A simple illustration of certain benefits of "short-selling"

Introduction

This note provides a simple description of short-selling practices together with an illustration of the potential benefits it can bring to investors.

What is short-selling?

Short-selling (in its "normal" form) is a financial transaction that consists in borrowing a tradable asset (e.g. a company stock) from a lender (e.g. a bank), selling it, and then re-buying the asset in order to return it to the lender. The steps involved in short-selling are described in the chart below.

Figure 1: Short-selling
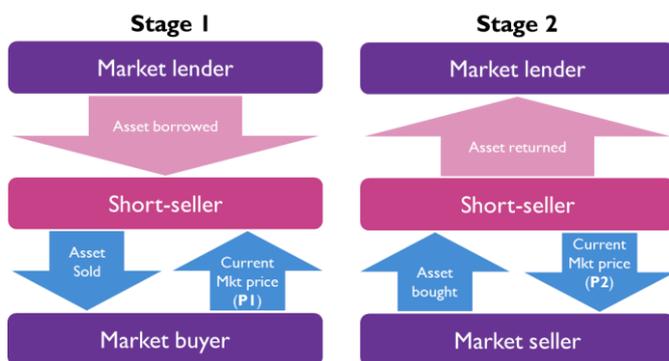
"Naked short-selling" is similar to short-selling in its formal form, with the only difference that the sale of the asset is done without first borrowing the asset.

Even though it may appear intricate and complex, short-selling serves a very simple purpose. In essence, short-selling (or "going short" as it is usually referred to in jargon) is specular to buying ("going long"). By "going long" an investor buys an asset at given price with the hope of being able to sell it later at a higher price. Conversely, by "going short" an investor sells an asset at a given price with the hope of being able to buy it later at a lower price (in the illustration of Figure 1, a short-seller would make a profit only if P2 is lower than P1).

Therefore, by going long or short investors express their expectations on the future price movement of an asset: they will buy an asset if they believe that its price will rise, and they will short an asset if they expect that its price will fall.

Public perception of short-selling

Short-selling is often depicted under a negative light. The most radical criticism of short-selling stems from the consideration that profiting from betting on a company's failure is ethically wrong. Others blame short-selling for exacerbating (if not causing altogether) market crashes. Finally, other criticisms are related to the possibility that, under certain market conditions, short-selling may destabilise market prices. For example during the 2008-09 financials crisis, short-selling was believed to be responsible for creating excessive downward pressure on financial stocks and, as a result, regulatory authorities in several countries (e.g. France, Germany, Italy, UK, and US) introduced temporary restrictions and bans on short-selling.

Notwithstanding the criticism above, others view short-selling as contributing to the effective functioning of markets and thus serving a socially beneficial purpose. First, short-selling facilitates exposing firms that engage in illegal practices (e.g. accounting fraud) and that are overvalued as a result. Second, by allowing investors who do not own an asset and have a bearish valuation of that asset the opportunity to trade that asset, short-selling increase both market liquidity and price discovery. Finally some academics have analysed empirically the impact of short-selling bans enforced during the 2008-09 financial crisis and concluded that these were either ineffective or harmful.[1]

Certain benefits of short-selling

In the discussion above we have illustrated the pros and cons of short-selling by considering its potential merit

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[1] Beber, A., and M. Pagano, (2013) "Short-Selling Bans Around the World: Evidence from the 2007–09 Crisis", *Journal of Finance, Vol. 68, Issue 1.*

and shortcomings in isolation. However short-selling might deliver significant benefits especially when it is carried out in the context of a wider investment strategy. More specifically short-selling can be used by investors as a mean to hedge an underlying investment in order to decrease risk-exposure. We illustrate this idea with a simple example.

The chart below depicts the evolution of the S&P500 from Jan 1990 until March 2017.

Figure 2: S&P500 (Jan-1990-Mar-2017)

Had an investor decided to invest in the S&P500 back in 1990, he would have made a hefty profit. The value of his investment would have experienced a more than a 5-fold increase (this corresponds to an annualised return of approximately 7.5 per cent). However, an investor would have also suffered significant losses during market downturns. In particular, the burst of the dot.com bubble in the early 2000's, and the financial crisis of 2008-09 would have wiped out approximately half of the investment's value.

The question we ask here is: is there an investment strategy that can be used to reduce the losses associated with these market troughs (albeit this would come the expenses of somewhat lower returns)? As we shall see below, short-selling an appropriately chosen asset can be used as an effective hedging strategy.

Figure 3 depicts the evolution (expressed in returns from Jan-1990) of the S&P500 and the NASDAQ. Whilst the S&P500 is based on the 500 largest US-based firms and is typically used as a default benchmark to represent a fully diversified portfolio, the NASDAQ is more heavily weighted towards technology-based companies.

