



GREAT INVESTMENTS FOR TIMES OF INFLATION

Matthias Riechert

SUMMARY

In this paper the author develops an investment strategy for long-term investors who expect higher rates of inflation. To begin with, the author establishes that the best way to achieve the investment goal is to invest in equities using a value-investing framework. He then analyses how individual companies react to a general price increase in the economy. It follows that only few companies have the ability to pass-through price increases without losing profitability. Those companies must exhibit a special range of characteristics, which can be identified by analysing the drivers of return on equity and by using fundamental business analysis including the “Greenwaldian” analysis of competitive advantage. Finally the writer highlights “hidden options”, a type of business model that might do extremely well during times of inflation.

1. INTRODUCTION

“In ever growing extent the Reich had to resort to the Reichsbank if it was to prolong its existence, and because the point at issue was the survival of the Reich, the Reichsbank did not regard itself justified in refusing even after the passing in 1922 of the law which gave it formal autonomy.”

Geheimrat v. Grimm (1926), Member of the Board of Directors of the Deutsche Reichsbank, quoted in H. Schacht (1953), 76 Jahre meines Lebens, own translation.

Since the early 1970s of the last century, the world monetary system is on a paper, or: *fiat*, money standard. Money production has been monopolised by government-sponsored central banks, and money is actually created through bank credit expansion literally out of thin air (*“ex nihilo”*). Be it the US dollar, the euro, the Chinese renminbi, the British Pound or the Swiss franc: they all represent fiat currencies. In mainstream economics, the paper money standard is considered a state-of-the-art institutional framework for organising monetary affairs. This view, however, stands in stark contrast to what economists in former times had to say about paper money. For them, paper money had actually a rather bad rap.

Take, for instance, Frank A. Fetter (1863–1949), who noted that paper money “(...) is peculiarly liable to be the subject of political intrigue and of popular misunderstanding. It is this danger, more than anything else, that makes political money in general a poor kind of money.”¹ Irving Fisher (1867–1947), in his *The Purchasing Power of Money, its Determination and Relation to Credit, Interest and Crises* (1911), was even more outspoken: “Irredeemable paper money has almost invariably proved a curse to the country employing it.”² The French philosopher François Marie Arouet, known as Voltaire (1694–1778), noted that paper money eventually would return to its intrinsic value – zero. Indeed, paper monies have almost always ended in inflation, or very high inflation, and even led the total breakdown currencies.

The financial and economic crisis, which started in the middle of 2007 in the US and has since then turned into a truly global crisis, can be interpreted, first and foremost, as having been caused by

¹ See Fetter (1926), *Modern Economic Problems*, p. 48.

² Fisher (1922 [1911]), *The Purchasing Power of Money, its Determination and Relation to Credit, Interest and Crises*, p. 78.

paper money.³ Over decades, expansionary monetary policies have provoked boom-and-bust cycles, over-consumption and over-investment, accompanied with *malinvestment*, which have led to ever higher levels of debt relative to economic income. In particular government debt levels have increased markedly, making a policy of “inflating-away-the-debt” increasingly attractive, given that governments and their electorate will have to choose between depression (as a result of the preceding paper money boom) or a policy of expanding the money supply even further (in an effort to escape the fallout of the paper money boom).⁴

It is very likely that the period of relative low inflation, or: disinflation, has come to an end, especially so as government sponsored central banks are in a position to increase the money supply at any one time in any amount politically desirable and, most important, mainstream economics considers deflation much more problematic than inflation. This conclusion is of the utmost importance for investors, to be incorporated in their strategic investment framework. Inflation – that is a debasement of the currency – will not only mean a loss of purchasing power of money, it will also have far reaching implications on the economies’ production and employment structure: While inflation is an economic and societal evil, it will affect industrial sectors and thus firms differently (and at different times): it will create relative beneficiaries and relative losers.

That said, forthcoming changes in the international monetary sphere, which will be most likely be accompanied with a (severe) debasement of most of the major currencies, will be of utmost importance for investment strategies. It is fair to say that the return of (high) inflation will have important implications at an economic, political and, most important, firm level most investors haven’t presumably dealt with for quite a number of years.

2. WHAT ARE THE INVESTMENT GOALS?

*“If you forego ten hamburgers to purchase an investment;
receive dividends which, after tax, buy two hamburgers;
and receive, upon sale of your holdings, after-tax
proceeds that will buy eight hamburgers, then you have
had no real income from your investment, no matter how*

³ Such an interpretation is put forward by economists taking recourse to the Austrian School of Economics. For such an interpretation see, for instance, Jesús Huerta de Soto (2008), Financial Crisis and Recession, 6 October, Ludwig von Mises Institute, Auburn, US Alabama; or Polleit, T. (2008), Credit Crisis: Precursor of Great Inflation, 7 February, Ludwig von Mises Institute, Auburn, US Alabama.

⁴ See, for instance; F. A. v. Hayek (1960), The Constitution of Liberty, Chapter 22, esp. pp. 330 – 333.

*much it appreciated in dollars. You may feel richer, but
you won't eat richer."*
Warren E. Buffett

The primary goal is to achieve an investment return so that investors will become richer through the increase of their purchasing power. Consequently, currency depreciation has to be beaten. In addition, taxes will also eat away a chunk of any positive return. Capital gains tax rates ranges between 15-35% and are likely to increase over time, as policy makers will try to please the majority by redistributing wealth. Therefore just offsetting the inflation rate by investing in, for example, inflation-linked investment bonds, will be a certain failure because the after tax return will be lower than the rate of inflation. As an example, an inflation rate of 10% and a capital gains tax of 30% require an investment return of 14.3% just to offset the loss of purchasing power. It follows that the investment return has to be *sufficiently above the inflation rate* in order to increase wealth through times of inflation.

The secondary goal is the timeframe of an investment. Generally, investing is foregoing current consumption in favour of (hopefully) more consumption at some point in the future. The length of the time difference depends on each individual's age and preferences and on the attractiveness of prevailing investment opportunities. In times of inflation individuals perceive that it is unlikely that saving money will lead to more wealth in the future. In fact, in economies with a higher inflation rate, individuals tend to plan on a much shorter timeframe. People hustle, speculate, and quickly convert cash into other (tangible) assets. A short investment timeframe, however, stands in contrast to our primary goal because it is simply more difficult to find rewarding short-term investment opportunities. As long as investment opportunities offer a sufficiently higher return relative to the inflation rate the timeframe becomes (almost) irrelevant since for a saver the optimal timeframe is from today until the harvest of savings, at the pension age.

3. WHAT ASSET CLASSES MIGHT REALISTICALLY ACHIEVE SOLID LONG-TERM RETURNS DURING PERIODS OF INFLATION?

The first category to consider is anything currency denominated that has a fixed (or no) coupon, such as cash, money market, bills and bonds. This category is unfit for our goal for two simple reasons. First, returns are limited to the pre-defined payoff. Locking-in the current pitiful returns is unacceptable considering our long-term goal. Second, the general level of interest rates is artificially reduced by central bank interventions. Currently (May 2012) interest rates on the 10-year Treasury bonds average about 1.5 per cent, with inflation (officially) at 2.3 per cent. The German Bund yield is at 1.2 per cent versus an inflation rate of 2.6 per cent – negative real rates everywhere. Distorting

activities by central banks are likely to persist or even to increase, especially should free market supply and demand threaten to meet at higher yields. It is hence not likely that sovereign bond yields will ever offer sufficient protection against inflation or compensate investors adequately for taking the risk (unless policymakers accept the inevitable and let free market forces clean the debt bubble).

