

How It Works & FAQ

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Overview

Welcome to Bitcoinmath.org — a learning platform designed to help you explore how financial decisions and strategies might play out in a world where Bitcoin is part of the equation. Whether you're comparing long-term savings plans, investment strategies, or borrowing scenarios, our interactive tools give you the ability to test ideas and visualize outcomes.

Educational Purpose Only

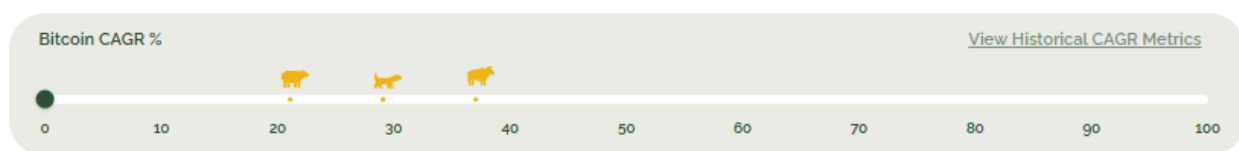
Before we begin: Nothing on this site is financial, investment, tax, or legal advice. All calculators, models, and content are for educational purposes only and are intended to help users better understand economic principles and decision-making frameworks. Please consult with a qualified advisor before making any financial decisions.

Key Concepts You'll See Across the Site

Here are a few essential terms that will help you understand the tools and models featured throughout Bitcoinmath:

- **OPM (Other People's Money):** The idea of using borrowed capital to invest or preserve your own — a key concept in financial leverage.
- **Inflation:** The ongoing decline of purchasing power as prices rise over time. Our models help compare inflation's impact across fiat and Bitcoin-denominated scenarios.
- **Compounding:** The process of earning returns on both your initial investment and the returns it generates. Many calculators explore how compounding magnifies growth (or loss) over time.
- **TVM (Time Value of Money):** The concept that a dollar today is worth more than a dollar tomorrow. This underpins many scenarios involving borrowing, saving, or deferring consumption.
- **Opportunity Cost** - The value of what you give up when you choose one option over another.
- **CAGR (Compound Annual Growth Rate):** A measure used to show the average annual growth of an investment over time. Most Bitcoin models on this site are powered by CAGR-based projections.

About the Bitcoin CAGR Bar



At the top of every calculator, you'll find a Bitcoin CAGR Bar — a dynamic slider that lets you adjust Bitcoin's assumed growth rate for the specified term. This feature gives you control over the model's projections, allowing you to explore a range of outcomes depending on how Bitcoin performs over time.

Things to be aware of;

1. We've included symbols representing Michael Saylor's 21 year price predictions;
 - a. Bear Case (21%)
 - b. Base Case (29%)
 - c. Bull Case (37%)
2. To view historic CAGR metrics, you can easily click the included link and be taken to casebitcoin where a real time display of Bitcoin's (and other asset classes) CAGR is shown over the past 15 years.
3. Models will populate after keying inputs and then setting CAGR. If you want to see a new CAGR modelled, you can drag/drop or simply click the new CAGR metric.

Our (Free) Featured eBook: *The Fiat Trap*

At Bitcoinmath.org, we believe understanding the past is key to navigating the future — especially when it comes to money.

That's why we created ***The Fiat Trap*** — a **handwritten, easy-to-digest eBook** that explores the **dark history of fiat currency**, the hidden forces behind inflation and debt, and how this system quietly robs people of their time, savings, and freedom.

This book is designed for the **curious but skeptical mind** — the kind of reader who senses something is off, but hasn't yet seen the full picture.

It's not about hype — it's about truth.

Inside *The Fiat Trap*, You'll Learn:

- How fiat money was born — and weaponized
- Why inflation is a feature, not a bug
- The silent cost of saving in dollars
- How Bitcoin emerged as a response to this system

If you're new to Bitcoin or want to share the “why” behind it with others, ***The Fiat Trap*** is a perfect starting point.

👉 **Available now** for [free download](#) or reading online.

(Have questions after reading? Email us at hello@bitcoinmath.org — we'd love to hear your thoughts.)

The Calculators:

Cash Savings



What does this calculator do?

This tool compares the **future value of holding cash** in a traditional account (e.g. savings, money market, CD, etc) versus investing that same cash into **Bitcoin**.

It accounts for:

- Annual percentage yield (APY) on your cash
- The impact of inflation on purchasing power
- Projected Bitcoin growth via a compound annual growth rate (CAGR)
- BTC “yield” represented in simple APY terms
- Time horizon in years

This lets you understand the **true opportunity cost** of sitting in cash versus being exposed to Bitcoin’s long-term appreciation.

♦ Cash Growth Scenario (TradFi)

You hold your cash in a traditional financial account earning APY. Over time, your cash balance grows at the stated interest rate:

Nominal APY:

Nominal Annual Return = Cash × APY

Real APY (after inflation) = $(1 + \text{APY}) \div (1 + \text{Inflation}) - 1$

Future Value (Real) = Cash × $(1 + \text{Real APY})^{\text{Years}}$

This shows how much your money grows *after inflation is accounted for* — giving you a clearer picture of actual purchasing power.

♦ Bitcoin Growth Scenario

If you had instead invested that same cash into Bitcoin, the value would compound based on your projected Bitcoin CAGR:

Future Value of BTC = Cash × $(1 + \text{BTC CAGR})^{\text{Years}}$

Example

Inputs:

- Cash Value: \$20,000
- TradFi APY: 3%
- Inflation: 2%
- Bitcoin CAGR: 30%
- Term: 3 years

Outputs:

- Cash APY (real): ~1%
 - Cash Future Value (real): ~\$20,600
 - Bitcoin APY (real): ~37.90%
 - Bitcoin Future Value: ~\$43,940
-

What does this help you understand?

- The **inflation-adjusted reality** of holding cash — even when earning interest
- The **opportunity cost** of not investing in Bitcoin if your time horizon is long enough
- A side-by-side projection of both scenarios using your own assumptions
- Why long-term Bitcoin exposure may outperform traditional savings accounts

Retirement Savings

What does this calculator do?

It compares how your regular retirement contributions would grow if invested traditionally (e.g., in the S&P 500) versus allocating the same contributions into Bitcoin, letting you see potential differences in retirement outcomes based on your expected growth rates for each.

