



Build Knowledge/Investment Theory & Strategy

The Rules for Profitably Using Margin

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Borrowing to invest can be tempting when you want to make up for losses or capitalize on market opportunities. Here's an analysis of the factors affecting margin investing—interest rates, alpha, asset allocation, stops, loan terms, and more—and how they impact returns in different market environments.

When using margin, investors generally expect a minimum profit of \$3 for each dollar at risk. Realizing a gain and avoiding losses depends on the interplay of a number of factors, some of which you can influence and some of which you can't.

In the article "[The Pitfalls of Margin](#)," I described the terms associated with leveraging and gave two examples using actual market history starting in the years 1990 and 1973. Of course, picking two years from the history does not reveal the entire picture. In this article I will demonstrate the pitfalls of leveraging for the investor using the entire market history since 1900.

Here is our example: Bob is 30 years old. He has \$100,000 in his portfolio. His portfolio is aggressive—100% S&P 500. For his portfolio growth, I used the historical index return plus dividends, less his portfolio costs of 0.5%.

Bob decides to borrow \$100,000 to enhance the return of his investments. He pays only the interest, which is paid out of his portfolio. The interest rate is equal to six-month short-term deposit interest rate plus 3%. At the end of 10 years, Bob is planning to pay back the loan principal from the portfolio.

I calculated the profit or loss as a result of leveraging for each starting year since 1900. I used my leveraging calculator, which is based on actual market history. Table 1 depicts the outcome. Figure 1 shows the same in graphical format.

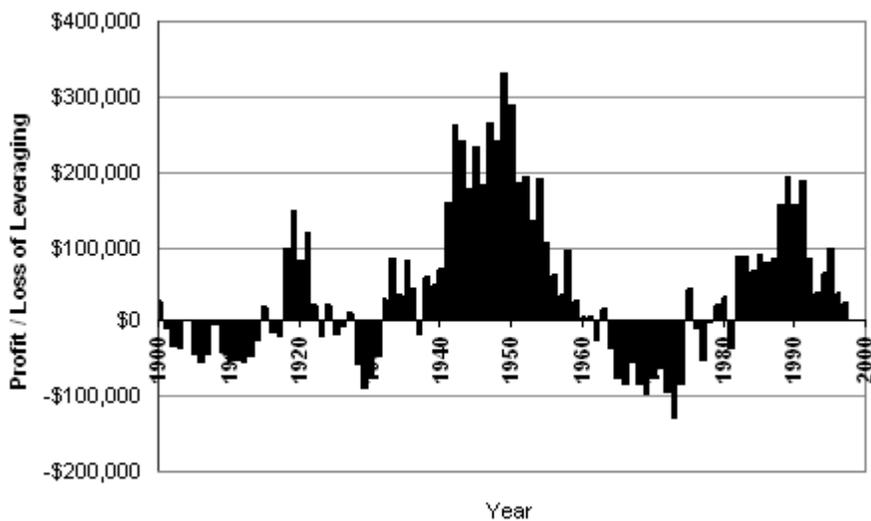
Year	Profit/loss	Year	Profit/loss	Year	Profit/loss	Year	Profit/loss
1900	\$27,250	1925	-\$16,300	1950	\$288,084	1975	\$44,317
1901	-\$10,295	1926	-\$6,546	1951	\$185,496	1976	-\$10,886
1902	-\$33,475	1927	\$11,342	1952	\$193,895	1977	-\$51,850
1903	-\$36,593	1928	-\$57,342	1953	\$135,363	1978	-\$1,732
1904	\$132	1929	-\$90,174	1954	\$190,345	1979	\$22,507
1905	-\$44,162	1930	-\$72,652	1955	\$105,959	1980	\$31,511
1906	-\$54,335	1931	-\$46,184	1956	\$60,429	1981	-\$37,009

