

Macro regimes shifts and the evolution of multi-factor methodologies

NOVEMBER 2024

Multi-factor portfolio construction has faced structural headwinds

Multi-factor portfolio construction has had to contend with a double whammy of structural headwinds. The first relates to the extent to which factor return characteristics have been impacted by changes to both the market structure and economic regime backdrop over the last 40+ years. This has exposed portfolio construction and analysis to significant anchoring bias risk. The second headwind is a function of the compounding impact that the incorporation of substantial unintended exposures embedded in typical factor methodologies has injected into multi-factor portfolios.

We examine how these headwinds have resulted in the evolution in multi-factor construction methodology and the importance of utilizing 'Pure' factor rather than traditional factor calculation.

Are Factor Return characteristics immune to macro regime change and subject to anchoring bias?

The original Fama 3-factor analysis utilised market data prior to 1992. The 5-factor analysis looked at data prior to 2014. The core premise of factor analysis is that over time factor premia (excess risk adjusted returns) are persistent and relatively indifferent to any given macro backdrop.

However, historical data indicates that factor returns are not persistent and have been impacted by changes to the economic and market paradigm and therefore this can inject anchoring risk into the modelling utilised to construct multi-factor strategies.

We can observe in Exhibit 1 on the next page that there has been a significant dislocation in factor return characteristics for US Large Caps in this century.

Research > Factors

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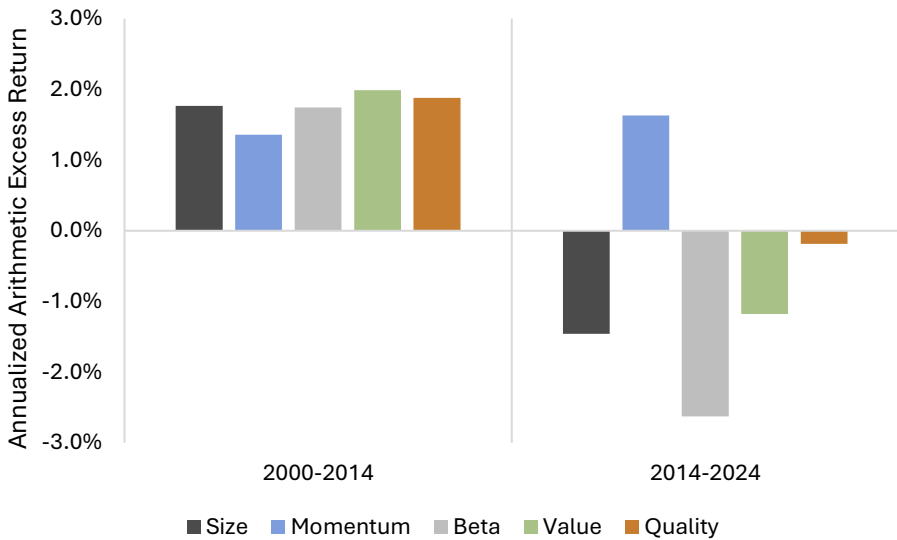
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A difficult 10 years for factor investors

Four perspectives on economic regime shift

Over the period Jan 2000 – Dec 2014 all five factors delivered positive return premiums (reinforcing the academic analysis and contention). However, over the last ten years only one factor – Momentum has delivered positive annualized returns. In this regard we have witnessed a significant regime change in factor characteristics. Is this correlated to simultaneous changes in the economic regime backdrop?

Exhibit 1: A regime shift in factor returns this century¹



Source: Wilshire Indexes. Data December 31, 1999, to September 30, 2024.

Mapping key regime changes over the last 40+ years

The last 40 years have seen substantial changes to the economic regime backdrop...

The charts in exhibit 2 illustrate the significant changes in economic growth, volatility and financial conditions witnessed over the last 40+ years. They pose questions over what is seen as normal and what degree of anchoring and mean reversion assumptions are reflected in modelling.

First, in terms of the trajectory of economic growth levels there have been 4 distinct economic regimes over the last 60 years mapped via the prism of nominal GDP growth (see chart 1 on the next page). These regimes were Stagflation, Great Moderation, Goldilocks and Secular Stagnation. These nominal GDP growth rate changes reflect changes to the growth and inflation rate environment (see chart 2).