♦ Traditional Retirement Plan Growth

The calculator estimates the future value of consistent contributions invested in a traditional asset like the S&P 500:

$$\text{Traditional Future Value} = P \times [((1 + r_{\text{s\&p}})^N - 1) \div r_{\text{s\&p}}]$$

Where:

- P: Annual retirement contribution
- $r_{\text{s\&p}}$: Expected annual S&P 500 growth rate (as a decimal)
- N: Number of years until retirement

This formula is the **future value of an ordinary annuity**, assuming contributions compound annually at the expected S&P 500 growth rate.

♦ Bitcoin-Based Retirement Growth

It also calculates the future value of making the same contributions into Bitcoin, compounded at your expected Bitcoin CAGR:

$$\text{BTC Future Value} = P \times [((1 + r_{\text{btc}})^N - 1) \div r_{\text{btc}}]$$

Where:

- r_{btc} : Expected annual Bitcoin CAGR (as a decimal)
 - Other variables are the same as above.
-

♦ Net Comparison

The calculator shows the difference in expected retirement balances between the two strategies:

$$\text{Difference} = \text{BTC Future Value} - \text{Traditional Future Value}$$

Example:

- Annual contributions: \$12,000
 - Years until retirement: 20
 - S&P 500 CAGR: 7% (0.07)
 - BTC CAGR: 25% (0.25)
 - Traditional retirement account grows to: $12,000 \times [(1.07^{20} - 1) \div 0.07] \approx 12,000 \times 40.995 = \$491,940$
 - Bitcoin retirement account grows to: $12,000 \times [(1.25^{20} - 1) \div 0.25] \approx 12,000 \times 150.724 = \$1,808,690$
-

What does this help you understand?

- ✓ How your retirement contributions could perform under traditional vs. alternative (Bitcoin) strategies.
- ✓ The potential for significantly different outcomes depending on your investment assumptions.
- ✓ The power of compounding and why your asset choice can dramatically affect your retirement nest egg.

College Savings 529

What does this calculator do?

It compares the future value of saving for college through traditional 529 plans — assuming moderate annual returns — versus investing the same annual contributions into Bitcoin, both over a **fixed 18-year term**. This helps you visualize potential differences in education funding outcomes.

♦ **Traditional 529 Plan Growth**

Your calculator models periodic annual contributions compounding at an expected average annual return over 18 years:

$$\text{529 Future Value} = P \times [((1 + r_{529})^{18} - 1) \div r_{529}]$$

Where:

- P: Annual contribution amount
 - r_{529} : Expected average annual return for 529 plan investments (as a decimal, e.g., 0.05 for 5%)
-

♦ **Bitcoin College Fund Growth**

Models the same annual contributions compounded at your specified expected Bitcoin CAGR over the fixed 18-year period:

$$\text{BTC Future Value} = P \times [((1 + r_{btc})^{18} - 1) \div r_{btc}]$$

Where:

- r_{btc} : Expected average annual Bitcoin CAGR (as a decimal)
-

♦ **Net Difference**

The calculator shows the difference in future college fund values:

$$\text{Difference} = \text{BTC Future Value} - \text{529 Future Value}$$

Example:

- Annual contributions: \$6,000

- 529 average return: 5% (0.05)
 - BTC CAGR: 25% (0.25)
 - 529 plan grows to: $6,000 \times [(1.05^{18} - 1) \div 0.05] \approx 6,000 \times 34.719 = \$208,314$
 - Bitcoin college fund grows to: $6,000 \times [(1.25^{18} - 1) \div 0.25] \approx 6,000 \times 152.605 = \$915,630$
-

What does this help you understand?

- ✓ How your annual contributions could grow in a traditional 529 plan versus Bitcoin over 18 years.
- ✓ The power of compounding — and the potential magnitude of differences in final balances depending on your expected investment returns.
- ✓ A clear illustration of how your choice of investment could affect your child's college funding.

Home Purchase

What does this calculator do?

It models the financials of buying a home, including mortgage payments, loan amortization, home appreciation, equity buildup, and total interest paid over time. It also shows the opportunity cost of minimizing your down payment (3.5% in this case) and investing your remaining cash in Bitcoin instead. While this scenario means financing more and carrying a larger monthly payment, it also means having more cash to invest in Bitcoin up front.

Key Formulas Used:

♦ Home Appreciation Over Time

$$\text{Home Value}_N = \text{Purchase Price} \times (1 + \text{Home Appreciation \%})^N$$

Calculates how your home's market value grows each year.

♦ Mortgage Payments

Calculates fixed monthly payments on your mortgage, based on the financed amount after down payment:

$$\text{Monthly Payment} = \text{PMT}(\text{Annual Interest Rate} \div 12, \text{Total Loan Months}, -\text{Loan Amount})$$

♦ Principal & Interest Breakdown

Uses amortization formulas to determine how much of each monthly payment goes to interest vs. principal:

$$\begin{aligned}\text{Principal Payment}_k &= \text{PPMT}(\text{Monthly Rate}, k, \text{Total Periods}, -\text{Principal}) \\ \text{Interest Payment}_k &= \text{IPMT}(\text{Monthly Rate}, k, \text{Total Periods}, -\text{Principal})\end{aligned}$$

♦ Total Interest Paid Over Loan

Sums the interest paid throughout the mortgage term:

$$\text{Total Interest} = (\text{Monthly Payment} \times \text{Number of Payments}) - \text{Loan Principal}$$

♦ Bitcoin Investment from Reduced Down Payment

Instead of a larger down payment, you use only a 3.5% FHA down payment. The remaining cash you would have used goes into Bitcoin.

BTC Investment Amount:

$$\text{BTC Investment} = \text{Original Planned Down Payment} - \text{Actual Down Payment}$$
$$(3.5\% \times \text{Home Price})$$

Future Value of Bitcoin Investment:

$$\text{BTC Future Value} = \text{BTC Investment} \times (1 + \text{BTC CAGR})^N$$

Where:

- BTC CAGR = expected average annual Bitcoin growth rate.
- N = number of years you hold BTC.