1907	-\$44,413	1932	\$29,729	1957	\$35,645	1982	\$88,122
1908	-\$4,407	1933	\$85,010	1958	\$95,820	1983	\$87,741
1909	-\$40,982	1934	\$34,523	1959	\$28,224	1984	\$66,574
1910	-\$52,151	1935	\$82,524	1960	\$5,547	1985	\$90,263
1911	-\$52,987	1936	\$42,234	1961	\$5,367	1986	\$81,486
1912	-\$53,573	1937	-\$16,627	1962	-\$25,551	1987	\$84,888
1913	-\$47,212	1938	\$58,671	1963	\$16,884	1988	\$156,335
1914	-\$25,621	1939	\$48,004	1964	-\$36,107	1989	\$193,493
1915	\$18,428	1940	\$70,718	1965	-\$75,294	1990	\$155,739
1916	-\$16,201	1941	\$159,834	1966	-\$82,413	1991	\$189,247
1917	-\$20,587	1942	\$261,986	1967	-\$53,514	1992	\$84,726
1918	\$98,135	1943	\$241,148	1968	-\$84,556	1993	\$38,981
1919	\$149,052	1944	\$178,399	1969	-\$95,642	1994	\$64,988
1920	\$81,653	1945	\$232,734	1970	-\$75,702	1995	\$97,366
1921	\$119,291	1946	\$184,511	1971	-\$63,307	1996	\$38,838
1922	\$22,956	1947	\$265,381	1972	-\$94,197	1997	\$23,385
1923	-\$20,713	1948	\$240,842	1973	-\$129,369		
1924	\$22,241	1949	\$331,248	1974	-\$83,160		

Source: Jim Otar

If you observe the figures in Table 1 closely, starting in 1900, the cumulative profit/loss picture did not turn positive until 1938. In my circle of friends, I don't know of anyone who is rich enough—or dumb enough—to keep borrowing for 37 years, paying all that interest, only to break even at the end (or worse).

Figure 1: Cost/Benefit of Leveraging



Source: Jim Otar

Wearing a [Gaussian](#) hat for a moment, here are some statistics:

- Number of winning years: 59
- Number of losing years: 39
- Average win amount: \$103,145
- Average loss amount: \$47,790
- Median profit due to the leveraging: \$25,318
- Lucky (top 10%) profit: \$189,572
- Median profit: \$25,318
- Unlucky (bottom 10%) loss: \$66,111
- Worst-case loss: \$129,369

Just because the median profit was a positive number over this time period, don't jump to the conclusion that all is well. We have to go beyond the median.

Calculating the profit factor

Traders use a concept called the profit factor. The profit factor measures the ratio of total dollars won to total dollars lost over the entire time period. It is calculated as:

$$\text{Profit Factor} = \text{PF} = \frac{\text{WY} \times \text{WA}}{\text{LY} \times \text{LA}}$$

where:

WY is the number of winning years
WA is the average win amount
LY is the number of losing years
LA is the average loss amount

In this case, the profit factor is:

$$\text{Profit Factor} = \text{PF} = \frac{59 \times \$103,145}{39 \times \$47,790} = 3.27$$

Generally in the trading world, if you are risking money, you want a profit factor larger than 3; i.e., each dollar of potential loss must come with a \$3 potential gain. Here is the catch: We are talking about a hundred-year time span. Considering that the average investing time horizon is between 20 and 30 years for an individual, this high profit factor that is based on

100 years does not necessarily mean that an individual with a limited time horizon will see any of this high-profit factor.

Let's look at various factors to see what works and what doesn't when it comes to leveraging for individuals.

Own/loan ratio

If your entire investment portfolio consists of borrowed money, the own/loan ratio is 0.

If you have \$100,000 in your portfolio and you borrow \$100,000 to invest, your own/loan ratio is 1.

I recalculated the profit/loss table (Table 1) for various own/loan ratios and for various loan repayment methods for all years since 1900. Then I calculated the profit factor for each, as indicated in Table 2.