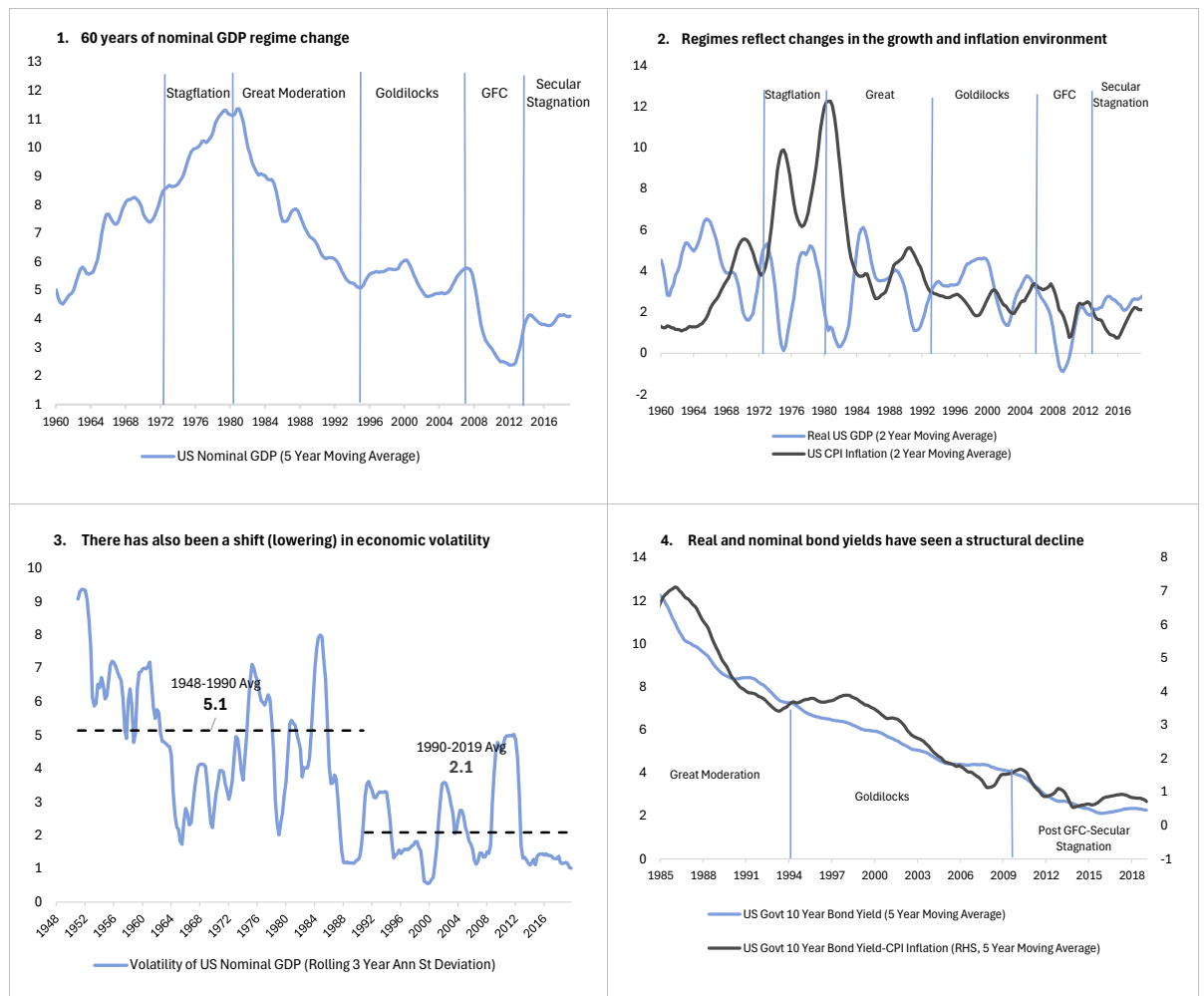
¹ Factors defined in Appendix A. Annualized Arithmetic Excess Return based on Fama-McBeth cross-sectional regression applied to monthly data. Universe: FTW US Large Cap.

Second, there has also been a regime shift in economic volatility. We show how the period of pronounced Boom/Bust cyclicity (1950 – 1990) has been replaced by a sustained period of lower and less volatile growth. The boom bust period was the genesis of the concept of the cyclical 4 phase rotation from Recovery > Expansion > Slowdown > Contraction often deployed in Investment Clock modelling. These cyclical dynamics should not be confused with mapping secular regimes.

Third, there has also been a regime shift in Financial Conditions. In the chart below we illustrate the contraction in both the US 10-year Nominal Bond Yield (the risk-free rate or discount rate) and the Real Yield over the last 40 years.

During the establishment of a new monetary policy response regime post the Great Financial Crisis (GFC) in 2008-9 markets became conditioned (anchored) to the notion of the Fed Put, Quantitative Easing and Financial Repression. This has radically altered the risk appetite and market reaction function.