The second category is anything that you can touch, e.g. art, jewellery, gold and silver. Tangible assets cannot default. However, these assets have no built in return. They produce nothing; hence their value depends on what someone else will pay for it later. Gold, for example, is just a shiny metal and yet, over thousands of years people have used it as a means of payment and a store of value. Tomorrow's purchasing power of gold and that of paper money are both depending on trust. Just imagine you could choose between all the gold and all outstanding paper Dollars. On one side you would see the famous⁵ cube of 170K tons and 68 feet edge length of shiny metal. On the other side you'd see four of those (same sized) cubes with stacked pallets full of gray and green printed papers, representing the US monetary base⁶. Both types of cubes produce nothing. You cannot eat them. You can only exchange them later into other goods. Ah, did I mention that ten years ago there was only one cube of paper Dollars? At the current gold price you can swap four paper money piles against roughly one third of the gold cube. How will this four-to-one-third ratio change if in a few years there are not four but eight paper money piles? Faced with the choice between paper currency and gold, I'd choose Gold because it cannot be printed. Gold is not an asset class that generates returns but it can be regarded as an alternative currency. Gold is money.

To illustrate, let's invert the relation between gold (or any tangible asset) and money. We can express the price of money in terms of x units of a gold ounce, y hamburgers or z pints of beer. Normally, during price stability, market participants can focus solely on the supply and demand of the good since the other side of the ratio, the value of money, is perceived to be stable. Now, if the money supply increases, then the price ratio will be affected by the money supply. This effect is intuitively obvious and known as the "quantity theory of money".⁷ The price of gold, for example, has gone up from around US\$ 300 per ounce to US\$ 1,600 per ounce during the last ten years. This increase can have two causes: More demand for gold, or more supply of paper Dollars. If we invert the price ratio we could say that one Dollar used to cost 0.33 of 1/100 ounce, whereas today it costs only 0.06 of 1/100 ounce of gold – a price drop of 81%. If inflation expectation rises, market participants will have

⁵ Warren E. Buffett, in Berkshire's annual report 2011, compared the world's gold stock with other investments, such as farmland and businesses and concluded that Gold's recent popularity is unwarranted. David Einhorn of Greenlight Capital, in his Q1 2012 letter to partners, pointed to the fact that one should compare Gold with paper money and not with productive investments.

⁶ According to The Federal Reserve Bank of St. Louis the adjusted monetary base was \$ 2,642 Billion on 31.05.2012. The Adjusted Monetary Base is the sum of currency (including coin) in circulation outside Federal Reserve Banks and the U.S. Treasury, plus deposits held by depository institutions at Federal Reserve. <http://research.stlouisfed.org/fred2/series/BASE/>

⁷ Milton Friedman restated the quantum theory of money by the argument that inflation "is always and everywhere a monetary phenomenon" in the sense that it can be produced only by more rapid increase in the quantity of money than in (economic) output.

to project both sides of the ratio. Under these circumstances they will find it increasingly difficult to plan and forecast. The economy suffers and markets become more volatile because of increased uncertainty.

Over the last decade gold more than fulfilled its role as a stable currency. Over a long time period gold can offset paper losses. But remember, we want to achieve returns *above* the inflation rate. The price of any tangible asset might *temporarily* increase by more than the inflation rate because of changes of the expectation of the price determining factors, such as the future inflation rate. Only if we correctly anticipate those changes can we achieve our goal by investing before others do, and by realizing profits after the market has shifted to our variant perception. This is market timing. Outsmarting others, jumping in and out of assets and consistently generating positive returns is almost impossible. However, at least, we have established that holding gold is generally superior to holding paper money during times of inflation.

The third category of investments is productive assets such as farmland, real estate or companies. Those assets sound promising because they might be able to produce a return in excess of the inflation rate. A simple approach, for example, is to buy real estate, in the hope that rents adjust for inflation. Farmland, another classic example, might profit from higher soft commodity prices. While the economical logic might be sound, there is, however, a political dimension that we need to consider. In the past policymakers oftentimes limited profits for ‘capitalists’ and ‘speculators’ during times of high inflation and lowered the financial burden for the average masses. Stefan Zweig, in his book “The World of Yesterday”⁸ gives an account of what happened during Austria’s hyperinflation in the 1920s, when everybody flocked into real assets:

“The most grotesque imbalance developed in housing, where the government – to protect the tenant and to harm the houseowner – prohibited any increase in rent. Soon, the annual rent for a medium-sized apartment in Austria cost less than a single lunch. All of Austria actually lived for free for five [] years.”

*Stefan
Zweig*

In early 2012, Austria’s government intervened again. It introduced a capital gains tax of 25% on all real estate transactions; whereas before, owners of real estate pocketed tax-free capital gains within

⁸ Stefan Zweig, “The world of yesterday”, Bermann-Fischer Verlag, 1944

a time period of ten years. Real estate investors had to suddenly adjust their expectations and many of them found that their investment return expectations, adjusted for tax and inflation, turned negative.

The risk of intervention, excessive taxes and repression seems lower for corporations because it is in the government's interest to support companies in their efforts to create economic growth (and taxpaying jobs). The benevolence on the part of authorities applies to both entrepreneurs and business investors. Under this political consideration shares of companies are generally a better choice than housing or farmland.

Over the last 50 years US stocks in aggregate have produced a compounded annual growth rate of around 11 per cent before and 7 per cent after inflation (S&P 500, dividends included)⁹. However, during times of inflation, stocks seem to perform rather poorly. Investigators find consistent empirical results that common stocks on aggregate are a poor inflation hedges¹⁰. Frank Reilly¹¹, for example, showed that S&P 500 index average returns during periods of high inflation (1968-1981) produced almost zero real returns. He concluded that the main variable that is responsible for detrimental returns on equity in an inflationary environment is the profit margin. In addition to poor business performance investors pay lower multiples. With elevated inflation expectation, investors demand higher yields leading to lower multiples (unless market intervention artificially depresses yields).

As a consequence, we should *not* invest into the overall stock market, for example in the form of indices. Instead, we must find those firms that we can understand and that possess a specific ability to maintain or increase profits during times of inflation. Once we can estimate what an asset will produce over time we can then decide how much we want to pay for it in order to achieve our goal.

4. A RELIABLE FRAMEWORK TO SELECT THOSE SECURITIES THAT WILL ALLOW US TO REACH OUR GOAL

Most market participants use a mixture of fundamental-, macro- and technical analysis to derive at a buying (or selling) decision. Essentially, at that point, they believe tomorrow somebody else will pay more for the asset than they did. Whether this turns out to be true or not will consequently depend on tomorrow's buyer and his belief. (The less naïve approach is to apply second and third degree thinking, i.e. what does tomorrow's buyer think that the next day's buyer thinks and so on). For those buyers the decisive skills will depend on their ability to predict the change in public perception. The activity is largely depending on the correct timing, which makes this activity a speculation. It can be successful,

⁹ Robert Shiller and Yahoo! Finance http://www.moneychimp.com/features/market_cagr.htm

¹⁰ For example: Jahnke, William W. (1975). What's behind stock prices? *Financial Analysts Journal*, 31, 69-76; Jaffe, Jeffrey F., & Mandelker, Gershon (1976). The Fisher effect for risky assets: An empirical analysis. *Journal of Finance*, 31 (2 May), 447-458; Fama, Eugene F. (1981). Stock returns, real activity, inflation and money. *American Economic Review*, 71(4 September)

¹¹ Reilly, Frank "The Impact of Inflation on ROE, Growth and Stock Prices", *Financial Services Review*, 6(1):1-17 <http://www.scribd.com/doc/16546212/US-Historical-RoE>

if relevant factors such as fundamental factors, monetary policy, supply of the assets as well as behavioural aspects such as the second (and third) degree changes in demand are correctly foreseen – a difficult task.