Table 2: Profit Factor for Various Own/Loan Ratio and Repayment Methods				
	Loan repayment method			
Own/loan ratio	Paying interest only	Paying annually 10% of the initial loan amount	Paying annually 15% of the initial loan amount	Paying annually 20% of the initial loan amount
	Profit factor			
0	2.85	2.53	3.04	3.28
1	3.27	2.97	2.57	2.34
3	2.68	2.56	2.48	2.32

Source: Jim Otar

Table 2 indicates that:

- If your own/loan ratio is 1 or more, you are better off paying interest only over the term of the loan and repaying the loan principal at the end of the term.
- If the own/loan ratio is 0—i.e., the entire investment portfolio is other people's money—you are better off paying down at least 15% of the original loan amount each year until the end of the loan term, until the loan is paid off, or until the portfolio depletes, whichever comes first.

Depletion stop

The portfolio is considered to be depleted when its value becomes less than one year's loan repayment amount. If the portfolio depletes, you can continue paying your loan repayments as if nothing had happened. Your other option is to liquidate the portfolio and pay off the loan.

If you continue paying interest after depletion, worst-case losses will be higher, especially if your loan payments include principal and interest. For the remainder of this article, the

entire loan is repaid immediately when the portfolio is depleted.

Asset allocation

You may feel more comfortable holding some fixed income or buying balanced funds in your leveraged portfolio. After all, we have been indoctrinated to invest within our risk tolerance.

Here is the catch: For an individual investor, because the cost of borrowing is usually higher than the yield of a fixed-income portfolio, it does not pay to borrow at a higher interest rate and then invest even some of that money in fixed income. If you are already taking a higher risk by borrowing money to invest, you might as well be prepared to invest 100% in equities.

Otherwise, don't borrow.

I calculated the profit factor for various asset mixes for all years since 1900, as indicated in Table 3 (own/loan ratio is 0) and Table 4 (own/loan ratio is 1).

Asset mix	Loan repayment method			
	Paying interest only	Paying annually 10% of the initial loan amount	Paying annually 15% of the initial loan amount	Paying annually 20% of the initial loan amount
Profit factor				
100% S&P 500	2.85	2.53	3.04	3.28
80% S&P 500, 20% fixed income	2.24	1.97	2.39	2.58
60% S&P 500 40% fixed income	1.50	nm	1.53	1.78

Source: Jim Otar

Asset mix	Loan repayment method			
	Paying interest only	Paying annually 10% of the initial loan amount	Paying annually 15% of the initial loan amount	Paying annually 20% of the initial loan amount
Profit factor				
100% S&P 500	3.27	2.97	2.57	2.34
80% S&P 500, 20% fixed income	2.81	2.59	2.24	2.00
60% S&P 500, 40% fixed income	1.96	1.89	1.72	1.52

Source: Jim Otar

This table tells us the highest profit factor occurs when a portfolio is most aggressive. For the remainder of this article, the borrowed money is invested 100% in S&P 500 and nothing is invested in fixed income.

Margin stop

When the portfolio value goes below a certain percentage of the loan balance, you may get a margin call. When that happens, you need to either add cash to your account to improve the margin ratio, or liquidate some or all of your investments reducing or eliminating your loan amount. I calculated the profit factor for various margin stop levels for all years since 1900 in Table 5:

Margin stop level	Loan repayment method		
	Paying interest only	Paying annually 10% of the initial loan amount	Paying annually 15% of the initial loan amount
	Profit factor		
No stop	2.85	2.53	3.04
60%	3.08	2.94	3.17
70%	3.23	3.13	3.20
80%	3.51	3.42	3.26
90%	2.93	2.89	2.89
100%	2.44	2.26	2.27

Source: Jim Otar

This table tells us at least two things:

- Never meet a margin call, never add money. Liquidate and pay off the loan.
- The optimum stop is at around 80%. Once the portfolio value is below 80% of the remaining loan balance, liquidate and pay off the loan. Don't wait in despair hoping that the markets will turn around and wipe out your losses. The markets may turn around, but that won't likely wipe out your losses.