Exhibit 2: Mapping the changes in economic growth, inflation and monetary policy



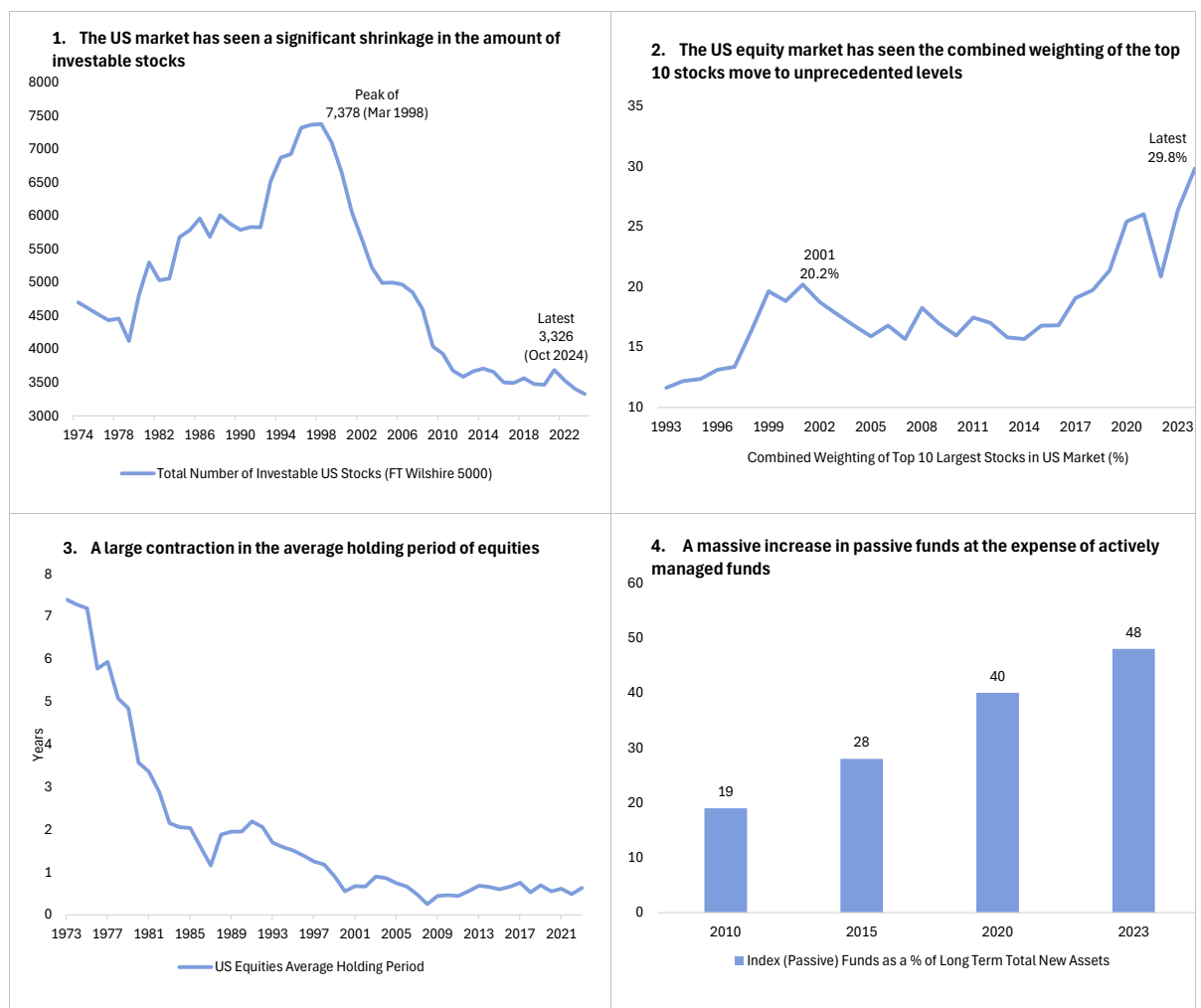
Source: LSEG Datastream. Data to December 31, 2019.

Market structure has also experienced regime change

... there has also been simultaneous regime change in market structure and behavior.

The structure of the US equity market has also encountered significant change over the last 40+ years. In Exhibit 3, we show the scale of shrinkage in investable stocks (as defined by the FT Wilshire 5000 Index), the contraction in the average holding periods and a significant increase in passive funds at the expense of actively managed funds. In addition, the equity market has seen the combined weighting of the top 10 stocks move to unprecedented levels. All this impacts the assumptions around the persistency of market behaviour over the last few decades.

Exhibit 3: Significant changes to Market structure



Source: Wilshire Indexes, LSEG Datastream and 2024 Investment Company Fact Book. Data as of October 31, 2024.

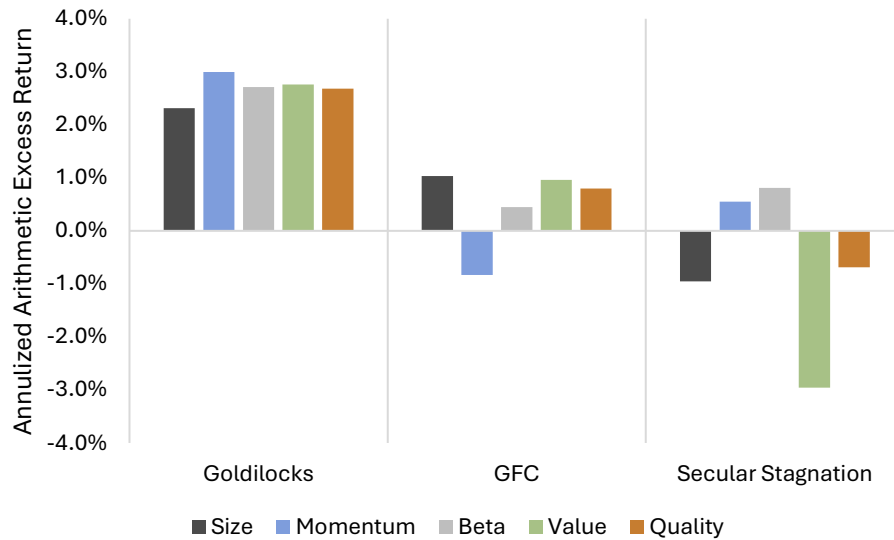
The macro regime shift has driven the evolution in factor portfolio construction.

In this report we will focus factor behaviour since 2000. This enables us to leverage the stock level factor data necessary to calculate factor premia using the rigorous techniques established by Fama and McBeth.

