually to make the credit card worth.".format(annual_expense))
print("That is ${:2f} monthly or ${:2f} weekly".format(annual_expense/12, annual_expense/52))
```

```
total return in points:  0
total cost in points:  0.0
You need to spend $0.00 in category annually to make the credit card worth.
That is $0.000000 monthly or $0.000000 weekly
```

Amex Blue Cash Preferred

Grocery

Points: 6x at US supermarket

- On up to $6,000 per year in purchases then it's 1x
- US supermarket: wholefoods, safeway
- Not US supermarket: walgreen, costco
  Check online

Points factor: no more than 1 cents

Check online

Annual Fee: 1st year free, then 95

New account bonus: 350 dollars = 35,000 cents

Carrier: Amex

```
points = 6
points_factor = 0.01
year = 30 # 30 years is a span
annual_fee = 95.0 * (year - 1) / year
annual_boost = 1.0
new_account_bonus = 35000

annual_expense = calculate_expense(points, points_factor, annual_fee, year, annual_boost, new_account_bonus)
print("You need to spend ${:.2f} in category annually to make the credit card worth.".format(annual_expense))
print("That is ${:2f} monthly or ${:2f} weekly".format(annual_expense/12, annual_expense/52))
```

```
total return in points:  35000
total cost in points:  275500.0
You need to spend $1336.11 in category annually to make the credit card worth.
That is $111.342593 monthly or $25.694444 weekly
```

Amex Gold/Rose Gold

Restaurant

Points: 4x at restaurant

- Enjoy up to $120 in Uber Cash annually
- $120 Dining Credit

Points factor: no more than 1 cents

Check online

Annual Fee: 250

New account bonus: 750 dollars = 75,000 cents

```
points = 4
points_factor = 0.01
year = 30 # 30 years is a span
annual_fee = 250
annual_boost = 1.0
new_account_bonus = 75000

annual_expense = calculate_expense(points, points_factor, annual_fee, year, annual_boost, new_account_bonus)
print("You need to spend ${:.2f} in category annually to make the credit card worth.".format(annual_expense))
print("That is ${:2f} monthly or ${:2f} weekly".format(annual_expense/12, annual_expense/52))
```

```
total return in points:  75000
total cost in points:  750000.0
You need to spend $5625.00 in category annually to make the credit card worth.
That is $468.750000 monthly or $108.173077 weekly
```

Amex Platinum

Lexury Travel

Points: 5x on Flights & Prepaid Hotels

Following 1400 credit

- $240 Digital Entertainment Credit
- $200 Hotel Credit
- $300 Equinox Credit
- $200 Airline Fee Credit
- $200 Uber Cash
- ...

Points factor: no more than 1 cents

Check online

Annual Fee: 695

New account bonus: 1250 dollars = 125,000 cents

Carrier: Amex

```
points = 5
points_factor = 0.01
year = 30 # 30 years is a span
annual_fee = 695
annual_boost = 1.0
new_account_bonus = 125000

annual_expense = calculate_expense(points, points_factor, annual_fee, year, annual_boost, new_account_bonus)
print("You need to spend ${:.2f} in category annually to make the credit card worth.".format(annual_expense))
print("That is ${:2f} monthly or ${:2f} weekly".format(annual_expense/12, annual_expense/52))
```

```
    total return in points:  125000
    total cost in points:  2085000.0
    You need to spend $13066.67 in category annually to make the credit card worth.
    That is $1088.888889 monthly or $251.282051 weekly
```

Chase Sapphire Preferred

Travel

Points: 5x points on travel purchased through Chase, points worth 25% more value on travel

- 5x points on Lyft rides
- Earn 5x total points on Peloton Bike and Peloton Tread purchases
- Complimentary DashPass subscription from DoorDash
- 10% anniversary points boost
- $50 Annual Ultimate Rewards Hotel Credit
- ...

Points factor: 1.25 cents or more or less

Check online

Annual Fee: 95

New account bonus: 1,000 dollars = 100,000 cents

Carrier: Visa

```
points = 5
points_factor = 0.0125
year = 30 # 30 years is a span
annual_fee = 95
annual_boost = 1.1
new_account_bonus = 80000 * 1.25

annual_expense = calculate_expense(points, points_factor, annual_fee, year, annual_boost, new_account_bonus)
print("You need to spend ${:.2f} in category annually to make the credit card worth.".format(annual_expense))
print("That is ${:2f} monthly or ${:2f} weekly".format(annual_expense/12, annual_expense/52))
```

```
total return in points:  100000.0
total cost in points:  228000.0
You need to spend $775.76 in category annually to make the credit card worth.
That is $64.646465 monthly or $14.918415 weekly
```

Chase Sapphire Reserve

Travel

Points: 10x points on travel purchased through Chase, points worth 50% more value on travel

- 10x points on Lyft rides
- Earn 10x total points on Peloton Bike and Peloton Tread purchases
- Complimentary DashPass subscription from DoorDash
- Priority Pass™ Select membership
- $300 Annual Ultimate Rewards Hotel Credit
- ...

Points factor: 1.5 cents or more or less

Check online

Annual Fee: 550

New account bonus: 500 dollars = 50,000 cents

Carrier: Visa

```
points = 10
points_factor = 0.015
year = 30 # 30 years is a span
annual_fee = 550
annual_boost = 1.0
new_account_bonus = 50000 * 1.5

annual_expense = calculate_expense(points, points_factor, annual_fee, year, annual_boost, new_account_bonus)
print("You need to spend ${:.2f} in category annually to make the credit card worth.".format(annual_expense))
print("That is ${:2f} monthly or ${:2f} weekly".format(annual_expense/12, annual_expense/52))
```

```
total return in points:  75000.0
total cost in points:  1100000.0
You need to spend $3416.67 in category annually to make the credit card worth.
That is $284.722222 monthly or $65.705128 weekly
```

Citi Costco

Gasoline

Points: 4x at eligible gas

- On up to $7,000 per year in purchases then it's 1x

Points factor: 1 cents

Check online

Annual Fee: No annual fee with paid Costco membership. Costco membership costs from 60.

```
points = 4
points_factor = 0.01
year = 30 # 30 years is a span
annual_fee = 60
annual_boost = 1.0

annual_expense = calculate_expense(points, points_factor, annual_fee, year, annual_boost)
print("You need to spend ${:.2f} in category annually to make the credit card worth.".format(annual_expense))
print("That is ${:2f} monthly or ${:2f} weekly".format(annual_expense/12, annual_expense/52))
```

```
total return in points:  0
total cost in points:  180000.0
You need to spend $1500.00 in category annually to make the credit card worth.
That is $125.000000 monthly or $28.846154 weekly
```

Misc.

Further study

How does credit card make money?

- Interest
- The interest of credit card can be **very high**, starting 15.99 APR, like hard money loan, don't over spend :)
- Securitization

Pay full statement balance

Grace period

Credit card is **compound interest**

Some thoughts

If the bank is large enough, it can possibly provide better rewards than small credit card, due to economic of scale

How to issue credit card

Cards need to win subcategory

More cards

- Centurion® Card from American Express (so-called 'the black cards')
- Business credit card

Off-topic, if you want to know, buy me a coffee.