A margin stop of 80% is used in all of the remaining tables in this article.

Trailing stop

The trailing stop enables you to pay off the loan on a high note if you are in a profitable position. It is triggered when the portfolio value drops to below a predetermined percentage of its peak value. The profit factors for various levels of trailing stop are indicated in Table 6.

Trailing stop level	Loan repayment method	
	Paying interest only, own/loan ratio=1	Paying annually 15% of initial loan amount, own/loan ratio=0
	Profit factor	
No trailing stop	3.24	3.26

5% from the peak value	Nm Nm	Nm
10% from the peak value	Nm	Nm
15% from the peak value	3.42	Nm
20% from the peak value	3.06	Nm

Source: Jim Otar

Observing this table, we come to two conclusions:

- If the own/loan ratio is 0 and you are paying down 15% of the initial loan amount each year—the optimum—you are better off not implementing any trailing stops.
- If the own/loan ratio is 1 or larger and you are paying the loan interest only, the optimum trailing stop is when the portfolio value goes below 15% of its peak level.

During the year, the portfolio will fluctuate, but this trailing stop decision is made only once a year at the end of the calendar year.

You might ask, "Should I implement the trailing stop immediately, starting with the first year or after a few years of investing?" I analyzed the effects of starting the trailing stop after two, four, and six years. In all cases, implementing the trailing stop at the beginning was better.

A trailing stop of 15% is used in all of the remaining tables for own/loan ratio of 1.

Alpha

Alpha is the excess return over and above the benchmark, and it has a great influence on the profitability factor. It is one of the most important factors in the profit/loss picture of leveraging. I calculated the profit factor for various levels of alpha for all years since 1900. They are indicated in Table 7.

Alpha	Loan repayment method	
	Paying interest only, own/loan ratio=1	Paying annually 15% of initial loan amount, own/loan ratio=0
	Profit factor	
-4%	Nm	Nm
-2%	Nm	Nm
0%	Nm	Nm
2%	Nm	Nm
4%	3.93	3.07
6%	5.16	5.99
Historic total return of S&P 500 less 0.5% portfolio costs	3.42	3.26

Source: Jim Otar

Observing this table, we come to two conclusions:

- Do not leverage unless your portfolio consistently outperforms the index by 4% or better.
- Going forward, based on current dividend yields, avoid leveraging using market index funds, because they do not provide sufficient alpha even when dividends are included.