Let's use some algebraic skills to illustrate this thinking. The owner of a stock does not receive the cash flows from a business; he or she receives a part of cash flows in form of dividends and profits from the appreciation in the share price. The market price is thus determined by

$$Price_0 = D_0 + \left(\frac{1}{1+r} \right) \times E(Price_1) \quad (1)$$

with

D_0 = Dividend in year 0

$E(Price_1)$ = Expectation of next year's price.

r = Discount rate.

A higher level of complexity is reached, when speculators try to estimate what the expectation of others might be with respect to the firm's fundamental development, i.e. future dividends. In this case the market price is found by

$$Price_0 = D_0 + \frac{1}{(1+r)} \times E \left[E(D_1) + \frac{E(D_2)}{(1+r)} + \frac{E(D_3)}{(1+r)^2} + \dots + \frac{E(D_n)}{(1+r)^n} \right], \quad (2)$$

with

$E(D_t)$ = Today's Expectation of Dividend in year t .

Market player using equation (1) tend to predict their returns from investing in equities by predicting future stock prices on the basis of their own expectations. Those using version (2) understand the implications of Keynes famous beauty contest¹² and factor in the expectation of others. To exemplify, think of what causes a bank run. It can be the realization that the bank will fail (1), or the indication that others will run (2).

In the long run and absent illiquidity issues, stock prices are linked to the performance of the underlying businesses. If the prevailing stock price is not warranted by underlying value, it will eventually fall. In the absence of a guidepost, participants are often disoriented and come up with esoteric *ersatz* (e.g. elaborate technical analysis, astrology, superstition).

¹² Keynes described this in Chapter 12 of "The General Theory of Employment, Interest and Money" when he talked about the famous beauty contest. In his case, the game was not trying to pick out the most beautiful woman among the group, but the woman who other people thought was the most beautiful.

Bring in value investors. Their reference point is the true economic value of the company. They buy if the current market price is sufficiently below the economic value. The relation between price and value is at the centre of their investment considerations. The economic value of a company is defined with

$$Value_0 = CF_0 + \frac{CF_1}{(1+r)} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_n}{(1+r)^n} \quad (3)$$

with

CF_t = Cash Flow in year t .

The economic value of a business is the present value of all future cash flows that can be taken out of the business discounted at the investor's discount rate¹³. The most important part of their activity is, therefore, estimating how much a company will earn and when. Specifically, value investors try to figure out the *true economic earnings* that, from time to time, can differ from accounting earnings. Once they have a solid understanding of the economics of a company, they choose a reasonable discount factor, reflecting their own risk propensity and bring back all prospective cash flows to get the present value. This process requires constant updating. As soon as the market price compared to the value offers a large enough *margin of safety*, value investors buy. This approach is suitable for our investment goal for three reasons.

First, during times of accelerated currency depreciation markets might be periodically in turmoil and produce huge price swings. By developing our own understanding of the economic power of a company we have a guidepost and become independent of market commentary, sales reports and individual opinions.

Second, we can separate the analysis and valuation of a business from the buying decision. We can get prepared by analysing many potential candidates and by pre-selecting a few great ones. Then, we wait until our favourites are being offered at low enough prices. Furthermore, we can incorporate higher inflation expectations into our framework by adjusting the discount factor r . Applying an increased cost of capital helps us to understand the value of the company in its realistic worst case. It assists us in finding a lower price, which leads to a lower risk and higher reward.

Third, if we do not believe that the current market price offers a sufficient return and we do not have alternative investment opportunities, we can wait and keep our funds in gold. This approach requires investors to be patient. Investors who recognise that central banks are an external market force, initiating artificial, or unsustainable, economic booms will be better suited for this strategy. For them the inevitable bust doesn't come as a surprise.

¹³Miller, M.H. and Modigliani, F. derived the free cash flow model in their irrelevance theorem.

5. MARGIN OF SAFETY

In the world of Benjamin Graham, the balance sheet can be used to calculate a liquidation value, which could result in a near term big cash flow. Here, the relation between price and the value is typically expressed in absolute terms. The mechanism is clear: (1) Determine a reliable value of the net assets and (2) buy if the market price is approximately 30 per cent below that value. Then (3) wait until the market reflects the intrinsic value again.

During inflation however, asset values aren't static anymore – they move as time goes by. Waiting can be a bad advice if the balance sheet consists of a lot of (net) cash. Furthermore, closing a 30 per cent discount produces a fantastic return, if it happens within a year (+43%) but not if it takes three years to close (+12.6%).

Probably for this reason Warrant Buffett moved away from Benjamin Graham's approach. He adopted Charlie Munger and Philip Fisher's concept to buy only those businesses that are expected to grow their earnings per share over the long-term. Once they were invested in those businesses their intrinsic value would grow over time, making waiting a lucrative pastime (provided earnings grew in real terms).

This strategy requires an alternative way to think about the margin of safety. The focus is not anymore on an absolute number. It now lies on the earnings stream of a company. If a firm will reliably produce (growing) earnings over time, we can then treat its stock like a bond and net income divided by the current market price of the stock represents the earnings yield.

To illustrate, let's look at Novo Nordisk, a Danish insulin company. It currently trades at a P/E ratio of 23, or in reverse, an earnings yield of 4.2 per cent ($1/23$, as of June 2012). Let's assume we have thoroughly analysed the business and its environment and we estimate that earnings per share will continue to increase over time even during inflation. The compounded annual growth rate over the past five years is 18 per cent. We don't know exactly by how much earnings per share will grow but at minimum, we believe, they will stay flat – even in a worst case.

Year	Earnings per Share (US\$)
2007	2.64
2008	2.94
2009	3.46
2010	4.46
2011	5.28
2012E	6.12
5 Yr CAGR	18.33%

Table 1. Novo Nordisk Earnings per Share,
Source: CapitalIQ

During the past 52 weeks the stock traded between \$85 and \$145. This corresponds with an earnings yield of between 4.2 per cent and 7.2 per cent. We can now compare the earnings yield with our minimum return requirements to derive the margin of safety. Our primary goal is a significant outperformance of the rate of inflation. If our long-term inflation rate expectation is 6-8 per cent, then we require a minimum pre-tax return of around 15 per cent to create a reasonable real return. For that reason, both minimum earnings yields observable over the last weeks weren't lucrative enough. Never mind, we can wait.

6. WHY CAN'T FIRMS SIMPLY PASS ALONG HIGHER PRICES TO THE CONSUMER?

“Obvious prospects for physical growth in a business do not translate into obvious profits for investors.”

Benjamin Graham

At first it seems intuitive that companies can simply pass along higher prices to the consumer. This would make equities ideal for inflation hedges. Let's take a simple example and follow the accounting arithmetic. Imagine a bakery firm that produces loaves of bread. The firm's revenues today are 100 loaves x \$1 each. Now, inflation kicks in and the general price level goes up by 25%.

