Practical Debt Management:
Evaluating Debt Repayment Strategies

Nick Lorenzo

This paper evaluates debt repayment strategies against the four traits of an ideal strategy.

Borrowers tasked with choosing the most practical debt repayment strategy are confronted with many options. To help borrowers objectively assess strategies, we propose four practical criteria that any ideal strategy must meet. We then evaluate three different strategies – including the popular AVALANCHE (prioritize high-interest debt) and SNOWBALL (prioritize low-balance debt) – against these criteria.

Introduction

The Problem

Repayment is a complex and growing problem.

With many forms of consumer debt on the rise [1], [2], [3], [4], [5], it's clear that Americans must make important decisions regarding the repayment of their debt. At first glance, it may seem obvious that a borrower should choose the repayment strategy that theoretically yields the lowest total cost. But a little thought shows that there are other considerations: such a strategy may be difficult to implement, or may yield low costs in only some cases. We believe that borrowers could benefit from a few simple guidelines to help them decide on the right strategy.

Overview of this Paper

In this paper, we use the terms **strategy** and **solution** interchangeably.

In this paper, we explain four straightforward and essential characteristics of an ideal repayment strategy. We then evaluate three different strategies against these criteria to see which fares best.

Our goal is to guide borrowers to choose the most sensible strategy, rather than the one that strictly minimizes total costs. For a detailed comparison of the total costs and savings generated by the strategies discussed in this paper, see Minimum Effort, Maximum Savings: Comparing Debt Repayment Strategy Performance [7].

Types of Debts Discussed in this Paper

In this paper, we use the terms **debt** and **loan** interchangeably.

We assume that each debt under consideration is **analyzable**. Essentially,[†] this means that (**i**) the debt's properties (such as interest rates and remaining principal) are known in advance for each debt individually, and that (**ii**) borrowers can direct specific payment values toward each debt individually.

For our discussion ahead, we consider two types of analyzable debts.

1. A **traditional** debt has a fixed interest rate, has no outstanding interest, and is not eligible for forgiveness.
2. A **non-traditional** debt may have any combination of (**i**) an interest rate that varies, (**ii**) outstanding interest (that may or may not capitalize), and (**iii**) forgiveness eligibility.

Characteristics of an Ideal Solution

An ideal strategy allocates money optimally, motivates the borrower, is simple to execute, and is easy to compare to other investment options.

Many strategies for solving the debt repayment problem have been proposed, but not all strategies are equally useful. An **ideal solution** satisfies four criteria.

1. **Optimality:** the solution minimizes the total cost of the set of loans over their collective lifetime.
2. **Motivation:** the solution motivates borrowers to continue investing in their loans (so they continue saving money on interest charges).

A repayment solution is more likely to succeed if it's easier to follow.

3. **Simplicity:** the solution is easy to execute in practice. Unclear, difficult, or inconvenient solutions may be executed imperfectly, resulting in unexpected interest charges.
4. **Comparability:** the solution is easy to compare to other investment opportunities, using common financial metrics such as the return on investment (ROI) or rate of return (ROR).

Each of these four criteria is absolutely essential to an ideal repayment solution. This list will help us to evaluate any repayment strategy we come across; an ideal repayment strategy will meet all four criteria.

Evaluation of Three Solutions

So far, we've described the problem and identified four key characteristics of its ideal solution. We now discuss the three solutions compared in this paper and evaluate them against these criteria.

[†]For more details, see [7].

Solution 1: AVALANCHE

AVALANCHE prioritizes paying off loans in order of descending interest rate.

The first strategy we consider is AVALANCHE. This strategy directs all excess money toward the highest-interest loan, attempting to minimize the total cost of a set of loans over their collective lifetime.

Optimality

- ✗ For some non-traditional debts, AVALANCHE yields higher costs than SNOWBALL.†
- ✓ AVALANCHE yields low costs for traditional debts.†

AVALANCHE can produce negative savings in some cases.

- ✗ AVALANCHE does not take into account some non-traditional debt properties, such as forgiveness eligibility. This can drastically increase costs, and even produce negative savings.†
- ✗ Borrowers who fail to perfectly execute this strategy may incur additional, unexpected interest charges.
- ✗ Without ongoing effort, AVALANCHE eventually assigns only minimum payments to any remaining loans, increasing costs.