Example:

- Home purchase price: \$500,000
- Traditional down payment (20%): \$100,000
- FHA down payment (3.5%): \$17,500
- BTC investment amount: \$100,000 - \$17,500 = \$82,500
- BTC CAGR: 30% over 10 years → BTC Future Value = $82,500 \times (1.30)^{10} \approx \$1,137,333$
- Home Equity + Appreciation after 10 years = \$284,587 (tradfi) vs \$175,146 (Bitcoin)
- Plus BTC value after 10 years = \$175,146 + \$1,137,333 = \$1,312,479

What does this help you understand?

- ✓ How your mortgage payments and home value change over time.
- ✓ How much equity you build vs. your outstanding loan.
- ✓ The opportunity cost of putting more money into a down payment vs. investing excess cash into Bitcoin.
- ✓ A side-by-side comparison of your potential net worth from home equity + BTC investment.

Auto Purchase

What does this calculator do?

It models the total cost of buying a car with financing, accounting for car depreciation, monthly payments, loan interest, and your equity position over time. It also helps you see the potential opportunity cost of using your cash as a down payment vs. investing it in Bitcoin.

Key Formulas Used:

♦ Depreciation of Car Value

$$\text{Car Value}_N = \text{Starting Value} \times (1 - \text{Depreciation \%})^N$$

Calculates how your car's market value drops each year.

♦ Monthly Loan Payment

$$\text{Monthly Payment} = \text{PMT}(\text{Annual Interest Rate} \div 12, \text{Total Loan Months}, -\text{Loan Amount})$$

Computes fixed monthly payments based on your financing.

♦ Equity Position

$$\text{Equity}_N = \text{Car Value}_N - \text{Remaining Loan Balance}_N$$

Measures what you'd net if you sold or traded the car at any time.

♦ Total Interest Paid

$$\text{Total Interest} = (\text{Monthly Payment} \times \text{Number of Payments}) - \text{Loan Principal}$$

Reveals the full cost of financing.

♦ Opportunity Cost: Investing the Down Payment in Bitcoin Instead

If you put \$0 down, you can **finance the full car price** and instead **invest the money you would have used for the down payment in Bitcoin**.

Future Value of Bitcoin Investment:

$$\text{BTC Future Value} = \text{Down Payment Amount} \times (1 + \text{BTC CAGR})^N$$

Where:

- BTC CAGR = expected average annual Bitcoin growth rate.
 - N = number of years you hold your BTC investment.
-

Example:

- Car price: \$40,000
 - Original down payment: \$8,000
 - Instead of putting \$8,000 down, you finance the full \$40,000 and invest \$8,000 in BTC at an expected 30% CAGR for 5 years: $\text{BTC Future Value} = 8,000 \times (1.30)^5 \approx \$29,700$
 - Meanwhile, your monthly payment increases slightly because you financed a larger amount, but the BTC investment could cover or exceed that cost over time.
-

What does this help you understand?

- ✓ How quickly your car loses value compared to your loan balance.
- ✓ How putting money into a depreciating asset (Automobile) compares to investing it in a potentially appreciating asset (Bitcoin).
- ✓ Your net position considering both your car equity and potential BTC investment value.
- ✓ A concrete example of opportunity cost, helping you make more informed financial decisions.

Home Equity

What does this calculator do?

It shows the opportunity cost of letting your home equity sit idle compared to tapping that equity via a loan at today's market interest rates and investing the borrowed funds into an asset like Bitcoin. It helps you estimate whether your investment's potential growth could outperform the cost of the borrowed money over time.

♦ **Idle Home Equity (not included in calculator)**

First, you have to estimate the amount of untapped equity in your home:

$$\text{Idle Equity} = \text{Home Value} - \text{Existing Mortgage Balance}$$

This represents the maximum cash you could access if you refinance, get a home equity loan, or a HELOC.

♦ **Loan Cost on Accessed Equity**

If you borrow your idle equity, the calculator estimates the total cost of the loan using amortized monthly payments over a 10-year term.

$$\text{Total Interest Owed} = (\text{Monthly Payment} \times 120 \text{ months}) - \text{Borrowed Amount}$$

The fixed monthly payment is calculated using the amortization formula and reflects both principal and interest. The calculator also shows Month 1's breakdown of interest vs. principal to illustrate how amortization works.

$$\text{PMT} = P \times [r(1 + r)^n] / [(1 + r)^n - 1]$$

Where:

- P = Loan Amount
- r = Monthly interest rate (APR / 12)
- n = Total number of payments (12 × 10 for a 10-year term)

Then:

$$\text{Total Interest Owed} = (\text{PMT} \times n) - P$$

◆ Investment of Accessed Equity

The model then shows how investing the borrowed amount into Bitcoin (or another asset) could grow:

$$\text{Investment Future Value} = \text{Borrowed Amount} \times (1 + \text{CAGR})^{\text{Number of Years}}$$

Where:

- CAGR is the expected average annual growth rate of your investment (e.g., 25% → 0.25).
 - Number of Years is your investment horizon.
-

◆ Net Position

Finally, it compares your expected investment value to the loan cost:

$$\text{Net Gain/Loss} = \text{Investment Future Value} - (\text{Borrowed Amount} + \text{Total Interest Owed})$$

This shows whether your investment's projected growth would exceed your loan repayment obligation.

Example:

- Home value: \$800,000
 - Existing mortgage: \$400,000 → Idle equity = \$400,000
 - Borrow \$400,000 at 7% APR over 5 years → Total simple interest $\approx 400,000 \times 0.07 \times 5 = \$140,000$
 - Invest \$400,000 into Bitcoin with 30% CAGR over 5 years → Investment Future Value $\approx 400,000 \times (1.30^5) \approx \$1,485,000$
 - Net Position: $1,485,000 - (400,000 + 140,000) \approx +\$945,000$
-

What does this help you understand?

- ✓ The **opportunity cost** of keeping equity idle vs. putting it to work.
- ✓ Whether an investment's potential growth can outweigh borrowing costs at today's rates.
- ✓ A realistic look at the risks/rewards of leveraging home equity to build wealth through other assets.

Borrowing vs. Selling

What does this calculator do?

It compares two strategies for accessing cash from your Bitcoin holdings over a fixed term:

1. **Selling BTC outright**, realizing a taxable gain and paying capital gains taxes, but freeing up cash immediately.
2. **Borrowing**, paying interest but remaining fully allocated to Bitcoin's potential upside — letting your BTC compound at your expected CAGR while avoiding a taxable sale.