Income Statement	Year 1	Option (1)	Option (2)
Units	100	95	105
x Price/Unit	1.0	1.25	1.20
= Sales	100	118.8	126.0
COGS	68	80.8	89.3
SGA	10	12.5	12.5
<u>Other</u>	<u>4</u>	<u>5.0</u>	<u>5.0</u>
EBIT	18	20.5	19.3
Interest	0.0	0.0	0.0
Tax (35%)	6.3	7.2	6.7
Net income	11.7	13.3	12.5

Table 2. Exemplary Income Statement

The baker's direct costs (COGS) are raw material, such as flour, sugar and spices. The majority of general costs (SGA) are rent and wages. Let's assume that all of those costs go up inline with inflation. The bakery company has two options: It can either raise prices in concert (1) or it can take a hit to profitability (2). If it elects option one, nearby bakeries that are increasing their prices more reluctantly, will take over some market share. Unless the firm has some kind of unique selling proposition, it won't get away with simply passing along higher input prices. In our example, physical output drops to 95. If the store elects option two, higher input costs will squeeze profitability but demand will remain strong. In our example the store does not fully pass on increased costs at prices of \$1.20 per loaf, but as a result sells 105 units. In both cases, management will be cheery since both managed to increase sales dramatically. But upon closer look, each of them failed to increase net income proportionately with inflation.

But that's not all. Because of higher bills from suppliers, the bakery has to pay more upfront. Sooner or later, any shop owner has to upgrade his machinery. Both options require the reinvestment

of earnings into the business. Particularly the owner who elected to increase the output (2) requires new investments in machinery to keep up with demand. And again, those machines will cost more than before. To finance those items, owner (1) reinvests half of net income and owner (2) needs to reinvest that plus 5.4. Issuing new shares will be a difficult task in an environment of lower margins. Moreover, existing shareholders will be diluted – the cake grows in size, but there will be more pieces. More debt, on the other hand, increases interested payments (and risk) and therefore lowers net income. It seems more likely, that in such an environment the only option will be to issue debt, probably at much higher rates than today. Either way, capital investments are required for increased working capital and for fixed assets upgrades. The new capital, however, does not produce magnificent returns. In both cases ROE does not come anywhere close to the inflation rate.

ASSETS	Year 1	Option (1)	Option (2)
Cash (4% of revenues)	6	7.1	7.6
AR (4% of revenues)	5	5.9	6.3
INV (3% of revenues)	3	3.6	3.8
LT tangibles	85	90.0	95.0
LT intangibles	15	15.0	15.0
Total Assets	<u>114</u>	<u>121.6</u>	<u>127.6</u>
LIABILITIES			
AP (4% of revenues)	4	4.8	5.0
Accrued Exp. (5% of revenues)	5	5.9	6.3
Debt	0	0.0	5.4
Equity	105	110.9	110.9
Total Liabilities	<u>114</u>	<u>121.6</u>	<u>127.6</u>
Working capital	5.0	5.9	6.3
ROE	11.1%	12.0%	10.6%
ROA	10.3%	11.0%	9.2%

Table 3. Exemplary Balance Sheet.

The reasons why businesses can't simply pass through higher prices to the consumer are:

- (1) Almost all businesses will either lose revenues if they raise their prices in concert with inflation, or they will have to reduce their profit margins if they try to boost demand.
- (2) Firms require more capital employed during inflation because working capital requirements will go up proportionately with inflation and, sooner or later, long-term assets need to be replaced or upgraded at higher cost.

As a result, the return on investment, which is the relevant yardstick for all investors, will most likely *not* go up inline with inflation for a normal firm. Only firms with pricing power will be able to adjust their prices upwards without losing sales. Those firms must have a sustainable competitive advantage.

7. THE DRIVERS OF RETURN ON EQUITY

To better understand which companies, despite the headwinds, might have the potential to perform well during inflation, let's look at return on equity. This ratio is the single most important indicator of a firm's performance since it provides an indication of how well management is employing the funds invested by the firm's shareholders to generate returns. A part of those returns is paid out as dividend and the rest is ploughed back into the firm, increasing its book value. That increase, relative to equity, is the sustainable growth rate at which a firm can grow absent any changes in profitability or financing. If that growth rate is below the inflation rate – tough luck for shareholders. Investors obviously prefer higher returns and therefore pay more for stocks of those companies that they believe will produce higher ROEs. Consequently those stocks trade at price-to-book ratios above one (and vice versa). But for prolonged periods of inflation, investors (including us) will require higher returns on investment. Unless, ROEs adjust upwards, this will drive down stock prices. While bond yields typically move with changing inflation expectations, this connection, unfortunately, does not seem to apply to ROEs and why should it? Historically, ROEs are very sticky during different economic environments. Over longer periods of time US companies generate average ROEs of around 12%.

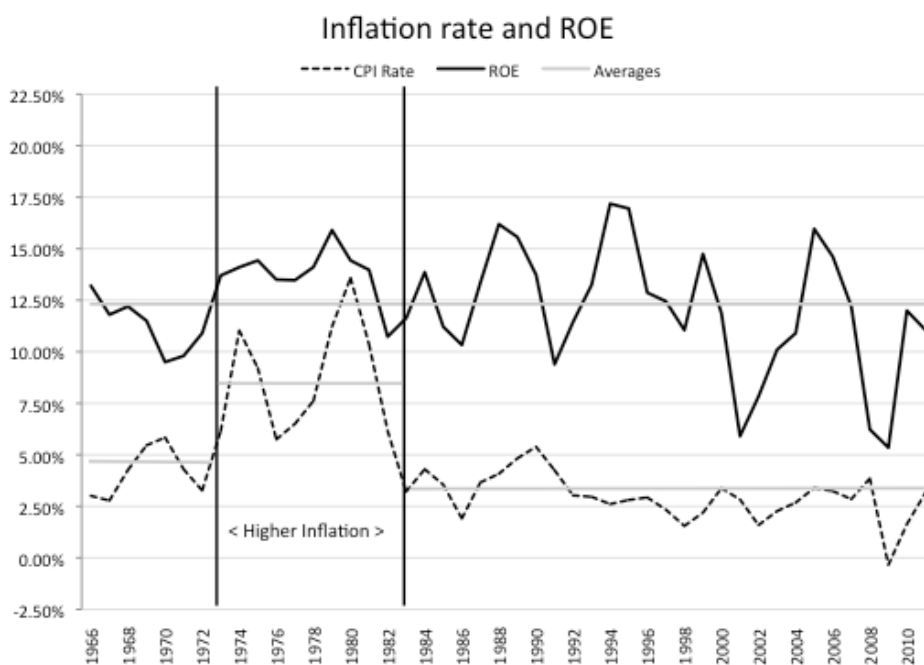


Figure 1. Time Series Plot of CPI Inflation and S&P 400: 1966-2011.