Motivation

- ✓ AVALANCHE's sometimes-low cost may motivate some borrowers.
- ✗ When slow, repayment progress may be demotivating.

Simplicity

A **sustained** repayment strategy is a strategy that requires ongoing effort to execute. Due to the sustained nature of AVALANCHE, it fails to meet the requirement of simplicity.

- ✗ As a loan is paid off, its payment must be shifted to another loan. This shift is usually done twice for each loan (except the last).
- ✗ Borrowers must track any changing interest rates on a month-by-month basis, and adjust payment values accordingly.
- ✗ The borrower must perform calculations before manually adjusting payment values.

Comparability

- ✗ Calculations of standard financial metrics – such as the ROI and ROR – may not be widely available for AVALANCHE.
- ✗ Most offerings of financial metrics are limited to traditional debts.
- ✗ Predicted metrics may not match real-world metrics, due to the possibility of imperfect execution.

In summary, AVALANCHE typically produces a low lifetime cost for traditional loans, which may motivate some borrowers. However, AVALANCHE produces negative savings with some non-traditional debts,† its execution requires diligence, and it is not easy to compare directly to other investment opportunities.

†See [7] for realistic examples with direct comparisons.

Solution 2: SNOWBALL

SNOWBALL prioritizes paying off loans in order of ascending balance.

The next strategy we consider is SNOWBALL. This strategy prioritizes paying off the lowest-balance loan, attempting to minimize the time until the next loan is paid off.

Optimality

- ✓ For some non-traditional debts, SNOWBALL yields better savings than AVALANCHE.[†]
- ✗ For most traditional debts, SNOWBALL yields lower savings than AVALANCHE.[†]
- ✗ SNOWBALL does not take into account some non-traditional debt properties, such as forgiveness eligibility. This can drastically increase costs, and even produce negative savings.[†]
- ✗ Borrowers who fail to perfectly execute this strategy may incur additional, unexpected interest charges.

Without ongoing effort, SNOWBALL eventually assigns only minimum payments to any remaining loans, increasing costs.

- ✗ Without ongoing effort, SNOWBALL eventually assigns only minimum payments to any remaining loans, increasing costs.

Motivation

- ✓ Some borrowers may be motivated by the idea of targeting low-balance loans.
- ✗ Low repayment efficiency may decrease motivation levels.

Simplicity

SNOWBALL is a sustained strategy; its execution requires time and effort throughout the payoff period.

- ✗ As a loan is paid off, its payment must be shifted to another loan. This shift is usually done twice for each loan (except the last).
- ✗ As with AVALANCHE, the borrower must perform additional calculations before manually adjusting payment values.

Comparability

- ✗ Calculations of standard financial metrics – such as the ROI and ROR – may not be widely available for SNOWBALL.
- ✗ Most offerings of financial metrics are limited to traditional debts.
- ✗ Predicted metrics may not match real-world metrics, due to the possibility of imperfect execution.

In summary, SNOWBALL aims to motivate borrowers by targeting low-balance loans. Like AVALANCHE, however, its execution requires diligence, and it is not easy to compare directly to other investment opportunities. It also generally offers poor repayment efficiency, including the possibility of negative savings.

[†]See [7] for realistic examples with direct comparisons.

Solution 3: EPSILON

A **turnkey** repayment strategy does not require any additional work after an initial setup.

Finally, we discuss the EPSILON strategy, which offers a turnkey solution to the loan repayment problem in two steps.

1. Find the fixed payment values that minimize the cost of the loans.[†]
2. Set recurring payment values to match these optimal values.

In stark contrast to sustained repayment strategies, there is no ongoing effort required: fixed, optimal payment values provide predictable, automatic savings, pre-maximized for any given monthly budget.

Optimality

EPSILON uses optimal, fixed payment values, attempting to minimize effort and maximize savings.

- ✓ By definition, EPSILON uses cost-minimizing payment values; payments are always distributed optimally.
- ✓ Since EPSILON is a turnkey strategy, borrowers minimize the amount of time and effort required to manage their loans.
- ✗ EPSILON often does not match the savings of AVALANCHE for traditional debts.[‡]
- ✓ If a borrower has even one non-traditional debt, EPSILON can offer significantly more savings than AVALANCHE and SNOWBALL.[‡]

Motivation

- ✓ Optimal payment distribution and automatic execution may increase motivation levels.

