

ISSN 0956-8549-747

Curse of the Benchmarks

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LONDON SCHOOL OF ECONOMICS

PAUL WOOLLEY CENTRE
Article for general readership

FINANCIAL MARKETS GROUP
DISCUSSION PAPER No 747

March 2016

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CURSE OF THE BENCHMARKS

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ABSTRACT

Obsession with short-term performance against market cap benchmarks preordains the dysfunctionality of asset markets. The problems start when trustees hire fund managers to outperform benchmark indexes subject to limits on annual divergence. For multi-asset portfolios the benchmark is generally the performance of peer group funds, also based on market cap. In the absence of formal instructions, asset managers, as well as off-the-peg mutual funds, are still keen to demonstrate their ability against the competition in the short run.

If securities markets were efficiently priced in the sense of reflecting best estimates of fundamental value, there would be no problem in using market cap benchmarks. But the terms under which most professional investment is handled ensure that markets are not efficient. Benchmarking causes, first, the inversion of the relationship between risk and return so that high volatile securities and asset classes offer lower returns than low volatile ones. Second, it fosters the pursuit of momentum strategies which then earn profits at the expense of benchmarked funds. The paper explains how these problems arise using rational models of asset mispricing and proposes an incentive-based solution.

Empirical evidence does not bear out the predictions of standard theory that high risk assets should deliver higher returns than low risk assets. The risk that matters is the variability of price that cannot be diversified away which is its variability in relation to the market as a whole.

The Capital Asset Pricing model predicts that the required rate of return, and therefore an asset's price, will be directly proportional to its market-related risk, or "beta".

Empirical studies from as far back as the early 1970s have shown either that there is no observable link between beta and return, or that the correlation is inverse (figure 1). Based on studies of US stocks over 70 years and international stocks over 23 years, Frazzini and Pedersen (2012) reports the relationship between beta and return to be flat, and that between beta and alpha as negative. They find similar inversion in other asset classes, such as US Treasuries and corporate bonds.

Figure 1: Beta Anomaly

US Equities, 1970-2011			
%	Return	Risk	Risk-adjusted return
Low beta	10.6	12.5	0.85
High beta	7.2	24.5	0.29

Global Equities, 1984-2011			
%	Return	Risk	Risk-adjusted return
Low beta	10.1	11.9	0.85
High beta	4.1	24.6	0.16

Source: GMO White paper Nov 2011

A second challenge to the theory of efficient markets is the presence of momentum in security prices, defined as the positive serial correlation of price changes. If prices were informationally efficient in reflecting the consensus estimates of future cash flows, they would move randomly in response to the random flow of price-sensitive information. Momentum within equity and bond markets and among asset classes has been extensively documented over the past 30 years, as in Asness et al (2013).

RISK-RETURN INVERSION

Anomalies on this scale cannot be explained as exceptional outcomes in otherwise efficient markets and call for a theory framework that explains mispricing as the natural state. In this spirit, Buffa, Vayanos and Woolley (2014) develops an analytical framework showing how risk inversion is the inevitable consequence of benchmarking. The analysis builds upon an earlier paper showing that asset prices are determined not only by cash flows, but also by flows of funds among market participants (Vayanos and Woolley, 2013). The new paper shows that when investors use a measure of relative performance that reflects their collective actions, such as market cap-based indices or peer group performance, incentives and valuations become distorted.

FUND MANAGEMENT CONTRACTS

Fund management these days is mostly conducted by professional managers (agents) acting for asset owners (principals). Delegation creates asymmetric information: agents have better information and different objectives compared with principals, and principals are uncertain of the competence and diligence of agents. The appointment contracts drawn up between the two parties are typically designed to minimize these agency frictions and at the same time provide appropriate incentives to the manager. In practice, neither side may think of the process in these precise terms and are simply following convention, but this is what is happening.