(Data prior 1977 taken from Fortune 500 industrial series, which is highly correlated with the S&P 400). Source: Standard & Poor's Compustat

Figure 1 shows the inflation rate versus the ROE of the S&P 400. Because ROE does increase somewhat during the inflation period 1972-1982, the distance between ROE and the inflation rate declined. Warren Buffett elaborated on this unfortunate fact in his paper “*How inflation swindles the equity investor*”. He pointed out that the sticky ROE combined with inflation and taxes will make it hard for equity investors to produce positive real returns. Buffett wrote the paper in 1977¹⁴ and presto, as the oracle forecasted, the annual inflation rate moved up and peaked three years later at 13.5%. Despite his sobering views on business performance during inflation, Buffett managed to substantially beat inflation during that period of time (Berkshires book value: ’78 +24%, ’79 +36%, ’80 +19%). Let’s use Buffet’s guideline, not to become pessimistic (we can’t do anything about the future) but rather to identify the necessary characteristics of great companies that might allow us to achieve our goal.

Return on equity is the ratio between net income and shareholder’s equity. We can decompose this equation using an alternative approach to distinguish between operating and financing components. We derive at:

$$ROE = \frac{Net\ Income}{Equity} = \underbrace{\frac{NOPAT}{Sales} \times \frac{Sales}{Net\ Assets}}_{Operating\ ROA} + \underbrace{Spread \times \frac{Net\ Debt}{Equity}}_{Financial\ Leverage\ Effect}, \quad (4)$$

where

$$NOPAT = Sales - Operating\ Expenses - Tax$$

$$Net\ Assets = Operating\ Working\ Capital + Net\ long-term\ Assets$$

$$Net\ Debt = Total\ interest\ bearing\ liabilities - Cash\ and\ marketable\ securities$$

$$Spread = Operating\ ROA - Net\ interest\ Expense\ after\ tax / Net\ Debt.$$

The first part, Operating return on assets (ROA), describes how profitably a company is able to employ its operating assets to generate operating profits. This yardstick evaluates the quality of the actual operating business and excludes effects from financing. For a firm that is entirely financed by equity (without excess cash) ROA would equal ROE. It can be calculated by multiplying (1) the operating profit margin, which is Net Income over Equity with (2) the asset turnover which is Sales / Net Assets.

¹⁴ Warren E. Buffett “How Inflation Swindles the Equity Investor”, Fortune, 1977

The second part, the financial leverage effect, explains the economic effect from adding debt to the capital structure. The spread (3) is the difference between how much the firm has to pay for debt versus how much it gets out by employing the capital in the business. As long as the operating return on assets is higher than the cost of borrowing, the effect is positive. The effect is magnified by the extent to which a firm leverages. Net financial leverage is defined with (4) Net Debt over Equity.

This alternative breakdown allows us to better understand how individual drivers are affected by inflation. Table 1 shows this break down for the S&P 500 for the time period 1993 – 2011.

Year	ROE	NOPAT Margin	Operating Asset Turnover	Operating ROA	Spread	Net Debt / Equity	Financial Leverage Gain
1993	10.0%	5.2%	1.19	6.2%	2.8%	1.4	3.8%
1994	15.9%	7.8%	1.18	9.3%	5.1%	1.3	6.6%
1995	15.6%	7.9%	1.13	8.9%	5.1%	1.3	6.7%
1996	16.9%	8.6%	1.10	9.4%	5.8%	1.3	7.5%
1997	16.5%	8.4%	1.06	8.9%	5.5%	1.4	7.6%
1998	16.9%	9.7%	0.94	9.1%	5.0%	1.5	7.7%
1999	17.3%	10.1%	0.90	9.1%	5.2%	1.6	8.2%
2000	15.7%	9.8%	0.92	9.0%	4.5%	1.5	6.7%
2001	7.3%	5.8%	0.86	5.0%	1.5%	1.5	2.3%
2002	5.2%	4.3%	0.78	3.4%	1.1%	1.7	1.8%
2003	13.7%	9.6%	0.76	7.3%	4.1%	1.5	6.4%
2004	14.2%	9.4%	0.95	9.0%	5.2%	1.0	5.2%
2005	16.0%	10.6%	0.94	10.0%	5.7%	1.0	6.0%
2006	17.0%	12.0%	0.85	10.2%	5.5%	1.2	6.8%
2007	13.3%	10.3%	0.75	7.7%	3.5%	1.6	5.5%
2008	4.6%	3.9%	1.10	4.3%	0.3%	1.1	0.3%
2009	10.8%	7.8%	0.98	7.6%	4.0%	0.8	3.2%
2010	13.9%	9.8%	0.98	9.6%	6.2%	0.7	4.3%
2011	14.7%	9.9%	1.10	10.9%	6.9%	0.6	3.8%
Average	13.4%	8.5%	0.97	8.2%	4.4%	1.3	5.3%

Table 4. S&P 500 time series plot of Alternative DuPont Decomposition. Data taken from Standard & Poor's Compustat and own calculations

(1) Wider net operating profit margins

Net operating profit margin can be defined and further decomposed to derive at

$$\text{Net Operating Profit Margin} = \frac{\text{NOPAT}}{\text{Sales}}.$$

A company can increase its margin by either higher per unit sales or lower per unit costs. Consequently, either sales = units x price (demand side barriers to entry) have to go up, or operating expenses (supply side barriers to entry) have to go down (or both). Let's forget about taxes for the moment. They won't go down with current sovereign debt ratios and fiscal deficits.

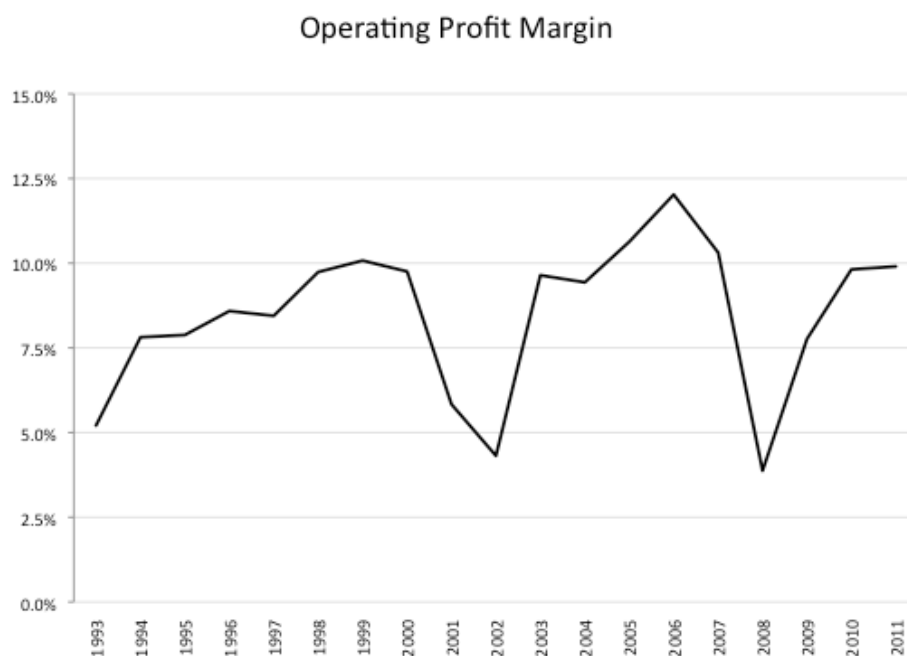


Figure 2. Time Series Plot of S&P 500 Operating Profit Margin: 1993-2011.