This helps you see whether it's more advantageous to sell BTC or to borrow funds while staying invested.

♦ Selling BTC Scenario

- You sell your BTC at the current market value to get cash.
- You pay capital gains tax on the sale:

$\text{Capital Gains Tax} = \text{Sale Value} \times \text{Cap Gains Tax Rate}$

$\text{Net Cash After Tax} = \text{Sale Value} - \text{Capital Gains Tax}$

Because you sold, you no longer benefit from BTC price appreciation.

♦ Borrowing Against BTC Scenario

- Instead of selling, you borrow the same amount of cash at a specified interest rate
- Your BTC remains fully allocated and continues to grow with your expected BTC CAGR.

Over the loan term (N years), the **future value of your BTC** is:

$\text{BTC Future Value} = \text{Starting BTC Value} \times (1 + \text{BTC CAGR})^N$

The **total interest cost** you pay on the borrowed cash is:

$\text{Total Interest Paid} = \text{Loan Amount} \times \text{APR} \times N$

Your **net position** after repaying the loan is:

$\text{Net Value} = \text{BTC Future Value} - \text{Loan Amount} - \text{Total Interest Paid}$

◆ Net Comparison

You compare outcomes by seeing whether the net value from **borrowing & holding BTC** exceeds the **net cash you'd keep after selling BTC and paying taxes**:

$$\text{Difference} = \text{Net Value (Borrowing)} - \text{Net Cash After Tax (Selling)}$$

Example:

- 1 BTC you hold is worth: \$100,000
 - BTC CAGR: 30% over 3 years → BTC Future Value $\approx 100,000 \times (1.30^3) \approx \$219,700$
 - Loan: borrow \$100,000 at 10% APR → total interest over 3 years $\approx 100,000 \times 0.10 \times 3 = \$30,000$
 - Net Value (borrowing) $\approx \$219,700 - \$30,000 = \$189,700$
 - Selling scenario: pay 15% cap gains → tax = $100,000 \times 0.15 = \$15,000$
 - Net cash after selling $\approx \$100,000 - \$15,000 = \$85,000$
 - Difference: $\$189,700 - \$85,000 = +\$104,700$ (borrowing strategy outperforms).
-

What does this help you understand?

- ✓ The **true cost of selling BTC** when you factor in capital gains taxes.
- ✓ How borrowing can let you access cash without liquidating your Bitcoin and missing potential upside.
- ✓ A clear net outcome comparison so you can evaluate whether borrowing or selling better suits your financial goals and risk tolerance.

Rental RE vs Bitcoin HODL

What does this calculator do?

It compares two investment strategies over a **fixed 10-year term**:

1. Buying a rental property, collecting positive annual cash flow, and reinvesting those cash flows into Bitcoin each year.
2. Instead of buying the property, taking the original down payment amount and investing it directly into Bitcoin at the start of the 10-year period, then simply holding (HODLing) until the end.

This helps you visualize how real estate cash flow + BTC reinvestments stack up against a straightforward Bitcoin HODL approach using the same capital.

♦ Cash-Flowing Real Estate Strategy

- You purchase a rental property with a traditional down payment (20–25% of purchase price).
- Each year, you earn **Annual Cash Flow** (Cash on Cash Returns) (after expenses) from rent:

$$\text{CoCR} = \text{Rental Income} - \text{Operating Expenses} - \text{Debt Service}$$

Each year's cash flow is **reinvested into Bitcoin**, buying BTC at that year's expected price based on BTC CAGR:

$$\text{BTC Price}_N = \text{BTC Starting Price} \times (1 + \text{BTC CAGR})^N$$

$$\text{BTC Purchased}_N = \text{Annual Cash Flow} \div \text{BTC Price}_N$$

The **future value of reinvested BTC** at the end of 10 years:

$$\text{Future Value (BTC from Cash Flows)} = \text{Sum}(\text{BTC Purchased}_N \times \text{BTC Price}_{10})$$

Your **property equity** after 10 years includes both principal paydown and appreciation:

$$\text{Property Future Value} = \text{Starting Property Value} \times (1 + \text{Property Appreciation Rate})^{10}$$

$$\text{Equity} = \text{Property Future Value} - \text{Remaining Loan Balance}$$

◆ Bitcoin HODL Strategy

Instead of buying the property, you invest the **original down payment amount** directly into Bitcoin at the beginning of the 10-year term.

This investment compounds at your expected Bitcoin CAGR:

$$\text{BTC HODL Future Value} = \text{Down Payment Amount} \times (1 + \text{BTC CAGR})^{10}$$

◆ Net Comparison

To compare the two strategies:

$$\begin{aligned} \text{Total Value (Real Estate)} &= \text{Equity} + \text{Future Value of Reinvested BTC} \\ \text{Difference} &= \text{Total Value (Real Estate)} - \text{BTC HODL Future Value} \end{aligned}$$

Example:

- Property purchase price: \$500,000
 - Down payment: 20% → \$100,000
 - Property appreciates 3%/year → property value ≈ \$671,000 in year 10
 - Loan paid down → equity ≈ \$271,000
 - Annual cash flow: \$12,000 reinvested yearly into BTC at 25% CAGR → future BTC value ≈ \$270,000
 - Total value real estate + BTC: \$271,000 + \$270,000 = \$541,000
 - Bitcoin HODL: \$100,000 × (1.25¹⁰) ≈ \$931,000
 - Difference: \$541,000 – \$931,000 ≈ -\$390,000 (HODL outperforms in this scenario).
-

What does this help you understand?

- ✓ The power of combining real estate cash flow with BTC reinvestments vs. simply investing your down payment into Bitcoin.
- ✓ How loan amortization and property appreciation contribute to real estate equity.
- ✓ A clear side-by-side of which strategy could deliver higher potential returns based on your assumptions for property appreciation, BTC CAGR, and cash flow.

Living a Bitcoin Standard



What does this calculator do?

This model shows what could happen when you convert all income to Bitcoin on payday, and **borrow against your Bitcoin to fund living expenses**. It tracks how your BTC stack compounds at an expected growth rate while your **loan balance and interest** also increase.