Figure 3: Returns of the S&P500 and NASDAQ (Jan-1990-Mar-2017)

Form a visual comparison of the returns depicted in Figure 3 we can draw the following conclusions:

- The two indices tend to move in tandem, i.e. they are closely correlated. In fact, the correlation of the indices' prices is 0.97, and the correlation of their weekly returns 0.86.
- The NASDAQ has significantly outperformed the S&P500 over the time period considered.
- The NASDAQ is also significantly more volatile than the S&P500: its market peaks are higher, but its market crushes more pronounced.

The above considerations are numerically confirmed by the table below where we report the average weekly returns, the standard deviation (of the returns) and the equity betas (calculated against the S&P500) of the two quality indices.[2]

Table 1: Average return and standard deviation of the S&P500 and the NASDAQ (Jan-1990-Mar-2017)

	S&P500	NASDAQ
Av. weekly return	0.16%	0.23%
Standard deviation	0.023	0.030
Equity beta	1.00	1.15

If someone investing in the S&P500 is willing to give away some returns in order to decrease the overall risk exposure, he could do so by building a long-short portfolio where the majority of his money is used to take a long position in the S&P500, whilst a smaller portion is used to take a short position in the NASDAQ. In this context short-selling the NASDAQ would act as a hedge for the primary investment (i.e. the long position

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2   The equity beta measures the covariance of an asset's return with that of a benchmark. Since the benchmark chosen here is the S&P500, the beta of the S&P500 is one by definition. The fact that beta of the NASDAQ is higher

than one means that movements in the returns of the NASDAQ are, on average, more pronounced than those of the S&P500.

in the SP&500). Short-selling the NASDAQ would generate a loss over the entire investment period (this the "cost" of having the hedge), but it would also mitigate the losses associated with the market troughs of the S&P500.

The problem is then: how much money should be invested in the S&P500 and how much should be allocated to hedge the investment? Luckily there exist a well-established methodology that can help determining the allocation of funds between the primary investment and the hedge. This method is the optimal portfolio framework developed by Markowitz. The goal of Markowitz's optimal portfolio allocation problem consists in finding portfolio weights that minimise the overall portfolio variance, whilst guaranteeing that the portfolio's return equal a target return. If the weights are not constraint to take only positive values than Markowitz's approach allows for the construction of a long-short portfolio (a positive weight means a ling position, whilst a negative weight means a short position). We do apply Markowitz approach to construct four different portfolios (made up of the S&P500 and the NASDAQ) where the weights are calculated so at to determine the following weekly target returns (calculate don a historical basis): 0.16 per cent, 0.15 per cent, 0.14 percent, and 0.13 percent. The results are reported below.

Table 2: Portfolio weights

	S&P500 weight	NASDQ weight	Target return
Portfolio 1	1.00	0.00	0.16%
Portfolio 2	1.14	-0.14	0.15%
Portfolio 3	1.29	-0.29	0.14%
Portfolio 4	1.44	-0.44	0.13%

We can see that, in order to achieve an average weekly return of 0.16 percent (which is precisely the average return of the S&P500) an investor should allocate all his funds to a long position in the S&P500 (the weight for the NASDAQ for this target return is zero). However, for lower target return levels the optimal portfolios prescribe taking a short position in the NASDAQ (the NASDAQ weights are negative), and the lower the target return level, the larger the size of the short position relative to the long position (i.e. the absolute ratio of the NASDAQ weight relative to the S&P500 weight).

In order to illustrate what is the implication of having an un-hedged investment in the S&P500 as opposed to

investing in the S&P500 with different hedging ratios, we compare below the returns (starting from Jan-1990) of the S&P500 with those that would have been achieved with hedged portfolios two, three, and four.

Figure 4: Returns of the S&P500 and of hedged portfolios (Jan-1990-Mar-2017)
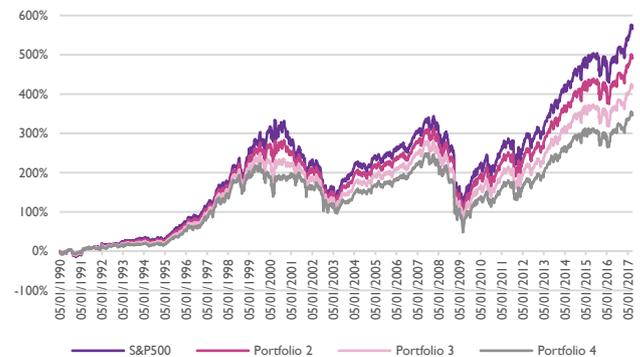
We can see from the figure above that that whilst hedged portfolios underperformed the S&P500 over the investment period considered, they also minimise the magnitude of the losses experienced during adverse market conditions (this is particularly true during the burst of the dot.com bubble).

Conclusions

Problems associated with short-selling are often addressed by considering this investment strategy in isolation. However, once short-selling is considered within the context of a broader investment strategy, its benefits become more apparent. We have illustrated here an example where Markowitz optimal portfolio theory would prescribe the use of short-selling as way to hedge a primary investment and minimise risk-exposure as a result.

If you have any questions about this topic please contact:

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