Source: Standard & Poor's Compustat

(a) Demand side barriers-to-entry

Raising prices for products is easier said than done. A company can only raise the prices of its goods or services if consumers are willing to pay more for it. The product or service must possess features that other competitors cannot replicate. This leads to customer captivity, acting as a barrier to entry. Higher prices result in higher profit margins and thus in higher ROA. The three characteristics we are looking for are

i. Buying habits

- ii. Switching costs
- iii. Search costs

(b) Supply side barriers-to-entry

All claims between the top and the bottom line of the income statement can theoretically be squeezed to reduce costs. Interest expense (or income) is not included here because it is part of leverage. Looking at the line items it is not hard to see why firms struggle to increase their profit margins during inflation.

Cost of sales	raw materials, energy, electricity, telephone, insurance, rent
SG&A:	wages, marketing, advertising, servicing
Other operating expenses:	R&D, provision for losses on credit sales, special charges
Tax	corporate tax

For most firms, all those items will likely go up in price, offsetting any unit price increase. Reducing costs during inflation will become even more difficult than it already is. Costs, by the way, are not the determining factor for pricing, despite a widespread belief. A firm's pricing power depends on its competitive situation and the strategic behaviour of its players. A firm that has a *sustainable* cost advantage compared to all other competitors might be able to increase the profit margin. The three cost related barriers to entry are

- i. Proprietary technology
- ii. Learning curve
- iii. Special access to resource / location

There is another source of supply side barrier-to-entry – scale. Economies of scale and the ability to reduce variable costs per unit are the most common source of competitive advantage because they allow firms to spread fixed costs over greater production volumes than all other sellers. But size alone does not count. Only size relative to others and size that results in measurable operational advantages does. There are two types economies of scale:

- i. Fixed cost spread
- ii. Network effects

(c) Governmental interferences

Finally, governments (of course) can interfere with competition. There are endless possibilities for regulators, tax and trade authorities to punish or protect industries and individual players. It is impossible to predict political decisions. However, we can analyse an individual company's risk to become a victim of potential interventions. Governments typically start their action if the industry in question has a large impact on a group of voters. This was shown in the example of housing in Austria; it can be seen with the ongoing "to-big-to-fail" argument in the case of banking and it can be seen in the solar industry. To avoid this political minefield investors can focus on companies that produce goods & services outside the radar of the government. Examples are frequently used/consumed products or very small priced items. Here is an incomplete list of potential sources of government influences:

- i. Regulation
- ii. Patents
- iii. Tariffs, quotas, price limits
- iv. Subsidies and taxes
- v. Purchase preferences

The key for a long-term investor, therefore, is to find firms that have barriers to entry, preferably a combination of demand *and* supply side. Only firms that have a sustainable competitive advantage can produce high returns on invested capital and only if those returns are above the firm's cost of capital, can the firm produce positive economic returns. This logic applies independently of a firm operates in periods of inflation, deflation or price stability.

(2) Increased turnover

Operating asset turnover describes how much sales a company can produce with its operating assets. It is defined with

$$\text{Operating Asset Turnover} = \frac{\text{Sales}}{\text{Net Operating Assets}}.$$

In general, firms with very high turnover should enjoy low profit margins, and vice versa. Think of a supermarket, for example. Firms like Safeway, Wal-Mart, Supervalu, and Walgreens have relatively high asset turnover (> 2.5) combined with low margins. Conversely, real estate and hotel companies, shopping malls, heavy construction, electric utilities, infrastructure, highway and rail tracks have relatively low sales / assets (< 0.3).

Net operating assets (or capital employed) are commonly represented as *fixed assets* plus *net working capital* minus *long-term operating liabilities*. As the business increases sales, a firm has to adjust its working capital requirements proportionately; independent on whether the growth came through more unit sales or through higher prices. A firm can only temporarily halt the increase through the negotiation of better terms – later payment in case of Payables and sooner collection in case of Receivables. That is a challenging task during inflation. Inventories are trickier: Over the long run inventories should follow the trend in sales. Over the short run, however, inventories can fluctuate because of short-term expectations, bottlenecks, etc. Moreover, the carrying value of inventories depends on the accounting method – LIFO, FIFO or average cost.

Consider our bakery that produces 100 loaves of bread in year 1, at a cost of \$1 each, and simply assume it sells 100 more at \$1.25 each in year 2. With LIFO, or last-in, first-out, the bakery accounts for inventories as though the last item purchased was the first to be used or sold. The older, cheaper inventory, therefore, is left over at the end of the accounting period. With rising input costs, LIFO serves to *decrease* the value of inventories on the balance sheet. The bakery would assign \$1.25 to COGS, thereby lowering net income, while the remaining \$1 loaves determine the value of inventory at the end of the period.

Conversely, with FIFO, or first-in, first-out, the bakery would assign the old loaves at \$1 to COGS and the more recent loaves at \$1.25 to the inventory. This accounting method *decreases* COGS and thereby increases earnings on the income statement. This will, therefore, lead to a higher balance sheet position and to higher profitability (on paper).

The average cost method does exactly what the name suggests. It takes the weighted average of all units available for sale and then uses that average cost to determine the value of COGS and ending inventory. For the bakery, COGS and the ending inventory would be valued at $((100 \times \$1) + (100 \times \$1.25)) / 200 = \$1.125$ per unit.

The cost of goods sold for any particular year equals the sum of beginning inventory, plus purchases, less ending inventory. Thus, with LIFO firms adjust their input cost calculations faster and can thereby lower reported earnings and tax bills¹⁵. However, IFRS does not permit LIFO. Most firms use average cost or FIFO calculation, albeit some use two different methods, one for their accounting books and one for their tax calculations¹⁶. The quicker the firm can sell the inventory, the less effect has the choice of the inventory accounting method. If you compare different companies just make sure that you compare apples with apples.

¹⁵ “A 2006 study found just 12% of publicly traded companies use LIFO. LIFO tends to lower a company's inventories and reduce its earnings, thus lowering its tax bill. But when a company stops using LIFO, it must pay taxes on its LIFO reserve--the amount by which using LIFO reduced its taxable income. Companies usually have four years to pay up; the Obama proposal would give them eight years.”; Source: <http://www.treasuryandrisk.com/2009/08/01/inventories-look-past-lifo>

¹⁶ <http://www.journalofaccountancy.com/issues/2009/jan/deathoflifo.htm>

Buffett on fixed assets: *“In the case of fixed assets, any rise in the inflation rate, assuming it affects all products equally, will initially have the effect of increasing turnover. That is true because sales will immediately reflect the new price level, while the fixed-asset account [at historical cost] will reflect the change only gradually, i.e., as existing assets are retired and replaced at the new prices. Obviously, the more slowly a company goes about this replacement process, the more the turnover ratio will rise. The action stops, however, when a replacement cycle is completed.”*

In summary, most firms will likely see some temporary turnover ratio improvements, because revenues should move up more swiftly with inflation, while asset values are not adjusted immediately for higher prices. The following firms will have an advantage during general price rises:

(a) ‘Asset-light’ companies

Firms, that already require only little capital, so called asset-light firms, will also need less capital reinvestment. The ratio to watch is operating ROA. The less tangible capital a business requires, the higher the chances that it can keep up with inflation. This is only true, as long as it has durable barriers-to-entry allowing it to raise prices inline with inflation. An instructive example is TripAdvisor, a web-based company that offers travel reviews. Net operating assets are almost negligible, with \$11 million operating working capital and \$14 million invested in net fixed assets, mainly in IT. With this ludicrous amount of \$25 million, the firm managed to produce operating earnings of \$288 million in 2011 – illustrating the power of network effects. However, the point here is that this firm will suffer much less during inflation. Working capital increase? Net fixed asset replacement? Irrelevant relative to revenues. As long as their exclusive attractiveness to users and customers remains unimpaired despite rising prices, they won’t care. The combination of durable barriers-to-entry and asset-light business models is what we should look out for.