The seemingly obvious solution is to benchmark the portfolio to an appropriate market cap index, including constraints on the margin by which annual returns may diverge from index returns. A typical instruction would be for the manager to aim for rolling returns three percentage points over benchmark returns, subject to an annual tracking error (standard deviation) of, say, plus and minus six percentage points. This limits the potential damage done by an incompetent manager taking excessive risk. It also has the advantage of comparing the return of the fund with the default option of passive investment in the index. For the fund manager, it provides a well-defined objective and a clear basis for measuring his contribution and

determining any performance-related fee. It has every appearance of being an optimal contract that strikes a mutually acceptable balance between the risk and return objectives of both sides.

To comply with tracking constraints, a manager must control how far the composition of the portfolio departs from that of the index. He has to be most vigilant of underweight positions in securities with large weights in the index, especially those with volatile and rising prices. If a security doubles in price and the investor is half-weight, the mismatch doubles; if he is double-weighted and the price halves, the mismatch halves also. Underweight positions in large, risky securities therefore have the greatest potential to cause the manager grief.

The effect is strongest when an industry sector or entire asset class is involved, such as the Tech bubble of 1999/2000, the commodities boom in the mid-2000s and the Japanese equities bubble of the late 1980s.

RISK/RETURN INVERSION

BVW (2014) provides a framework for studying how investment contracts interact with asset prices. Rather than taking the two stages separately and specifying the contract exogenously, this is handled as a joint determination of fund manager contracts, including fee structure, and the formation of equilibrium market prices. Prices find their level given the contracts and contracts are optimal given prices.

The model, which comprises asset owners, managers, and multiple securities, traces in detail how benchmarking pressures distort prices. A positive earnings shock for a security or sector causes prices to rise to a new and higher valuation level. Managers who were underweight to start with now find their mismatch has increased and need to make additional purchases to satisfy their tracking constraint. This describes the plight of value managers forced to buy bubble stocks they know to be over-priced.

There is no corresponding pressure on managers with overweight positions because they have gained a contribution to their target return and are unlikely to have breached the tracking error on the upside. The initial price

rise to the new valuation level is thus amplified, making these stocks both more expensive and more volatile. There is an opposing force upon stocks suffering negative shocks but the effect is stronger for stocks that increase in price because they account for a larger fraction of market movements.

This is all captured in the general equilibrium framework of the model which shows the amplification effects on valuation and volatility. The result is that high beta and high volatile securities become significantly over-priced whereas low beta and low volatile stocks become under-priced. The first effect is stronger than the second, implying that the overall market becomes permanently over-valued and prone to sector bubbles.

RELATING THEORY TO PRACTICE

The bulk of investment, whether professional or personal, is based on index benchmarks. An alternative is to have performance benchmarked to peer-group funds but these too reflect market cap values and generate similar outcomes. Even where no benchmark is specified, the manager will often protect his commercial risk by tracking competitors' returns.

Calibration of the model shows that the effects of benchmarking can be powerful enough to cause inversion of risk and return on the scale observed in empirical studies. Specifically, the predictions are in line with the empirical observation of an inverse relationship between a security's return and its total volatility (i.e., market-related plus idiosyncratic risk), as well as between its beta (market-related risk) and return.

The model shows that when agency frictions increase and managers are accorded less freedom, benchmarking results in an even steeper inversion and a greater propensity for bubbles. There is no clearer demonstration of how asset owners' attempts to reduce their private risks exacerbate the riskiness of the overall market.

One might imagine that there would be plenty of investors eager to exploit the higher returns offered by low risk securities and that their buying would go some way to correcting the distortion. After all, the advantages of "betting against beta" have been well-documented over the years. But

unbenchmarkd funds are equally attracted by the short-term opportunities offered by the amplification effects created by benchmarked funds. This is where the second part of the analysis comes in.

MOMENTUM INVESTING

Investors have the choice of two basic strategies: Value which uses estimates of fundamental worth, and Momentum which takes account of fund flows moving across assets. Value is based on cash flows and ignores fund flows, while momentum follows fund flows and ignores cash flows. The challenge is to understand how momentum investing can thrive when value investors stand ready to exploit mispricing. VW (2013) explains this by recognizing that asset owners mostly delegate investment responsibility to fund managers raising the problem of asymmetric information.