Focusing on data since 2000

In Exhibit 4 we compare the factor returns delivered during the end of the ‘Goldilocks’ period (Jan 2000 – July 2008) through to the GFC period (Aug 2008 – Dec 2014) and the returns during the era of ‘Secular Stagnation and Financial Repression’ (Jan 2015 – Jan 2020). The shift in economic backdrop has clearly been a catalyst behind the delivery of very different factor return profiles

Exhibit 4: Factor return characteristics have been impacted by the macro regime backdrop



Source: Wilshire Indexes. Data December 31, 1999, to January 31, 2020.

A sustained erosion in factor premia – driven by the macro backdrop ...

The first-generation of factor strategies emerged during Goldilocks: Alternative beta

During the “Goldilocks” period the delivery of consistent excess returns of around or above 2% reinforced the belief in the homogeneity of factor premia. This was a period when factor investing was relatively “easy”. A portfolio targeting high exposure to a single factor would do just as well as a portfolio attempting to target all factors. Furthermore, the TMT crash in 2000 acted as a catalyst behind the development of index strategies like Minimum Variance, Equal Weighting and Fundamental Weighting/Value Style. These were popular and successful, since they had demonstrable and significant exposures to low beta, size and value respectively.

... the catalyst behind the evolution in factor strategies

The second-generation evolution occurred during the GFC: Multi-Factor indexes

Moving to the period spanning the GFC, the magnitude of all factor premia more than halved making it harder to get decent returns net of transaction costs. Practitioners

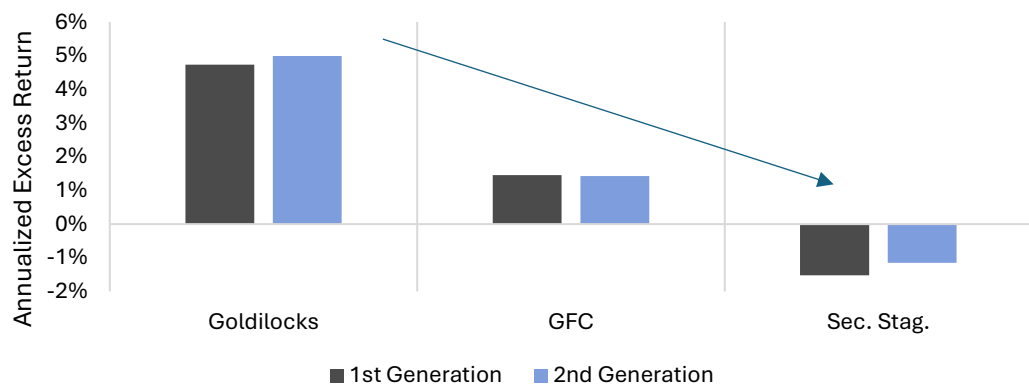
realized that targeting a single factor may not deliver the returns they desired, so a second generation of portfolio construction techniques appeared aiming at multiple factor exposures.

Typical of these methodologies involves creating a **composite factor**, where all five factors were bolted together into a single factor. This is used for stock selection, weighting or optimization. The key assumption of such a composite approach is that it delivers significant exposure to all its components. However, this proved to be a false premise, as such indexes tended to lead to unbalanced factor exposures skewed strongly towards size and value. Moreover, a desire to avoid excessive transaction costs and the recent momentum crash led many practitioners to accept low (or even negative) momentum exposure delivered by these indexes.

The period of Secular Stagnation saw both strategies fail in large part due to anchoring bias.

In summary while these methods were successful during the Goldilocks and GFC periods, they have witnessed persistent deterioration and delivered negative returns during the period of secular stagnation (see Exhibit 5) ². This was mainly attributable to these strategies skewing exposure to size and value factors but also crucially minimizing exposure (explicitly or implicitly) to momentum. This is a clear example of anchoring bias being factored into modelling.

Exhibit 5: Secular stagnation exerted pressure on factor portfolio returns



Source: Wilshire Indexes. Data December 31, 1999, to January 31, 2020.

² First Generation return results are averages of Min Var, Equal Weight and Value Style. Second Generation portfolio weights are proportional to composite factor score * market cap weight. Rebalanced semi-annually in March and September.

A key lesson: Anchoring bias and unintended exposure capture have been detrimental...