(b) Companies with durable fixed assets

The opposite applies to fixed asset turnover. The longer a firm can delay replacement of fixed assets, the more it can increase the turnover ratio. The ideal timeframe is forever. Fixed assets with very long lives are typically infrastructure. Heathrow Express, for example, is the 15-minute rail link between London Heathrow’s airport and Paddington station. BAA and Railtrack built the track 14 years ago for roughly GBP 1 billion and since then maintenance costs were probably limited to some train upgrades and minor replacement work. The ticket price, however, has been increased threefold, way ahead of inflation and there is doubtless room for more upside, until the pain motivates commuters to look for alternative transport. The crucial element in this example is the pricing power

in combination with hard to replace and long-lived fixed assets. Companies with high proportion of tangible assets will rather be hurt by inflation because of the reinvestment requirements. This finding is contrary to common believe.

(c) Companies with negative working capital

A firm that has a dominant position over its suppliers can negotiate favourable payment terms, i.e. pay later and collect earlier. Wal-Mart, for example, has a negative net working capital (\$ -7.8 billion in 2011). If receivables, payables and inventory move proportionately with sales, then Wal-Mart will generate more excess cash from its business and the turnover ratio will increase and ROE improves.

(3) Cheaper leverage – spread

$$\text{Spread} = \text{Operating ROA} - \frac{\text{Net Interest Expense after Tax}}{\text{Net Debt}}$$

If businesses reduce their cost of capital by using cheaper leverage, they can increase their profitability. As long as operating ROA is higher than the cost of serving the debt, ROE improves. Figure 5 shows the spread for the S&P 500. It is at a record high at 6.9%. If a company chooses a capital structure with net debt/Equity of one, the ROE gain from leverage alone will be 6.9%.

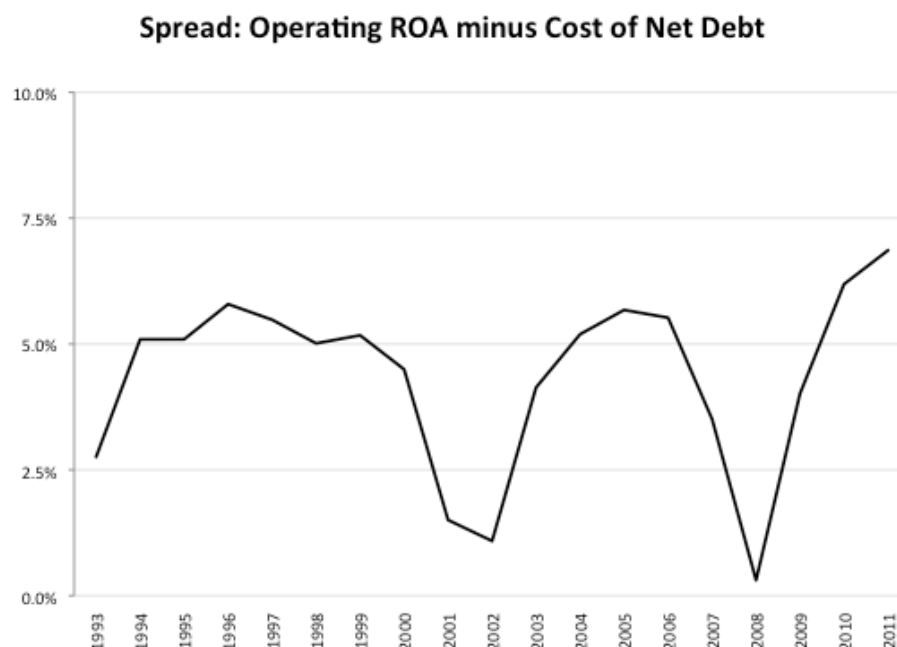


Figure 3. Time Series Plot of S&P 500 Spread: 1993-2011.

Source: Standard & Poor's Compustat

However, in our scenario borrowing costs will most definitely go up, and not down. Moreover, the current interest rate environment is already extremely low, making further reductions unlikely. It is highly probable that debt will be replaced at higher cost levels than the average cost of debt now on corporate books. On average, future levels of debt will have a slightly depressing effect on return on equity. Firms with (very) long maturities of outstanding debt at low fixed rates will benefit. Their relative advantage over other firms that did not take on cheap liquidity will last until the debt needs to be rolled over.

(4) More leverage

$$\text{Net financial Leverage} = \frac{\text{Net Debt}}{\text{Equity}}$$

During the inflationary periods in the 70ies, many companies mitigated the negative effects from inflation through increasing their leverage. Reilly¹⁷ shows that for the S&P 400 the ratio between total assets and equity increased in the period 1968-1981 from 1.8 to over 2.3. However, the positive effect was slightly offset by higher interest costs, typically for the higher inflation environment. The current situation for the S&P 500 is shown in **Figure 2**. Cash on the balance sheet is at record high (around 13% of total assets) and the level of net debt relative to equity is at record low (0.6x). Considering the lucrative spread between cost of debt and ROA, this situation seems strange. Why not increase leverage to push up ROE? Either, firms are unable to issue debt in the current environment, or companies are preparing themselves for tough times.

¹⁷ Reilly, Frank

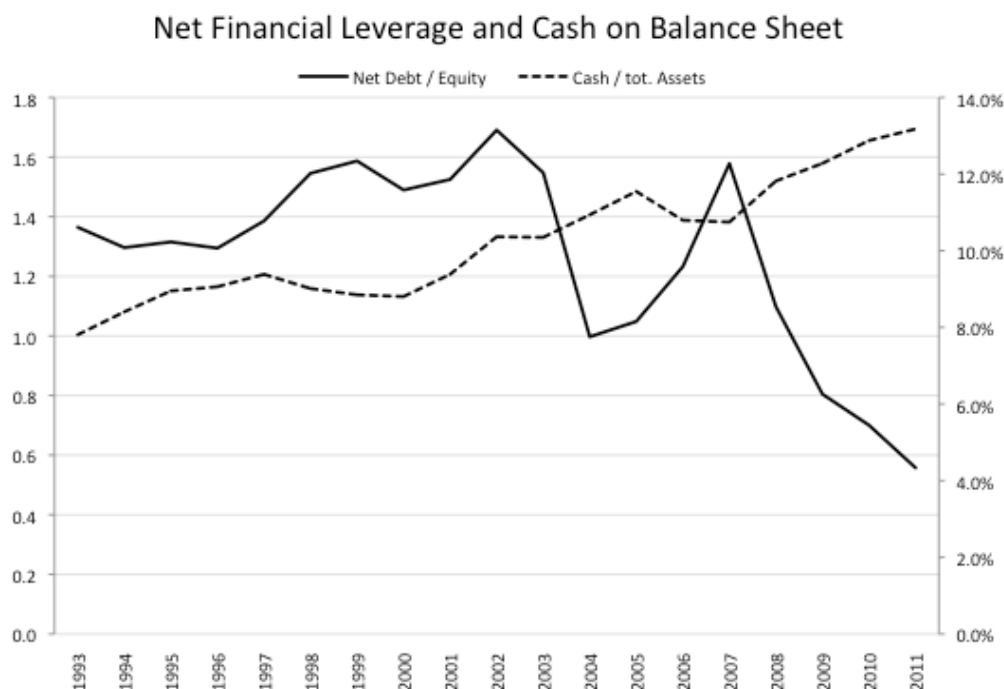


Figure 4. Time Series Plot of S&P 500 Net Financial Leverage (left axis) and Cash on Balance Sheet (right axis): 1993-2011. Source: Standard & Poor's Compustat

Leverage does not tell us anything about a business's ability to increase *operating* returns. The financing decision can be separated from the operating decision. Most great businesses, however, which are characterised by operating earnings power and durable barriers to entry, do not require a lot of capital. It is those companies that have low returns on invested capital that will require large injections.