Asset owners have to learn about the ability of managers from the accumulating evidence on performance. They eventually withdraw funds from underperforming managers causing them to sell shares that have mostly done badly, thereby amplifying the price declines. Outperforming managers receive inflows and increase their holdings of assets that have been doing well. Fund flows and price adjustments take place gradually and in a manner consistent with momentum.

The model is conducted in a formal framework in which principals and agents act rationally and optimally in light of available information. A novel aspect is that prices do not adjust immediately or fully to expected future flows since new circumstances may arise in the interim that nullify their impact. Buyers may choose to buy fairly cheaply now rather than wait for the possibility of buying the assets very cheaply in the future. They are taking a "bird-in-the-hand" rather than waiting for "two in the bush". Their actions damp the price fall but extend the duration of the decline, causing prices to exhibit momentum. Similarly in rising markets investors choose between a small profit now or the chance of a greater one later.

Once momentum enters the pricing system investors have the choice of two strategies. They can follow fund flows and pursue momentum

strategies, hoping to sell before reversal sets in. Alternatively they can take advantage of mispricing created by over-shooting and adopt value strategies. Momentum is a short-term approach because trends are typically short-lived and pay-offs established quickly. Value calls for patience while waiting for prices to revert to fair value.

The leading question is who momentum investors sell to when they take their bird-in-the-hand profit. By definition, prices will have been rising before momentum investors move in and it will take a further rise to establish a profit. Some new momentum investors may still come in at this late stage, but investors looking for value will have lost interest long ago. ***The buyers of momentum investors' cast-offs are likely to be value managers complying with the constraints of index benchmarks and tight tracking.***

MOMENTUM GAMES BENCHMARKERS

Momentum investors are attracted to volatile assets with rising prices in large, liquid markets. This is also the description of the assets benchmarked investors are obliged to buy in response to rising prices, regardless of value and however high they go. Unconstrained momentum investors are free to select the timing of their trades whereas benchmarked funds are captive buyers of securities with rising prices. Momentum traders can exploit this predictability.

The implication is that benchmarking to market cap both fosters momentum and is gamed by it. Earlier it was shown that benchmarking leads to the inversion of the relationship between risk and return as well as to the over-valuation of the entire market. Momentum investors compound the buying and selling pressure and amplify the distortions caused by benchmarkers.

The mechanism is seen most clearly in equity markets where momentum investing has been especially successful. Academic and practitioner research has repeatedly confirmed not only the presence of serial correlation in equity prices, but that it obeys a surprising regularity. So much so that studies are able to describe the optimal

lookback (the period of rising price before purchase) and holding period. Optimal periodicities for both lookback and holding periods are found to be quite stable at 6-8 months over many decades and in most national markets. Momentum traders have been able to make good profits by keeping to fixed periodicities despite this practice being well-known and widely used. No one has been clear who is stuck on the losing side of the trades.

The explanation suggested by the model points to benchmarked funds as the gullible party. Managers have to demonstrate compliance with tracking error constraints within the annual client reporting cycle. This leads them to rebalance portfolios following strong performance by stocks under-represented there and to do this in time for the annual reports to clients. Momentum traders know that they can enjoy the early stage of the price rises and rely on benchmarkers coming in as buyers at the late stage. Benchmarked funds are the sacrificial counterparties and without them momentum traders would struggle to make a living.

Momentum is also present in the price performance of entire asset classes but without the same regularity. Trending is still a powerful force but the durations vary, so that optimal periodicities cannot be established with the same confidence. Nevertheless, momentum investors can still rely on benchmarked funds as late stage buyers and can exploit this competitive advantage without being able to milk the relationship so consistently.