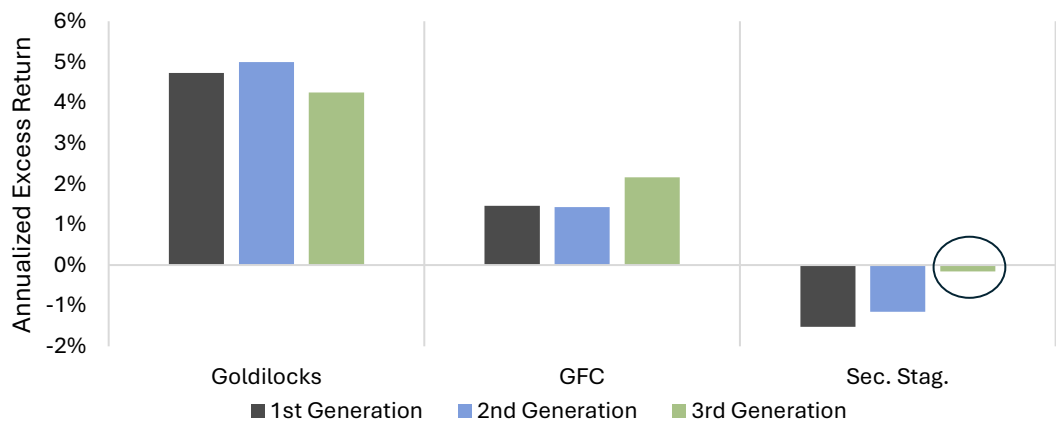
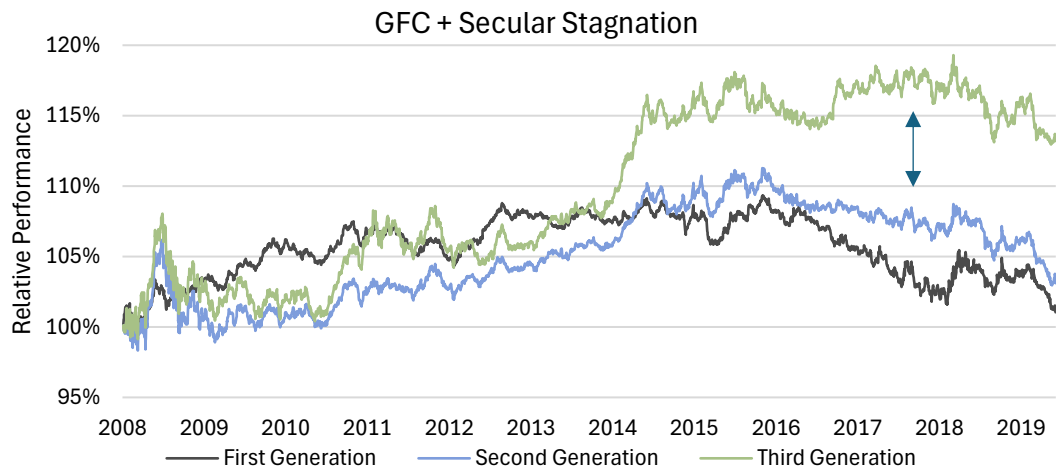
...the evolution of 3rd Generation 'Pure Factor' indexes

Because of anchoring bias, one can conclude that multi - factor construction methodology should either:

- Be adaptive because we have observed macro regime change has strong causality in terms of factor return characteristic change.
- Be completely free of anchoring bias by allocating to factors equally and without prejudice.

Allocation to factors should not be left to chance. They should be intentionally and precisely targeted. This is achieved via a **third generation** of indexes, or "Pure Factor" indexes.

Exhibit 6: The 3rd generation approach prevented factor strategy drag over the GFC and Secular Stagnation period– delivering superior cumulative returns



Source: Wilshire Indexes. Data December 31, 1999, to January 31, 2020.

A 3rd Generation approach is required to time factors and create truly multi-factor indexes

Pure factor indexes are designed to strip away the noise (minimizing off target components) embedded in first- and second-generation indexes and so identify genuine factor premia moves. The methodology achieves this by multiplying market capitalization weights by powers of positive factor scores. The powers (or tilt strengths) are chosen to target the precise mix and quantity of factor exposures required ([see Factor Index Series Methodology](#)).

Pure (third generation) indexes should not be confused with market neutral or long-short factor indexes that are often used by academics for factor analysis. Those technical indexes are notoriously unsuitable for use as practical investment vehicles. Contrary to this, the third-generation indexes discussed here are long-only and are pure from the point of view of *active exposure*. Typically, they are similarly as investible as the first- or second-generation products (see Appendix B).

A key problem confronting factor index construction over the last few years has been the accumulation of uncontrolled '**off target**' exposures. These can lead to sub-optimal outcomes and unintended risk exposures. For example, using a first or second-generation portfolio, making the correct factor calls could possibly result in underperformance due to unintended exposures. This is particularly important when the desire is to time factors. We shall address this in the following section, but for now we note that timing factors is notoriously difficult.

Allocating to factors equally, is the preferred method for those less confident in their ability to time factors. Consider then a third-generation factor index that targets an equal allocation of active exposure to each of the Value, Momentum, Size, Low Beta and Quality factors and is rebalanced in semi-annually in March and September.

Exhibit 6 shows the excess return delivered in the three economic periods by the first, second and third-generation factor indexes.

Note the third-generation index solves the problem of low performance during the period of secular stagnation by keeping pace with the market cap weighted benchmark. Given the average of the factor premia during secular stagnation period was near zero, without factor timing, it is difficult to see how any multifactor approach could do better than this.

It is well-known that factor portfolios can experience long periods of underperformance which can be challenging for portfolio managers. In this context, the fact that the third-generation product matched the strong compound returns delivered by the cap weighted benchmark is beneficial.