Core Calculations (Year N)

1. BTC Price Each Year

$$\text{BTC_Price_N} = \text{BTC_Current_Price} \times (1 + \text{BTC_CAGR})^N$$

2. Nominal Annual Income (adjusted for inflation)

$$\text{Nominal_Income_N} = \text{Monthly_Income} \times 12 \times (1 + \text{Annual_Inflation})^N$$

3. Real Annual Income (after inflation)

$$\text{Real_Income_N} = \text{Nominal_Income_N} \div (1 + \text{Annual_Inflation})^N$$

4. Purchasing Power Loss

$$\text{Loss_}\%N = 1 - (1 \div (1 + \text{Annual_Inflation})^N)$$

5. BTC Purchased That Year

$$\text{BTC_Purchased_N} = \text{Nominal_Income_N} \div \text{BTC_Price_N}$$

6. Total BTC Accumulated So Far

$$\text{Total_BTC_Accumulated_N} = \text{SUM}(\text{BTC_Purchased_1 to N})$$

7. Total BTC Value

$$\text{BTC_Value_N} = \text{Total_BTC_Accumulated_N} \times \text{BTC_Price_N}$$

8. Interest Paid That Year

$$\text{Interest}_N = \text{Nominal_Income}_N \times \text{Loan_APR}$$

9. Annual Loan Taken (Income + Interest)

$$\text{Loan_Outlay}_N = \text{Nominal_Income}_N + \text{Interest}_N$$

10. Total Loan Balance

$$\text{Total_Loan}_N = \text{SUM}(\text{Loan_Outlay}_1 \text{ to } N)$$

11. Net Position vs. Loan

$$\text{Net_Value}_N = \text{BTC_Value}_N - \text{Total_Loan}_N$$

12. Annual Net Increase

$$\text{Annual_Net_Change}_N = \text{Net_Value}_N - \text{Net_Value}_{(N-1)}$$

13. Annualized BTC Benefit:

$$\text{Annualized_Benefit} = \text{Net_Value}_N \div \text{Years}$$



Example Output

Assuming:

- BTC Price = \$115,900
- Monthly Income = \$8,334
- YoY Salary Increase = 3%
- BTC CAGR = 21%
- Inflation = 2%
- Loan APR = 10%
- Year = 5

At Year 5:

- BTC Accumulated = ~3.21 BTC
- BTC Price = ~\$248,266
- BTC Value = ~\$796,990

- Total Loan = ~\$687,105
 - Net Wealth = ~\$109,885
 - Annualized BTC Advantage = ~\$21,997
-



What does this help you understand?

- How much BTC you accumulate by converting all income to Bitcoin
- How the interest and debt compound and accumulate over time
- How compounding BTC growth can outpace loan interest over time
- Your year-by-year net worth if you live on a Bitcoin standard
- The effect of inflation on income and purchasing power
- Long-term salary impact(s) by converting economic energy into Bitcoin

Dollar Cost Average (DCA)

What does this calculator do?

It shows what happens when you invest the same dollar amount into Bitcoin every week or month over a specified term.

- How much you invest each month
- How many years you'll invest
- Your expected Bitcoin growth rate (CAGR)
- Inflation rate (to see what happens if you don't invest)

The calculator tells you:

- How much Bitcoin Value you would have using a DCA strategy
 - What your money would be worth if you just held it in cash and did nothing
-

Formula Breakdown

This formula calculates the **future value of monthly investments** when the investment is growing at a compounded annual rate (like Bitcoin at 30% CAGR). For simplification, this calculator uses a longer form calculation which allows you to minimize the number of inputs while still producing the same desired output.

Spreadsheet Formulas:

1. Ending BTC Price (with growth)

$$\text{Starting BTC Price} \times (1 + \text{BTC CAGR})^{\text{Years}}$$

2. BTC Acquired Over Time (with compounding price growth)

$$\text{BTC Acquired} = \text{Investment Amount} \div (\text{Starting BTC Price} \times (1 + \text{BTC CAGR})^{\text{(Period Number} \div \text{Periods Per Year)})$$

3. Ending Term Value (with compounding price growth + inflation)

$$\text{Ending Term Value} = E9 * ((1 + ((1 + ((1 + I3)/(1 + E12) - 1))^{(1 / E10) - 1}))^{(E10 * E11) - 1}) / ((1 + ((1 + I3)/(1 + E12) - 1))^{(1 / E10) - 1})$$

Where:

- **E9** = Monthly investment amount (e.g., \$500)
 - **I3** = Annual growth rate (e.g., 0.30 for 30% CAGR)
 - **E10** = Number of compounding periods per year (typically 12 for monthly)
 - **E11** = Number of years
 - **E12** = Annual Inflation Rate
-

✓ Example:

If you invest **\$500/month** for **5 years** and BTC grows **30% per year** with **5% inflation**.

- Monthly rate $\approx 2.212\%$
 - Total months = 60
 - Future Nominal value = ~\$61,366
 - Future Real Value (after inflation) = \$53,159
-

✓ What this helps you understand:

- How much Bitcoin you accumulate with monthly investing (DCA)
- How compound growth creates long-term value
- The cost of doing nothing (holding cash while inflation eats it)
- How even small monthly investments can grow significantly over time

Retire on Bitcoin

What does this calculator do?

It helps you estimate how much Bitcoin you'd need to retire for a **20-year period** by modeling:

- Annual living expenses (adjusted for inflation/lifestyle creep).
- Rolling debt service as you borrow each year against your BTC — without paying it back — with interest compounding on the **entire outstanding debt balance**.
- BTC appreciation over time to track how your BTC's value grows relative to your rising debt.
- Peak BTC required throughout the term, showing the maximum required based on each LTV (30% and 50%)

♦ Annual Expenses Growth

Each year, your annual expenses grow:

$$\text{Expenses}_N = \text{Expenses}_1 \times (1 + \text{Expense Growth Rate}) ^ (N - 1)$$

♦ Rolling Debt Service

Each year, you:

- Add the new borrowing needed to fund that year's expenses.
- Accrue interest on the entire outstanding debt balance.

Your rolling debt amount at year N is:

$$\text{Debt}_N = (\text{Debt}_{\{N-1\}} \times (1 + \text{Loan APR})) + \text{Expenses}_N$$

Where:

- $\text{Debt}_{\{N-1\}}$ = total debt carried forward from prior year with interest compounded.
- Expenses_N = new borrowing to cover current year's living costs.