The exploitation of benchmarked funds appears to be stepping up to a new level of sophistication. Investing on the basis of computer-driven models has been around for several decades but, until recently, most advances in algorithmic trading have been deployed in intra-day high frequency trading. Now these techniques, including artificial intelligence, are being harnessed to search more widely for opportunities to game the trades of traditional players. These models are predatory, searching markets for predictable and therefore exploitable behaviour, and benchmarked funds, and the second-round responses they promote, are a massive and obvious target.

INVESTMENT IMPLICATIONS

Short-termism in financial markets has been a periodic worry of policymakers usually surfacing in the wake of a crisis. Successive studies have failed to provide a convincing analysis of the phenomenon because they have been lacking both a theory framework and an operational definition of short-termism. The models described here help to identify the problem and its solution.

Momentum and benchmarking share the defining feature of being influenced by fund flows rather than cash flows. For momentum investors the motive is short term gain; for benchmarkers it is avoidance of short term underperformance against the benchmark. Both focus on current price and valuation to the exclusion of what ultimately matters to long term investors, which is the future stream of earnings and dividends. Benchmarking and momentum are the embodiment of short termism and the analysis in the previous sections is all about short termism, its origins and impact on prices.

The charge sheet against benchmarking and momentum, is a long one. Together they cause mispricing across the spectrum of asset markets, notably the inversion of risk and return, bubbles and crashes, and secular over-valuation. They lead to the misallocation of capital at the micro level, and crises and contraction in the macro-economy. The implication is that much of the activity in asset management and security markets is not merely superfluous but wealth-destroying. ***This is not surprising given that the majority of trades bear no relation to fundamental worth and are focussed instead on window-dressing and gaming.*** The remedy lies in changing incentives, not in a barrage of regulation, and starts with an understanding of the strategy options facing investors.

STRATEGY OPTIONS FOR INVESTORS

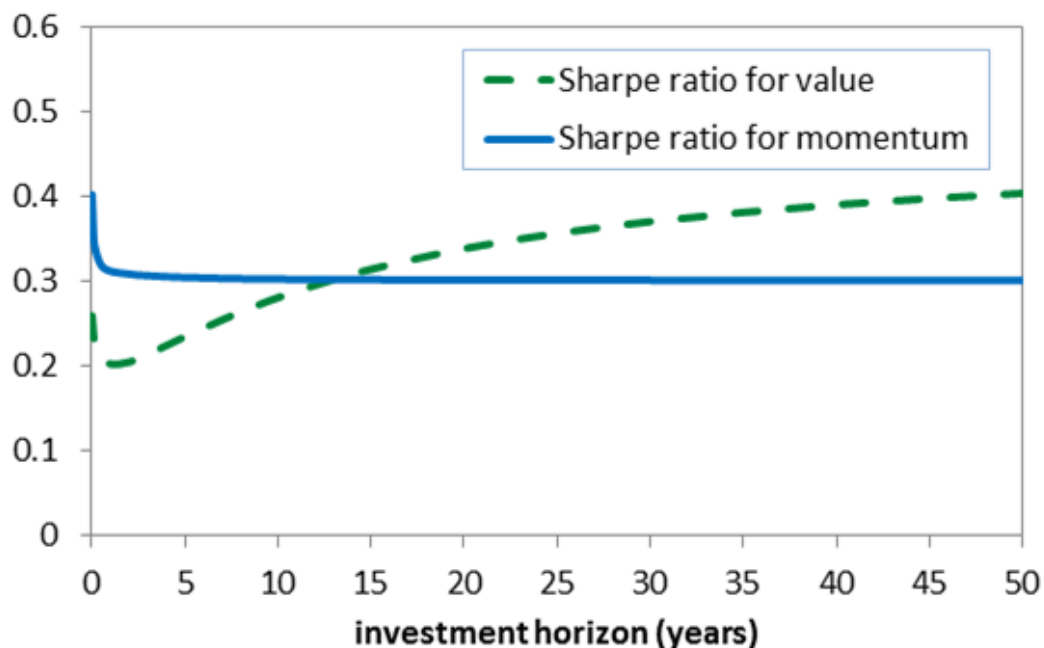
A valuable spin-off from developing a rational framework to explain asset mispricing is that it can be used to show the strategy choices available to investors in mispriced markets. The models can be calibrated to show the a

priori risk-adjusted returns to different combinations and implementations of momentum and value over any horizon, with or without tracking constraints. The key comparisons are between value, benchmarked value and momentum.