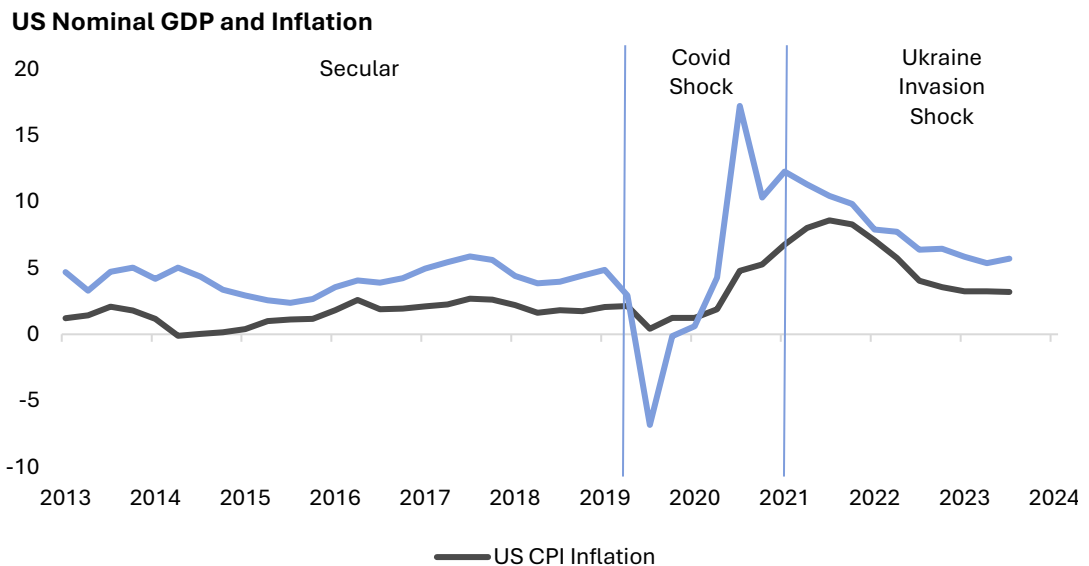
How have factor strategies behaved through the Covid and Ukraine Invasion period?

How have the strategies performed during the turbulence over the last 4 years?

The global economy has encountered two major shocks over the last 4 years (see exhibit 7). The first was the Covid Pandemic that initially produced a once in 300-year recession that was relatively short lived due to rapid fiscal intervention and an injection of aggressive monetary stimulus including Quantitative Easing. The more pernicious impact came via the sudden increase in input costs and inflation due to supply chain disruption.

Then in February 2022 the Russian invasion of Ukraine saw commodity prices surge, and this fed into a cost-of-living squeeze that saw real disposable income decline. This is reflected in the subsequent loss of economic momentum. Indeed, the level of US Nominal GDP growth is now approaching pre Covid levels. Although inflation continued to rise for a period after the invasion the combined impact of the data anniversary effect, the resumption of supply distribution and the tightening in financial conditions has seen inflation also decline rapidly.

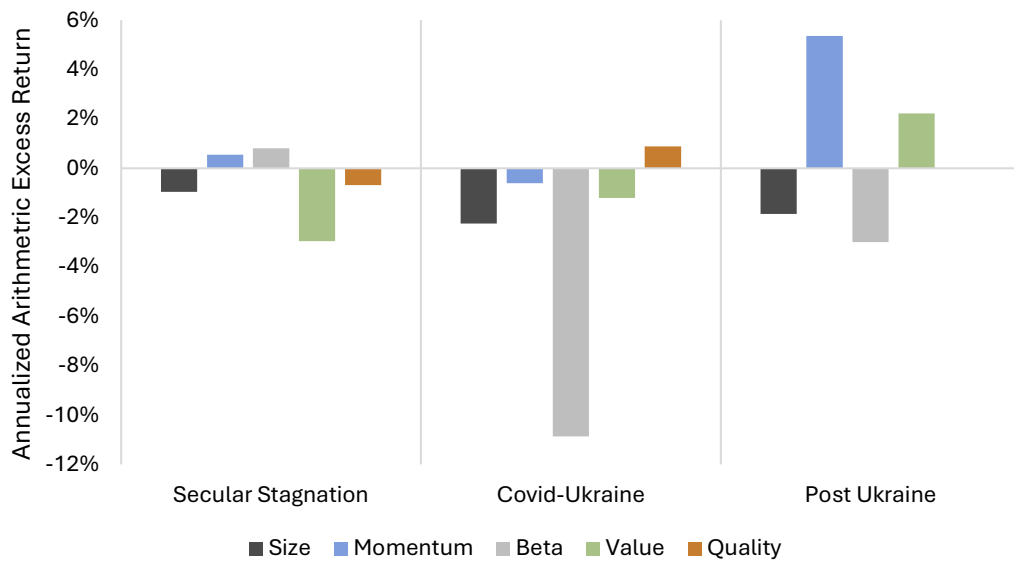
Exhibit 7: The economic impact of the Covid and Ukraine Invasion shocks



Source: LSEG Datastream. Data as of October 31, 2024.

The impact of these shocks on factor returns is shown in Exhibit 8.

Exhibit 8: The factor impact of the Covid and Ukraine Invasion shocks



Source: Wilshire Indexes. Data December 31, 2014, to September 30, 2024.

The latter five years of the Secular Stagnation regime spanning Jan 2015 - Jan 2020 saw factor returns flatline (either negative or near zero). The Covid shock period (Feb 2020 - Jan 2022) was particularly challenging with low beta, value and size significantly underperforming with only the quality premia positive but small. Post the invasion of Ukraine (Feb 2022) we observe that both momentum and value premia have returned with a vengeance, whilst size and low beta have remained negative.