The use of leverage can be lucrative strategy in acquiring assets during inflation. A simple advice is to take out a long-term fixed rate loan and invest the sums into something that goes up with inflation. In Germany in the 1920s, Hugo Stinnes followed this strategy very successfully by borrowing vast sums in Reichsmark, and repaying the loans later with nearly worthless currency. Admittedly, Stinnes also had access to hard currency, strengthening his financial liquidity during the hyperinflation. His strategy earned him the title of "Inflationskönig" (Inflation King).

8. HIDDEN OPTIONS

“Ideally, to protect against inflation, you want a royalty on someone else’s sales so you don’t have to invest any more capital—you license it to them and you make money as their volume grows...”
Warren E. Buffett

Some business models are disguised call options with the potential for extremely high margins. To recall, a financial call option is characterised by a non-linear payoff: the option buyer pays a fixed upfront premium and receives an upside participation on an underlying asset at expiry. This asymmetry is noteworthy, as it possesses the characteristics of what we are looking for: Fixed input costs and unlimited participation in rising prices. Unfortunately traditional financial options tend to be priced quite efficiently thanks to market makers. Also, the fixed expiration date requires that buyer be correct about both the underlying asset and the timeframe—making it difficult to succeed. Buying a call option on the Consumer Price Index, for example, would be a risky game since we don’t know when inflation will materialize. The theta (i.e. time-decay of the option) might hurt. Under these conditions any engagement would be a speculation.

However, if a company has revenues that are linked proportionately to someone else’s sales, while operational costs are fixed, then its earnings potential possesses the characteristic of an option. Furthermore, if we can reasonably assume that (someone else’s sales) will go up with inflation, the case becomes interesting. Such a company will expand its profits without the need of capital investment. Here are three categories of hidden options:

a) Mining royalty and metal streaming companies

Royalty companies provide financing for (precious) metal mining companies and in return obtain exposure to mine operations with the benefit of a set operating cost and no capex requirements. With precious metals the return in form of a volumetric production payment will most likely go up with general price inflation while the operating costs of the royalty firm are fixed.

Interestingly, we can replicate a simple royalty agreement by using option-pricing models. Each annual production payment represents a call option with a fixed maturity date and strike price. Some variability has to be included because we cannot precisely determine the production volume in advance—prudence is advisable in this business. But in general, this valuation approach captures the positive convexity effect, whereas traditional stock valuations do not. It is interesting to notice, that

market analysts use traditional methodologies, e.g. Net Asset Value (NAV) and Discounted Cash Flow (DCF) for royalty firms, totally missing the optionality.

b) Brokerage, Auctions

The Internet has created a range of new disrupting business models that fall into this segment. For those lucky start-ups that gained enough popularity quickly, network effects have built barriers to entry. The value of the service increases when others join, creating a reinforcing virtuous circle. Popular examples are eBay, Amazon, Facebook and TripAdvisor. A less known, but equally instructive example is Rightmove plc, UK's largest residential property portal. Estate agents, rental agents and home developers pay for the right to advertise their property. Contracts are a mix of monthly subscription fees plus a charge per property. Clearly, if the transaction volume of UK's housing market grows, Rightmove benefits. At the same time the online business model limits costs to salaries, IT and administration. The result: a staggering 150% ROA (2011). Whether the competitive position remains dominant going forward is a different question. The point here is that online brokerage models can produce an enormous upside during inflation. Other examples for hidden options are auction business models, such as the classic examples eBay, Christie's or Sotheby's.

c) Franchise

Franchise models are well known amongst fast food restaurants. Burger King and McDonald's, for example, typically charge a monthly royalty fee of approx. 5 per cent of gross sales plus another 4 per cent for advertising contribution from its restaurant operators. In a fully franchised model, input costs are primarily marketing and administrative costs. Wages, raw material, energy, rent and fixed asset upgrades, however, are largely imposed on the operators—a fantastic investment for times of inflation. Clearly, the whole value chain will perform only if it has barriers to entry.

In the fast-food restaurant industry, great businesses have brands that help customers to find reliable food in known quality. In addition, economies of scale will further strengthen the chain through cost advantages. If a company can combine these barriers with a franchise business model, investors should definitely take a close look. Here, the hidden option is created because the company's revenues will grow without the need for capital investments from the parent company. The substantial majority of the cash flows generated by the company over the long term can be returned to the shareholder through share buybacks or dividends.

9. CONCLUSION: WHAT IS AN APPROPRIATE STRATEGY TO ACHIEVE REAL INVESTMENT RESULTS DURING INFLATION?

“The underlying principles of sound investment should not alter from decade to decade, but the application of these principles must be adapted to significant changes in the financial mechanisms and climate.”

Benjamin Graham

To conclude, we have developed the following strategy to invest for inflation.

- (1) Higher inflation rates on a global scale are inevitable. That said, we don't know how (magnitude) and when (timing) inflationary consequences of the credit crisis and policy response will materialize.
- (2) Our primary investment goal is to sufficiently beat inflation over the long-term.
- (3) The best asset class to achieve our goal in is equities. However, the general stock market does not provide a reliable shelter against rising prices because the market's ROE is sticky. Only selected individual companies will consistently earn higher returns on equity.
- (4) The most suitable investing framework to deal with inflation and high volatility is the value-investing framework. Generally, separate the selection process from the buying decision. Short-list a selection of great businesses. Focus on a fundamental understanding of the business and estimate true economic earnings to derive at an intrinsic value. Buy, if the estimated earnings yield leaves a large enough margin of safety, considering future inflation rates. Be patient and stay in a stable currency (e.g. gold) if you don't find the earnings yield to be adequate.
- (5) There are only five ways to increase ROE: Higher operating profit margin, lower tax, higher operating asset turnover, higher spread and more leverage. Companies with the ability to increase the profit margin are the most prospective candidates for our selection of great businesses because their barriers to entry provide high durable ROEs, allowing us to stay invested over longer time periods (saving tax, trading costs and nerves). Indications for those companies are superior returns on operating capital compared to other players in the same industry over an extended period of time. Amongst great companies with barriers to entry, prefer
 - i. businesses that produce everyday goods & services or very small priced items. They are less likely to become a subject of governmental intervention.
 - ii. businesses with little tangible capital (no utility or energy firms) because asset light companies need less capital for upgrades and replacements. They will create higher ROA and are thus less hurt by inflation.

- iii. businesses with durable long-term fixed assets that are hard to replicate.
- iv. businesses with a disconnection between input prices and revenues. Firms with hidden options can widen their profit margins if revenues move up with inflation. Examples for payoff structures with positive convexity are royalty, brokerages, auctions and franchise business models.