The turnkey nature of EPSILON makes it intrinsically robust.

- ✓ With automated payments, EPSILON takes effort to be stopped, but no effort to continue: only a negatively motivated borrower would interrupt its execution.

Simplicity

- ✓ Borrowers do not have to track loan balances or interest rates.
- ✓ No calculations or payment value updates are required.
- ✓ Borrowers using automated payments cannot incur unexpected interest charges by imperfectly executing the strategy.

Comparability is vital for discerning borrowers and financial advisors.

Comparability

- ✓ Since execution is automatic, costs and savings are predictable.
- ✓ The ROI, ROR, and other financial metrics are readily available for borrowers who use EPSILON.

In summary, EPSILON endeavors to combine the convenience and simplicity of fixed payment values with maximized savings, but sometimes does not achieve the savings of AVALANCHE.[‡]

[†] At the end of this paper, we discuss how to obtain these optimal payment values.
[‡] See [7] for realistic examples with direct comparisons.

Evaluation Overview

Here we tabulate our discussion of the advantages and disadvantages of each strategy. Recall that an ideal solution to the loan repayment problem should be **O**ptimal, **M**otivational, **S**imple, and **C**omparable.

EPSILON is the only strategy satisfying all four characteristics of an ideal repayment solution.

	O	M	S	C
AVALANCHE	✗	✓	✗	✗
SNOWBALL	✗	✓	✗	✗
EPSILON	✓	✓	✓	✓

Table 1: Overview of repayment strategy characteristics.

We see that, of the three strategies above, EPSILON is the only one that exhibits all four characteristics of an ideal solution.

Summary and Conclusions

To assist borrowers in evaluating repayment strategies, we proposed four straightforward criteria that an ideal strategy must meet – **O**ptimality, **M**otivation, **S**implicity, and **C**omparability. We then used these criteria to compare AVALANCHE, SNOWBALL, and EPSILON.

Execution complexity is a weakness of any sustained repayment strategy.

We saw that sustained strategies share a major disadvantage: they require careful calculation and adjustment as loans are paid off. In addition, a delay in updating payment values – or a mistake in the calculations – could cost a significant amount of money in unplanned interest charges.

EPSILON combines optimality with set-and-forget execution.

By contrast, turnkey strategies eliminate the inconveniences of sustained strategies by using fixed payment values. With its turnkey nature, optimality, and available financial metrics, EPSILON stands out from other repayment strategies.

How to Obtain EPSILON Payment Values

We offer customized, straightforward, and informative PDF reports.

We use a proprietary algorithm to find optimal EPSILON payment values. EPSILON is capable of optimizing arbitrary combinations of traditional and non-traditional analyzable debts, including interest rate schedules (such as subsidized loans and introductory interest rates), loan forgiveness, outstanding interest, and interest capitalization.

Our customized, professional reports include EPSILON payment values and a number of financial metrics and visualizations, such as total sav-

ings, payoff times, ROI, ROR, and much more. Everything is packaged into a single, easy-to-read PDF, delivered securely.

Readers are encouraged to visit www.epsilonmetrics.com to learn more about the benefits of EPSILON, and to see example analyses.

About Strategy Performance

The aim of this paper was to provide a qualitative comparison of the AVALANCHE, SNOWBALL, and EPSILON strategies. Readers interested in direct, real-world comparisons of the savings achieved by these strategies – and the effort required to achieve these savings – are encouraged to read Minimum Effort, Maximum Savings: Comparing Debt Repayment Strategy Performance [7].

A Word for Financial Professionals

EPSILON's turnkey nature and optimality make it an ideal solution for financial professionals seeking easy-to-implement, mathematically driven repayment plans.

This performance comparison is particularly relevant to financial professionals whose clients are borrowers: the flexibility, convenience, simplicity, and optimality of EPSILON make it an exceedingly practical choice.

Financial professionals are encouraged to read Mastering Client Debt Repayment: Ideal Repayment Plans for Clients and Advisors [7] to learn more about the fit between client, financial practice, and repayment plan.

About the Author

Nick Lorenzo holds a Ph.D. in Mathematics and an M.S. in Applied Mathematics from Rensselaer Polytechnic Institute and a B.S. in Mathematics and Physics from Case Western Reserve University. He is Epsilon's owner, founder, and lead mathematical researcher.

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