With this background we now examine the performance of the first, second and third-generation indexes since the Covid and Ukraine shocks.

Exhibits 9 and 10 demonstrate the pitfall of off-target exposures of first and second-generation indexes. Here where we track the recovery of value post the Covid pandemic crash of February 2020, after the long period of decline during secular stagnation.

Exhibit 9 shows the average factor and industry exposures of the first-generation FT Wilshire Value Style index and a third-generation FT Wilshire Pure Value index over this period. Both target the value factor but notice that the Value Style index has other significant off-target factor exposures of size, momentum and low beta, alongside large active industry exposures. The Pure Value index has significant exposure only to value.

Exhibit 9: Comparing exposures: 1st generation Value Style vs 3rd generation Pure Value (Feb 2020 to Sep 2024)

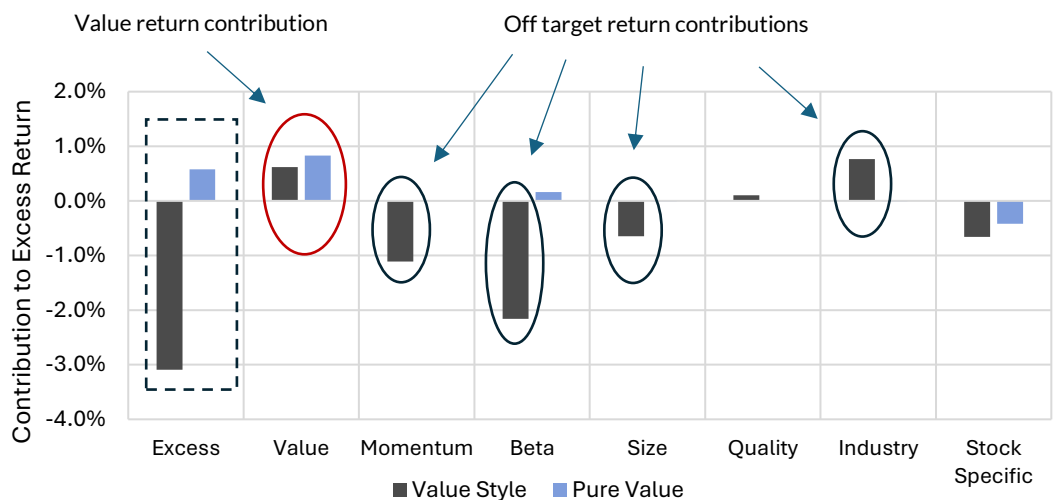
Traditional Value style incorporates large off-target exposures ...



Source: Wilshire Indexes. Data as of September 30, 2024.

Exhibit 10 comprises the corresponding performance attribution analysis which decomposes the excess return of the indexes into their factor, industry and stock specific components. Note that the Value Style index has underperformed the cap weighted benchmark by more than 3%. The positive contribution from value is completely swamped by negative contributions from off-target factors such as size, beta and momentum.

Exhibit 10: Performance Attribution: Value Style vs Pure Value (Feb 2020 to Sep 2024)



Source: Wilshire Indexes. Data as of September 30, 2024.

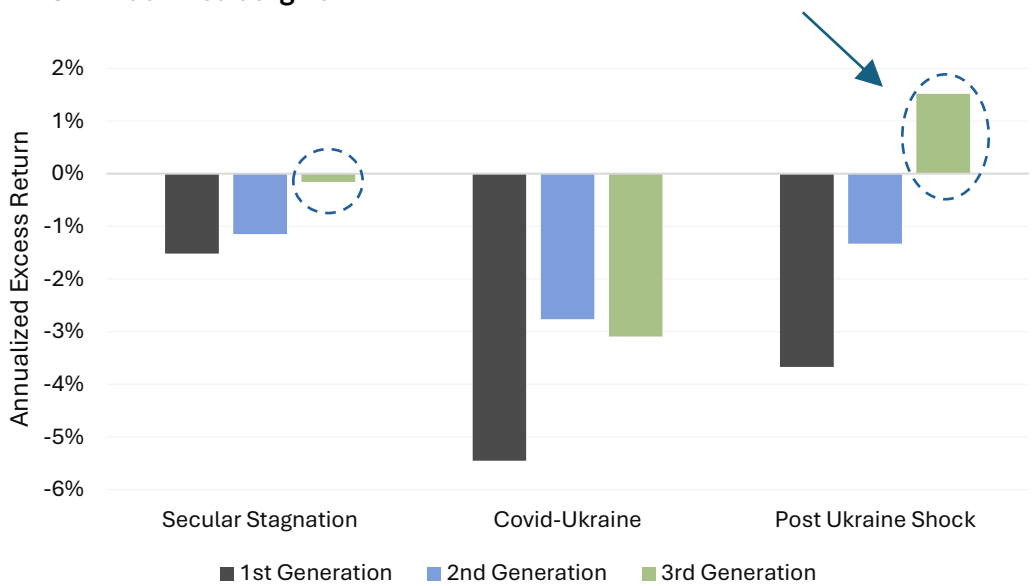
On the other hand, since the Pure Value index has no off-target exposures, the return contribution arises only from value and stock specific components, leading to an excess return of over 0.5%.