VALUE AND MOMENTUM

The central prediction is that momentum delivers higher risk-adjusted returns than value in the short-term but that value dominates momentum in the long-term (VW, 2013). The model shows value investors trading securities based on an objective measure of fundamental value and benefiting from the oscillation of prices around fair value, or mean reversion. If trades deliver initial losses instead of gains, holdings are retained or even augmented if still good value. Mean reversion confers on value its main advantage that long run risk is less than the sum of the short run risks. Returns to momentum in the model, as in empirical studies, are based on investors buying and selling on a fixed cycle of lookback and holding period regardless of fundamental value. This makes momentum a succession of independent bets so that long run risk is equal to the sum of the short run risks (figure 2).

Figure 2



Several qualifications to this prediction work in value's favour. First, the distribution of outcomes for value is narrower than that for momentum because they depend on expectations of future cash flows which generally cluster around the consensus view. For example, a basic valuation model such as price-to-book gives results not greatly different from more complex valuation models. On the other hand, returns to momentum vary widely because the outcomes are sensitive to whether investors sell before or after the trend reverses. Theory, as in empirical studies, compares returns from the best outcomes only, thus flattering the performance of momentum.

Second, the success of momentum depends on the optimal periodicity of cycles of price around fair value remaining stable, while there is no equivalent requirement for the success of value. Returns to momentum are consequently more data-mined than those for value. Third, momentum investors, by definition, buy late and miss the initial gains whereas value investors face no comparable handicap. Finally, theory and empirical studies generally exclude transactions costs. Trend following is a high turnover strategy and involves buying into rising markets whereas value strategies are generally countercyclical.

MOMENTUM v BENCHMARKED VALUE

The practice of benchmarking, amplified by momentum, drives high risk stocks up and their future returns down, while low risk stocks are pushed down and their prospective returns up. Benchmarks based on market cap will therefore be skewed towards high risk, low return securities. Similarly, global benchmarks will have an over-allocation to high risk, low return markets.

Benchmarked managers must rebalance portfolio weights in line with the rotation of over-priced sectors, which implies buying high and selling low each time. Value funds benchmarked to any index, including specialist sub-indices, will be a mix of carefully selected cheap stocks combined with a bunch of dear stocks bought to comply with the tracking constraint. With

this drag on performance it is not surprising that trustees and asset owners complain about the inability of managers to beat their benchmark.

Here is where the comparison with momentum is important. Benchmarked value funds will be buying over-priced securities pushed higher by momentum investors. ***Benchmarked funds lose out to momentum investors over all but the shortest horizons.***

VALUE DOMINATES OTHER STYLES

The conclusion, qualified by practical considerations, is that value beats both momentum and benchmarked value for medium and long term horizons. Only for short horizons, equivalent to the formation period of the average bubble, do momentum and benchmarked funds stand a chance of outperforming value, depending on the state of market valuations at inception. With the passage of time, the ranking puts value clearly in the lead. While there is abundant empirical evidence supporting these conclusions for equity-only portfolios, nothing seems available on the returns to value applied as the core strategy for multi-asset portfolios. Few funds adopt it and correspondingly few managers offer it.

TRUSTEES ARE AGENTS TOO

The standard view is that *homo economicus* will always find the best and cheapest way of fulfilling his needs which for the vast majority of investors should mean investing on the basis of value. Trustees are not taking the course that yields the best returns for two reasons. First, they fall victim to a general failure to understand where finance goes wrong and, second, they have conflicting incentives in their role as agents to the ultimate asset owners.