♦ BTC Value Growth

BTC appreciates each year at your expected CAGR:

$$\text{BTC_Price}_N = \text{BTC_Price}_1 \times (1 + \text{BTC CAGR}) ^ (N - 1)$$

$$\text{BTC_Value}_N = \text{BTC_Amount} \times \text{BTC_Price}_N$$

♦ BTC Value Calculation

The total loan determines the total BTC required based on the two LTVs shown;

$$\text{BTC Value Required} = \text{Total Loan Year}_N / \text{LTV}$$

♦ Total BTC Required

Once BTC value has been determined based on total loan required and associated LTV, you then divide by the BTC Market Value to arrive at the total BTC Required for each year;

$$\text{Total BTC Required Year}_N = \text{BTC Value Required} / \text{BTC Market Value Year}_N$$

♦ Peak BTC Required + Year

Once completed, the calculator will automatically find the peak BTC required and in which year, and share the results in the dynamic summary.

Example:

- Starting expenses: \$120,000/year
- Expense growth: 3%/year
- Loan APR: 8%
- BTC CAGR: 30%
- Starting BTC price: \$116,000

Rolling debt grows each year with new borrowings + interest on total debt, e.g.:

- Year 1: Debt_1 = 120,000 x 1.08 = 129,600
 - Year 2: Debt_2 = (129,600) + (123,600 x 1.08) ≈ 263,088...
 - Meanwhile, BTC value compounds: BTC_Price_10 ≈ 116,000 × 1.30¹⁰ ≈ 1.23M
 - Max BTC Required 7.09 BTC (30% LTV) Year 4 / 4.26 BTC (50% LTV) Year 4
-

What does this help you understand?

- ✓ What the peak BTC required looks like to fund your current (and future) lifestyle.
- ✓ The amount of BTC you'd need through each year of your 20 year retirement journey.
- ✓ How borrowing against your BTC to fund retirement without selling creates **rolling debt** that grows annually.

Dividends vs. Bitcoin

What does this calculator do?

It compares how your investment performs over 5 years in four different strategies:

1. **Dividend Stock (Standard)** – You buy shares of a dividend-paying stock, collect dividends in cash and do nothing with them.
2. **Dividend Stock with Reinvestment (DRIP)** – You reinvest your dividends to buy more shares.
3. **Bitcoin HODL** – You invest the same initial amount into Bitcoin and let it appreciate.
4. **Bitcoin DRIP** - You buy shares of a dividend-paying stock and reinvest your dividends to buy Bitcoin.

The model shows how each path grows in value over time, accounting for:

- Dividend yield
 - Share price decay
 - BTC compound growth
-

How Each Scenario Works

♦ 1. Dividend Stock – Cash Payout (Standard)

You buy shares and **collect dividends in cash**, but don't reinvest them.

Formulas:

- $\text{Starting Shares} = \text{Initial Investment} \div \text{Share Price}$
 - $\text{Monthly Dividend} = \text{Shares} \times (\text{Annual Dividend} \div 12)$
 - $\text{Monthly Share Price} = \text{Share Price} \times (1 - \text{Monthly Decay Rate})^n$
(Decay applied each month)
 - $\text{Total Value} = (\text{Shares} \times \text{New Share Price}) + \text{Collected Cash}$
-

♦ 2. Dividend Stock – Reinvested (DRIP)

You reinvest your dividends to buy more shares each month.

Formulas:

- $\text{Monthly Dividend} = \text{Shares} \times (\text{Annual Dividend} \div 12)$
- $\text{Shares Bought} = \text{Dividend} \div \text{New Share Price}$

- Updated Shares = Last Month's Shares + Shares Bought
 - Total Value = Total Shares × Share Price
-

♦ 3. Bitcoin Investment (HODL)

You use your full purchase amount to buy BTC once and hold it.

Formulas:

- BTC Purchased = Initial Investment ÷ BTC Price
 - BTC Price (Monthly) = BTC_Price × (1 + CAGR)^(n ÷ 12)
 - Total Value = BTC × New BTC Price
-

♦ 4. Bitcoin with Reinvestment (BTC DRIP)

Each month, you take the equivalent dividend payout and buy more BTC.

Formulas:





- **BTC Bought Monthly** = Monthly Dividend ÷ BTC Price That Month
- **Total BTC** = BTC Last Month + BTC Bought This Month
- **Total Value** = Total BTC × BTC Price That Month

Example:

Assumptions:


- **Initial Investment:** \$20,000
 - **Stock Share Price:** \$20
 - **Dividend Yield:** 20% annually
 - **Share Price Decay:** 5% annually
 - **BTC Starting Price:** \$116,098.40
 - **BTC CAGR:** 35%
 - **Time Horizon:** 5 years (60 months)
 - **Dividends paid monthly, reinvested monthly if applicable**
-

Final Results After 5 Years

Strategy	Final Portfolio Value
 Dividend (Standard)	\$33,079
 Dividend (DRIP)	\$41,722
 Bitcoin (HODL)	\$89,681
 BTC DRIP	\$57,273


Math Behind Each Scenario:

1. Dividend Stock – Standard (No Reinvestment)


- **Shares Purchased:** $\$20,000 \div \$20 = 1,000$ shares
 - **Monthly Dividend:** $1,000 \times (20 \times 0.20 \div 12) = \sim \$33.33/\text{month}$ initially
 - **Share Price Decay:** Each month, price drops slightly (5% annually = $\sim 0.41\%$ monthly)
 - **Final Share Price:** $\sim \$15.49$
 - **Total Dividends Collected:** $\sim \$17,584$
 - **Total Portfolio Value:**
 - Shares: $1,000 \times \$15.49 \approx \$15,495$
 - Cash: $\approx \$17,584$
 -  **Total: \$33,079**
-

2. Dividend Stock – DRIP (Reinvested Dividends)


- Reinvest monthly dividend to buy more shares
- Each month:
 - $\text{New Shares} = \text{Monthly Dividend} \div \text{Current Share Price}$

- Total Shares grow over time, even as price declines
 -  **Final Value: \$41,722**
-



3. Bitcoin – HODL

- **BTC Purchased:** $\$20,000 \div \$116,098.40 \approx 0.1722 \text{ BTC}$
 - **BTC Grows 35% Annually:** Compounded monthly
 - **Final BTC Price:** ~\$520,897
 - **Portfolio Value:** $0.1722 \times \$520,897 \approx$  **\$89,681**
-

4. Bitcoin – DRIP (Buy BTC Monthly with Dividends)

- Monthly Dividend from Standard scenario used to buy BTC
Each month:
 - $\text{BTC Bought} = \text{Dividend} \div \text{Current BTC Price}$
 - Total BTC compounds in value
 - Plus ending equity value
-  **Final Value: \$57,273**

What does this teach you?