Since the 2022 Ukraine invasion the Pure Factor strategy has outperformed

Suppose now that some putative factor rotation model had correctly predicted this turn around in value's fortunes. Either index could have been used to harvest the positive value premia, but only the pure index would have delivered it.

On the multifactor front, note that the Third Generation Index (Pure Factors) has delivered the superior return profile over the Covid and Ukraine Invasion period (see Exhibit 11).

Exhibit 11: Impact of the Covid and Ukraine Invasion shocks on First, Second and Third Generation strategies



Source: Wilshire Indexes. Data December 31, 2014, to September 30, 2024.

As noted earlier, before Covid, only the third-generation factor index was keeping pace with its cap weighted benchmark. All three generations underperformed during the period between the Covid and Ukraine shocks, with the first-generation indexes suffering the most.

Post the Ukraine invasion only the third-generation index has outperformed. This is because it avoids any anchoring bias by targeting all exposures equally, and so has been able to pick up the significant improvements in Momentum and Value premia.

In contrast, the first and second-generation indexes, with their anchoring bias towards size and low beta, have significantly underperformed during this latest period.

Conclusion

The economic regime backdrop has impacted factor premia outcomes. During the “Goldilocks” period all five factors performed very well. The GFC period saw a transition with all premia shrinking and with momentum suffering underperformance largely due to the market crash in late 2008. Then, in the post GFC period of Secular Stagnation value, size and quality premia turned negative with only low beta and momentum premia displaying small positive premia.

This further deteriorated through the Covid shock at the beginning of 2020, when low beta was severely impacted, and quality was the sole working factor. These latter two periods have therefore been particularly challenging for factor investing. Finally, post Ukraine shock, momentum and value have rebounded strongly.

We have identified an “anchoring bias” in the construction of first and second generations of portfolios designed to capture factor premia. Essentially, practitioners tailored their portfolios toward factors that performed well during previous economic backdrops, perhaps with the intention of producing impressive back tested results.

However, it is well known that the out of sample results often fail to live up to the promise of those found in-sample. Indeed, by concentrating on obtaining high exposure to factors like size and value that worked so well during Goldilocks and the GFC, practitioners have seen their portfolios experience a prolonged period of underperformance during the Secular Stagnation period, where these factors failed.

We have identified two possible approaches to this problem, both of which require the construction of third generation of portfolios that deliver precise control and quantity of factor exposure.

The first approach can be characterized as factor rotation or timing. This is extremely difficult to execute. It not only requires a forecasting capability, but also importantly requires the adoption of appropriate implementation tools. For the latter we believe Pure Factor indexes are the most appropriate implementation tools as they will deliver performance aligned with premia of the selected factors only, without the potential for results being contaminated or spoiled by unintended or off-target exposures.

The second approach is to do away with anchoring bias all together by seeking a balanced exposure to all Pure Factors. We demonstrate that such an unbiased approach does much to alleviate the underperformance of previous generations of factor indexes during the period of Secular Stagnation.

Finally, we have seen that value and momentum premia have recovered substantially since the Ukraine shock in February 2022. During this period the unbiased pure approach has delivered strong outperformance relative to the cap weighted index, whilst previous anchored approaches continue to languish behind their capitalization benchmarks.

Appendix A: Factor Definitions

The factor definitions used in this document are broadly aligned with those found in the academic literature and are summarised below.

Value

Value is defined as an equally weighted composite of the latest Earnings Yield, Sales to Price Ratio, Cash Flow Yield and Book to Price Ratio.

Momentum

Momentum is defined as the cumulative local price return, starting twelve months prior to, and ending one month before, the calculation date.

Quality

Quality is defined as an equally weighted composite of the latest ROE, Accruals Ratio and Debt to Equity Ratio.

Size

Size is defined as the negative of the natural logarithm of the full company market capitalization calculated in USD.

Beta

Beta is calculated as the negative of the covariance between stock total return and the underlying (market) index total return divided by the variance of the underlying index total return using two years of daily data prior to the calculation date.

For more details see [Factor Index Series Methodology](#)

Appendix B: A note on the implementation of pure factor indexes

It is often stated that “pure” versions of factor indexes present difficulties in their implementation. Exhibit B1 that shows typical measures of diversification, capacity, concentration and weight difference³ for all three generations of indexes discussed previously.

Exhibit B1: Implementation properties: First, Second and Third Generation indexes

	First Generation	Second Generation	Third Generation
Diversification			
Average No. Stocks	415.75	424.9	286.24
Effective No. Stocks	282.68	198.13	116.31
Capacity			
Relative to MCAP Weighting	39.01%	34.84%	24.31%
Concentration			
Top 10 weight (%)	12.76%	14.29%	20.96%
Weight Difference			
Active Share relative to MCAP	45.19%	40.39%	49.61%
Annual Two-Way Turnover	46.39%	81.28%	81.47%

Differences between first, second and third-generation indexes are not significant.

In summary, there is a trade-off between factor exposure and the implementation properties of indexes. The more factor exposure required the more concentrated the indexes tend to be. Third generation products have the advantage over previous generations in that one can choose the exact balance between these competing properties.

³ Averages over semi-annual rebalances: September 1999 – September 2024

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