E-A-R©'s

Monthly Multi-Asset Note

(Bonds, Money Market Instruments, FX, Commodities and Equities)

September 2017

If spring comes, can winter be far behind? The past few years have been characterised by false dawns in which some optimism at the start of the year / trading season has been undone – whether by wobbles in key asset prices, political events or fears of a meltdown in one of the mega and thus key markets. Perhaps, if we accept joys, we have to accept sorrows also. Similarly, if we accept returns, we have to accept some degree of losses!

Trading Money Market Instruments

When "short term risk free rates" collide with negative returns

In its first fixed income note, EAR presented one trading strategy that could, among others, be applied in order to take advantage of an upward sloping yield curve. Since then, the South African government and various credit curves have since steepened. Suffice to say that investors would have reaped benefits from riding/rolling down the curve as per EAR's perspective. South African funding curves reflect deep-seated anomalies such that avoiding duration risk is in vogue. In this environment there could well be some basis for arguing against longer term rides due to increased interest rate sensitivity risk. It is for this reason that EAR compares short term rides between SA government Treasury Bills (T-bills) and their equivalent and supposedly credit risk laden instruments; i.e. Johannesburg Interbank Rates (JIBAR) linked investments. Rolling down the curve refers to the purchase of some "longer dated" maturity and disposing of it before its actual maturity date. This strategy is in direct contrast with one that advocates for a "buy and hold". EAR further postulates that central to a ride is the question of whether a ride is underpinned by a mean reverting yield curve

strategy that would set filters for respective rides. All of the T-bill maturities' volatility filters are less than 2 per cent. Mean reverting rides will be expounded upon in subsequent notes.

Table 1: Money Market Instruments

MM Instruments	6M T-bill	9M T-bill	12M T-bill
Rolling Down Return (RDR) (%)	0.05	*-0.02*	*-0.03*
MM Instruments	6M Jibar	9M Jibar	12M Jibar
Rolling Down Return (RDR) (%)	0.11	0.09	0.17

Source: EAR and Bloomberg

In the same vein of accepting joys and sorrows, the investment fraternity has to contend with the notion that the theory of "risk free" rates as regards to South Africa has since been relegated to investment folklores. Both the 3 and 6 months T-bills have been trading above their corresponding JIBARs. Could this be a sign of a jaded asset class? Whilst the zero curve, in line with other funding curves, has been upward sloping; the real bug bear and the source of a steeper slope has been the glut of 3 months T-bills offered to market over a very short period. Consequently, riding the T-bill curve would yield the following returns; positive, albeit slender returns (0.05%) if the ride is for 3 months; i.e. from 6 to 3 months. Riding from 12 to 9 months would yield negative returns of 0.02%. This trend would persist even if the ride were to last for 6 months! The source of this pricing anomaly has indeed eroded term premium associated returns across the T-bill curve! JIBAR linked investments would, on the other hand, yield higher returns in proportion to some term-to-maturity (TTM), more so in the 12 months space (0.17%). Investment strategies that centre on "riding the quality scale" may need to look beyond standard definitions and templates! As for T-bills, EAR would not ride them, at least in the short term (until November 2017). Let alone touch the 3 month bill with a ten barge pole! Rolling down the curve, for at least one year in the short end of the nominal curve (R2023/R208) could yield approximate returns of 1.6% (on the basis of the shape of the slope), free of extreme shocks that could decimate

returns associated to taking advantage of term premium. This is however not conditional on the curve repricing to, for example, some level of forward rates or reverting back to certain long-term levels. Therefore, under these conditions rolling down the curve may need to be considered in accordance to the curve reverting to some conditional levels. More is to follow....

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Commodities: Enough Fuel to sustain Hard and Soft Commodities?