-  Dividend Yields and Decay Rates are key in determining outcomes
-  Bitcoin HODL and Bitcoin DRIP can be useful strategies based on the goals

Bitcoin Life Insurance

What does this calculator do?

This tool compares the performance of purchasing traditional life insurance versus using Bitcoin as a long-term life insurance alternative. It evaluates:

- **BTC Premiums & Price Growth** (based on projected CAGR)
- **Death Benefit & Surrender Value** (in BTC terms)
- **Traditional Policy Premiums & Death Benefits**
- **The Impact of Inflation** on real value
- **Time Horizon** over a multi-year policy period

It helps you visualize how Bitcoin-backed policies might perform compared to traditional options, with or without inflation adjustments.

Bitcoin Life Insurance Scenario

You purchase life insurance denominated in Bitcoin and pay premiums in BTC. Your BTC grows based on your projected Bitcoin CAGR, and death benefits are paid in BTC.

Key Calculations:

- **BTC Price Projection:**
$$\text{BTC Price in Year } N = \text{BTC Price Year 1} \times (1 + \text{BTC CAGR}) ^ (N - 1)$$
 - **Annual BTC Premium Value (USD):**
$$\text{BTC Premium} \times \text{BTC Price}$$
 - **Total BTC Premiums (USD):**
Data provided by Meanwhile
 - **BTC Surrender Value (USD):**
Data provided by Meanwhile
 - **Death Benefit (USD):**
Data provided by Meanwhile
 - **Inflation-Adjusted Values:**
$$\text{Real Value} = \text{Nominal} \div (1 + \text{Inflation Rate}) ^ \text{Years}$$
-

Traditional Life Insurance Scenario

You pay a fixed annual USD premium for a fixed USD death benefit.

Key Calculations:

- **Total Premiums Paid (USD):**
Based on industry benchmark data for \$1M Death Benefit
 - **Surrender Value:**
Based on industry benchmark data for \$1M Death Benefit
 - **Death Benefit:**
Fixed amount, e.g., \$1,000,000
 - **Inflation-Adjusted Values:**
Same formula as above
-

Example

Inputs:

- Age Range: 35–39
- Inflation: 3%
- BTC CAGR: 20%
- BTC Annual Premium: 0.1 BTC
- Traditional Annual Premium: \$13,640
- BTC Price Year 1: \$118,598
- Death Benefit: 1.88 BTC / \$1M (TradFi)
- Term: 20 Years

Outputs

- Total Premiums Paid (Tradfi): \$272,800
- Total Premiums Paid (Bitcoin): \$307,479
- Surrender Value (Tradfi): \$117,812
- Surrender Value (Bitcoin): \$2,095,809
- Death Benefit (Tradfi): \$732,960
- Death Benefit (Bitcoin): \$3,955,455
- Numbers represented in USD value after inflation

What does this help you understand?

- How Bitcoin-denominated policies stack up against traditional life insurance
- What happens to your premiums and benefits when inflation is considered



Debt-to-Bitcoin Treasury Allocation Model

This model is designed for businesses (or individuals) who already have cash on hand and are evaluating whether to allocate a portion of that capital into Bitcoin instead of continuing to pay down rolling debt as aggressively.

Rather than reducing outstanding liabilities with excess cash, the model assumes the entity makes an initial Bitcoin purchase and continues with a monthly DCA (dollar-cost averaging) strategy, while allowing the debt balance to persist. It simulates how the resulting interest expense grows over time, and whether the appreciation of Bitcoin outpaces this cost—potentially growing net treasury value.



Model Assumptions

- Cash is Available: Business has the funds but chooses to hold debt and buy Bitcoin instead
 - Initial Purchase + DCA: A lump sum BTC buy followed by consistent monthly buys
 - Debt is Rolling: The outstanding balance increases with purchases and compounds monthly interest
 - BTC Market Growth: Simulated via a customizable annual CAGR
 - No Principal Paydown: Focus is on comparing BTC upside vs. rising interest burden
-

Formulas

- **$\text{BTC ACquired} = \text{BTC Purchase} / \text{BTC Price}$**
- **$\text{Total BTC} = \text{Prior Total BTC} + \text{BTC Acquired}$**
- **$\text{BTC Value} = \text{Total BTC} \times \text{BTC Price}$**
- **$\text{Profit} = \text{BTC Value} - \text{Debt Balance}$**
- **$\text{Interest Owed} = (\text{Debt Balance} \times (\text{Annual Interest Rate} / 12)) + \text{Prior Interest Owed}$**
- **$\text{Net Profit} = \text{Profit} - \text{Interest Owed}$**
- **$\text{Net Profit \%} = \text{Net Profit} / \text{Debt Balance}$**

What does this teach you?

- ✓ Investing cash in performant assets may produce better results than paying down more debt
- ✓ Compounding interest isn't as strong as compounding Bitcoin CAGR

Living a Bitcoin Standard - Getting Started

What does this calculator do?

This model simulates what it would look like to live off of borrowed dollars while accumulating Bitcoin over time—essentially living on a *Bitcoin Standard*. It helps you evaluate the feasibility of borrowing to cover living expenses while DCA'ing into BTC using income, and it tracks how your Loan-to-Value (LTV) evolves based on price appreciation, income, spending, interest, and BTC accumulation.

LTV is the key factor in this model. Most lenders only let you borrow a percentage—typically 50%—of your BTC's value. So if you spend everything you earn and rely solely on a BTC-backed loan, you'd fall short on cash, making the strategy unworkable. That's why it's important to have an upfront BTC buffer to give yourself breathing room from the outset, and to model how your LTV evolves over time based on income, expenses, and Bitcoin's expected growth.