Regarding the second, trustees act as agents to the ultimate asset owners who are private investors, pension fund members and taxpayers. Just as trustees are uncertain of the competence of the fund managers they appoint, so asset owners need assurance of the ability of trustees. They judge this from the accumulating evidence on fund returns

with emphasis on the latest results. For their part trustees take to heart Keynes' aphorism that “worldly wisdom teaches that it is better for reputation to fail conventionally than to succeed unconventionally” and stick to what they have been taught to do.

Disappointing performance from the conventional model of investing has spurred some trustees to follow the early example of private investors and US college endowment funds in hiring hedge funds. Hedge funds have the return on cash or T Bills as benchmark, which is one step in the right direction. The corollary of giving a cash benchmark is that other controls need to be in place to handle the problem of elevated agency friction. This has not been done and hedge funds operate mostly under a cloak of opacity and seek quick returns using momentum. ***The irony is that trustees have been appointing one set of managers to exploit another set also in their pay.***

CONTRACT TERMS FOR VALUE

Benchmarking to market cap distorts incentives, prices and returns across all securities markets. In dealing tidily with the private matter of agency friction, asset owners have unwittingly created a far greater problem for themselves and for the economy at large. The solution depends on a radical revision of the contracts trustees write with fund managers with particular regard to strategies, incentives and monitoring. There is a private benefit – even an early mover advantage - for every fund that changes to a value strategy and the public interest is advanced by every fund that makes the change. Once adopted, funds have nothing to gain and everything to lose by capitulating.

The ultimate objective of trustees should be to have their entire fund invested on the basis of fundamental value for both asset allocation and security selection. However it is best to phase the changes over several years to avoid the transition being associated with a single stage in the cycle of market distortions.

There are various ways of implementing value and managers should disclose their methodology at the outset and in regular reviews. Some will

choose to confine themselves to marketable securities, others will also invest in infrastructure projects and there will be different degrees of involvement in corporate decision-making. Level of turnover (the lower of sales and purchases) is an unambiguous indicator of style, with high turnover for momentum and low for value. A set of diagnostic tests should be used to examine trading patterns, in particular, whether purchases generally take place with rising prices (momentum) or falling prices (value)

Manager skills are best measured by comparing performance against the results of other managers committed to the value style. Over the longer term and therefore covering one or more valuation cycles, this would provide a convincing demonstration of ability and in the shorter term would help to explain underperformance against market indices when bubbles are forming. Periodic underperformance against the universe of non-value managers would be a positive sign that the fund was being run in the manner intended. Work needs to be done by the consulting community to start gathering the relevant data for peer comparisons. Performance fees should only be paid on the basis of long-term results..

Passive investment currently accounts for some 30% of equity investment by institutional funds, boosted by the rapid expansion of Exchange Traded Funds (ETFs) By going passive, trustees lock their funds into the distortions of the moment and go on to suffer a continuing bias to high risk, low return securities. Collectively, they are endorsing the misvaluations created by the 70% of active funds.

CATALYST FOR CHANGE

The *status quo* is maintained by the asset management industry which benefits from volatility and inefficient pricing, by trustees who should take a stand but understandably don't and governments who are happy to see a large and flourishing investment industry for the foreign exchange earnings and taxes it brings in. Above all the present system has been bolstered by the academic theory of efficient markets. The victims are the economy and the ultimate asset owners who are dispersed, unaware of what is being perpetrated against them and powerless. Capitalism is in danger of dying

by its own sword unless the present absurdities are recognized and addressed.

The most likely catalyst would be a multinational agency such as the Bank of International Settlements or the EU Commission rising to the challenge of promulgating a code of best practice for trustees and investors. The code would recommend contract terms and need have no more than advisory status at the outset, although it is likely to become fiduciary duty to observe the code. Once a few leading funds acknowledge the need for change and begin adopting the new contracts, the trickle would soon turn into a flood, reinforced by emerging performance data. Market returns would be higher and more stable, regulation could be lighter and the size and cost burden of the asset management industry would shrink. If a final sanction was needed to encourage the stragglers, the tax concessions could be withdrawn from pension and charitable funds showing high turnover and therefore deemed to be trading rather than investing.

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