Table 2: Money Market Instruments

Commodity Curve Factors	Factor Volatility
Market-Wide Component	80.0%
Sector Components	11.4%

Source: EAR and Bloomberg

As an asset class, commodities provide diversification opportunities. Whilst some use commodities and their performance as a bellwether to global economic performance, some invest directly in this rather exotic asset class. Before investing in this market, traders have to encounter a myriad of technicalities. Key among these is two common market situations; i.e. contango and backwardation. Notably, pricing of the futures market is the main aspect of commodity markets. Typically and under what could be characterised as common market conditions, future prices are expected to be higher than spot prices due to the embedded cost of carry in futures. Contango prevails when future prices are higher than spot prices whilst backwardation characterizes the inverse of this "order". Whilst conventional belief holds that backwardation is a sheer anomaly; soft commodities/"softs" do go into backwardation, particularly those that are perishable. Further, history is littered with cases of backwardation even on hard commodities ("hards"); as was the case in December 2008 and early 2009 where Gold slipped into backwardation.

Commodity prices are important from various perspectives (geopolitical and economic). For instance, macroeconomic planning of certain emerging and developed markets would somewhat be contingent on the performance of certain commodities. It is therefore important to excavate some of the dynamics that govern this asset class. More often than not, investors would shun commodities due to their erratic sources of volatility such as geopolitical tensions. This of course could compromise an investment process, significantly so! In its character as a research house that embraces volatility, EAR considers a basket of highly correlated "softs" and "hards", which include Gold (futures and spot), Platinum (futures and spot), Brent (spot and futures), Maize and Wheat. EAR's research is aimed at identifying key common drivers of the various commodity curves. Notably, these drivers carry so much weight such that hedging strategies could be based thereon. Resultantly, these are principal sources of volatility as regards commodity curves! Thus, a set of futures contracts is elementary in this modelling exercise. From a modelling perspective, the quantitative ingredients of commodity futures' curves pattern after the term structure of interest rates/bond yields. Hence, the use of models such as the modified Nelson Siegel version to extract commodity components that could come in various curve shapes proves to be fairly robust. In EAR's view, though, testing for mean reversion remains essential, with regards commodities as an asset class. Hence, EAR leans more toward certain versions of random processes that would incorporate some degree of oscillation toward some dynamic parameter which may differ due to factors such as seasonality! For this note, though; EAR presents factors that drive the volatility of the individual curves. It is worth noting that common factors of volatility do not imply that various commodities are homogenous. Idiosyncratic sources of volatility would still prevail across the various commodity curves.

The first factor that governs the volatility of both "softs" and "hards" relates to market-wide

components that affects all commodities. This volatility factor, which explained 80% of total commodity curves' volatility relates to hedging activities (i.e. long/short positions move the curve) and how these commodities relate to, in this case, various exchange rate pairs such as the AUDUSD, NZDUSD, USDJPY etc. Further, equity markets and interest rates would sometimes affect this market wide factor. The second factor relates to sector specific components that affect commodities within the same sector. It is here that the two market states; contango and backwardation become all the visible as per the slope (particularly the shape thereof) of commodity curves. For instance, whilst the sector specific factor explained some 11.4% of the total curves volatility; there were instances (from June to October 2017) where Maize (an agro product) "*contagoed*" and thus its particular slope-induced volatility went negative. The same held for the following commodities; Gold, Silver and Palladium. For spot traders, going short on these, (on an intra-day basis) from historic averages that prevailed in June 2017 would have paid off as per the slope of these curves! This implies that over the period, there has been surplus supply of the aforementioned commodities. Backwardation prevails, due to amongst others, some low probability of the commodities' increased supply in the future. Thus, the spot price of the commodity would tower over future prices. During the period under review; both Brent and Wheat slipped into backwardation. Measured long positions on Brent and Wheat would have paid off! Brent prices have since marched upward since lows of $30 per barrel in early 2016. Therefore, in EAR's proposition, views (bullish or bearish) on the various commodities, particularly futures markets, may be based largely on the shape of the slope factor (which relates to sector specific factors). This would not only assist commodity traders but those that tie investment cases on the macro picture and the performance of various commodities. With regards equity investors - ditto!