Key Formulas Used:

BTC Buffer (USD Value)

Initial Expense Cushion (Months) x Monthly Living Costs

Max LTV %

=MAX function to identify highest number in the dataset

Max LTV Month

=Index and Match Function to identify month associated with Max LTV %

Ending BTC Value

Total BTC Accumulated + Starting BTC

Monthly Debt

Monthly Expenses * (1 + Expense Growth %)^(Month # / 12)

Monthly Interest

Monthly Expenses * (Borrow APR / 12) + Prior Month's Interest

Cumulative Debt

Monthly Debt + Monthly Interest + Prior Month's Cumulative Debt

Example:

- Take Home Pay \$5500
- Living Costs \$4000
- Cashflow % to BTC 50%
- Income Growth Rate 5%
- Expense Growth Rate 3%
- Bitcoin CAGR 30%
- Expense Buffer 6 Months
- Borrow APR 10%
- BTC Starting Price \$117,207

BTC Buffer \$24,000

Max LTV % 50.62%

Max LTV Month 21

Metric	All In	Cash Flow Only
Starting BTC	0.205	0.205
Net New BTC Acquired	2.25	0.31
Ending BTC Value	2.45	0.52
Ending BTC Value (USD)	\$3,963,629	\$838,608
Accumulated Debt	\$827,329	\$0
Ending Net Value	\$3,136,301	\$838,608
Annualized	\$313,630	\$83,861

What does this help you understand?

- ✓ Larger starting BTC collateral buffers can help reduce LTV % and liquidation risk
- ✓ Wider spreads between income and expenses can help reduce LTV % and liquidation risk
- ✓ Bitcoin CAGR can outperform borrowing costs

Our Trusted Partners

At **Bitcoinmath.org**, we believe that education should be paired with action — and that having the right tools and services is essential when navigating the Bitcoin ecosystem.

This page features a **curated list of Bitcoin-first companies** that we believe represent the **best in class** across custody, wallets, tax tools, lending platforms, hardware, security, and more. Every partner listed here has either been **used by us personally** or has earned our recommendation based on deep research and community trust.

Why These Partners?

We only feature companies that align with Bitcoin values: security, transparency, decentralization, and long-term thinking. Whether you're a first-time HODLer or a seasoned Bitcoiner, these tools can help you protect, use, or grow your Bitcoin more effectively.

We may receive **referral fees or affiliate commissions** if you choose to sign up for some of these services using our links. These commissions **come at no cost to you** and help support the continued development of Bitcoinmath tools and educational content.

Partner Spotlight

Each month, we feature a **Partner Spotlight** — a handpicked promotion, limited-time offer, or unique benefit from one of our trusted partners. These spotlights are our way of highlighting exceptional value and bringing **exclusive perks** to the Bitcoinmath community.

From discounted services to early access features, each spotlight is selected based on its relevance, usefulness, and alignment with the values we care about most: **Bitcoin-first, user-focused, and best-in-class**.

Want to Learn More?






The Bitcoinmath team is deeply familiar with each partner's offerings. If you're curious about how a specific product works, or how to integrate it into your strategy, you can:

- Use the **contact forms** (where available) embedded on each calculator page under the relevant partner section, or
- Reach out to us directly at **hello@bitcoinmath.org** — we're happy to help point you in the right direction.

Education & Entertainment

Bitcoin isn't just a financial revolution — it's a cultural one. Whether you're just starting out or already deep down the rabbit hole, this page is your gateway to the **most engaging and insightful Bitcoin content out there**.

We've curated our favorite resources across the spectrum of **education and entertainment** — everything we personally read, watch, listen to, and share with friends:

-  **Books** that build foundational knowledge
 -  **Podcasts** from the sharpest minds in the space
 -  **Social media voices** who keep it real and informative
 -  **Documentaries** that inspire and enlighten
 -  **Training & tutorials** for anyone leveling up their Bitcoin IQ
-

Bitcoin Swag Marketplace

Looking for the perfect gift for the Bitcoiner in your life (even if that's you)?

We've also created a **Bitcoin SWAG Marketplace on Amazon**, packed with gear and goodies ranging from:

- T-shirts & hats
- Hardware wallets & electronics
- Stickers, socks, books, mugs, and even candy 🍬

👉 Browse our top picks and support Bitcoin culture — whether you're stacking sats or just stacking gifts.

Have a favorite resource we missed? Want to get your Bitcoin podcast, video series, or product featured? **Email us anytime at hello@bitcoinmath.org** — we're always looking to grow the list.

Bitcoin Strategy Playbook

? What is this section about?

This playbook outlines the real-world strategies we personally use to buy, protect, and use Bitcoin. These are not recommendations—just the tools and approaches we've found helpful and effective in managing our Bitcoin through different financial scenarios.

? Who is this for?

Anyone who wants to understand how Bitcoin can be part of their financial life—whether you're brand new or already stacking sats. These strategies are laid out simply to help you explore and learn at your own pace, while giving you graphical representation of how the processes work and which tools are involved.

? Is this financial advice?

Nope. Nothing here is financial or investment advice. These are strategies we use ourselves and are sharing for educational purposes only. Always do your own research and speak with your financial advisor.

? What types of strategies are covered?

Here's what you'll find:

- **Buying Bitcoin** – The best apps and onramps we use
 - **Cold Storage** – How we protect Bitcoin long-term
 - **DCA (Dollar Cost Averaging)** – Automating recurring buys
 - **Borrowing Against Bitcoin** – Using BTC as collateral via CeFi or DeFi
 - **Retirement Accounts** – Ways to gain Bitcoin exposure in IRAs or 401(k)s
 - **Earning Bitcoin Rewards** – Getting sats back on everyday spending
-

? What tools and services do you recommend?

Each strategy includes the actual platforms we trust and use—like **River**, **Strike**, **Unchained**, **The Bitcoin Adviser**, **Fold**, **Bitcoin IRA**, and **SALT Lending**.

? Where can I learn more about the tools mentioned?

Visit our **Tools & Services** page for more information on each partner.

? What if I have questions or need help?

If you have questions, we might have answers! Use the Contact Forms or you can email us directly at hello@bitcoinmath.org and someone on the Geek Squad will get back to you.