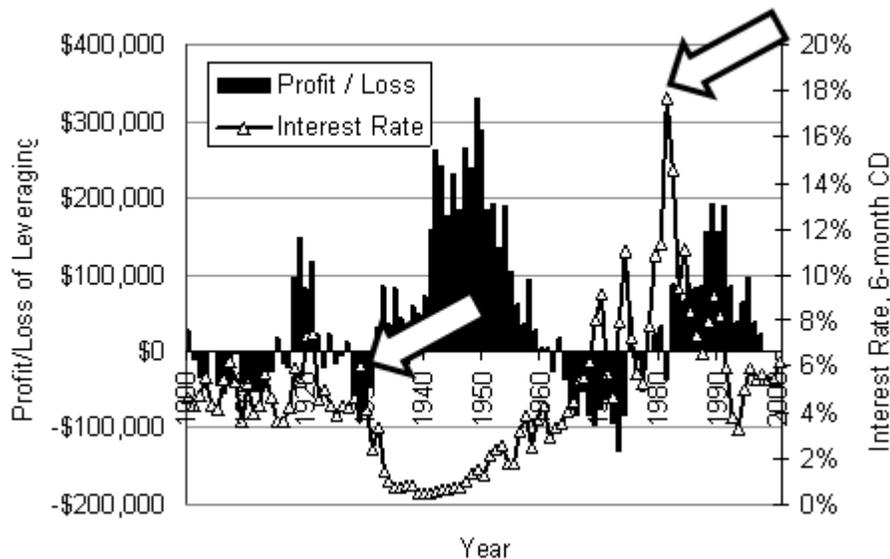
Interest rate

The interest rate has a great influence on the outcome. In Figure 2, I added the historic interest rate to the historical profit/loss chart that was depicted in Figure 1. The vertical scale on the left of the chart indicates the profit/loss as a result of leveraging. The vertical scale on the right-hand side of the graph indicates the interest rate.

We observe that there are two relatively long-term waves of profitable leveraging. The first one started after 1932. The second one started 49 years later, after 1981. There is a common thread between these two waves: they both occurred immediately after sharp drops in the interest rates. These are indicated with arrows on the chart.

If you are lucky, you may be able to catch a similar wave once in your lifetime. That is, if you notice it in a timely fashion. But I think such an opportunity is now well behind us baby boomers. The next such opportunity may not come until 2030, according to the 54-year Kondratieff cycle.

Figure 2: Correlation Between the Prevailing Interest Rate and Profit/Loss of Leveraging



Source: Jim Otar

Table 8 indicates the profit factor for various interest rates:

Net interest rate	Loan repayment method	
	Paying interest only, own/loan ratio=1	Paying annually 15% of initial loan amount, own/loan ratio=0
Profit factor		
Six-month CD yield minus 1%	10.17	9.27
Six-month CD yield plus 0%	7.70	7.18
Six-month CD yield plus 1%	6.03	5.45
Six-month CD yield plus 2%	4.39	4.29
Six-month CD yield plus 3%	3.42	3.26
Six-month CD yield plus 4%	2.57	Nm

Source: Jim Otar

If you are paying an interest rate that is 3% higher than a six-month CD, leveraging is unlikely to work for you profitably over the long term.

Term of the loan

Time heals most wounds. This is also true for leveraged investments. A longer loan term can create a higher profit factor, provided you don't get stopped out. I calculated the profit factor for various loan terms, as indicated in Table 9.

Loan term	Loan repayment method	
	Paying interest only, own/loan ratio=1	Paying annually 15% of the initial loan amount, own/loan ratio=0
Profit factor		
5 years	1.80	Nm
10 years	3.42	3.26
20 years	8.15	7.16

Source: Jim Otar

If your loan term is less than 10 years, leveraging is unlikely to work for you profitably.

Final thoughts on leveraging

Three of the most important factors that determine the success of a leverage strategy are luck, interest rate, and alpha. You have no control over luck and the interest rate. As for alpha, most of us have insignificant control over it unless we follow a disciplined asset selection and monitoring strategy.

After all this discouragement, if you still want to advise your clients to borrow money to invest, here are some guidelines:

- Don't borrow an amount that is more than what the client already owns.
- Don't leverage if your client is within 10 years of retirement or already retired. The loan term must be 10 years or longer without any withdrawals.
- Pay abundant attention to asset selection; you'll need to outperform the index by 4% or better.
- Make sure client's net (after-tax) interest cost is at a minimum; it should not exceed the six-month CD plus 3%.

Never meet a margin call. Liquidate assets and pay off the loan if asset value is below 80% of the loan balance.

- Use a 15% trailing stop. Liquidate sufficient assets to pay off the loan if portfolio value goes below 85% of its peak value at the end of the year.

If your client meets all these points, good luck—you will need it.

Jim Otar is a financial planner, a professional engineer, a market technician, a financial writer, and the founder of retirementoptimizer.com. His past articles on retirement planning won the CFP Board Article Awards in 2001 and 2002. He lives and works in Thornhill, Canada, and can be reached at (905) 889-7170, or by e-mail at jimotar@rogers.com.

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