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Real Yields

The search for yield in any environment brings about its own challenges. For instance, an investor may have been constrained in achieving a particular required return due to restrictions pertaining to some investment process. Moreover, the investment environment may be exposed to external challenges, which may add more difficulty to the investment process. In the fixed income space, interest rate volatility impacts the investment process. Consequently, the need to track how sensitive a particular bond's price is to changes in some prevailing rate of return is important. This stems from the inherent price/yield relationship.
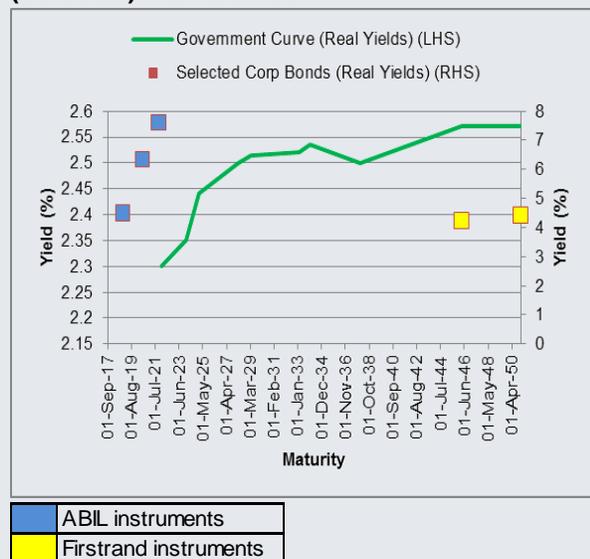
Portfolio Modified Duration

Widely used as a fixed income sensitivity measure, modified duration indicates to investors the impact on bond prices, as a rate, due to small changes in the yields. It is considered a more direct measure of the relationship between changes in interest rates and changes in bond prices. Although helpful and widely applied, modified duration is not without its limitations. For example, it assumes that the bond price change is somewhat linear with respect to changes in its respective yield. Therefore, modified duration as a measurement for large changes in bond yields is often rendered inaccurate.

Given the charged financial market environment, investors tend to shy away from high duration bonds, so as to insulate their portfolios from undesirable interest rate risk. Whilst this could bode well for conventional vanilla bonds; CPI indexed bonds could present another layer of risk in as far as duration risk is concerned. This is informed by the common occurrence in the SA

real yield market where low duration bonds are often illiquid (mainly shorter dated bonds). Furthermore, investors could try to manage both interest rate sensitivity and systemic volatility. The latter could, in turn, provide an indication of instrument liquidity relative to some market proxy (e.g. the CILI).)

Figure 1: Government Real and Corporate (Selected) Real Curves

Legend:
- ABIL instruments
- Firstrand instruments

Source: EAR and Bloomberg

In attempting to establish a "model" portfolio holding, EAR assessed how a portfolio comprising of a mix of corporate real bonds (equally weighted) would have fared relative to the CILI's modified duration. As reflected below and for investors whose mandate is to track the CILI; such an equally weighted "model" portfolio comprising of selected corporate real bonds would have been within the modified duration of the Composite Inflation Linked Index (CILI) for the 3rd quarter of 2017. Moreover, an investor would have generated yields ranging from 4.31% to 7.71%, on average, for the quarter. In addition, the portfolio would have had a tracking error of 0.008 (or 0.8 basis points). This means that the portfolio, although benchmarked against the CILI, would generate daily returns (or losses) that would "deviate" from the benchmark returns by 0.8 basis points whilst still remaining within the index's MD. In spite of the portfolio remaining within the CILI's MD, the portfolio

would have been outside the ICORP's MD by a rate of 2.87%. The interesting aspect about the selected corporate bonds is that the shorter-dated corporate bonds, issued by ABIL (ABKI01, ABKI02 and ABKI03), provided investors better yields compared to longer-dated FirstRand bonds (FRBI46 and FRBI50); and this may be attributable to the quality of the instruments. In addition, an investor would generate some higher yield on the ABIL bonds at a significantly lower MD but would take some liquidity risk. In an effort to manage liquidity and quality risk whilst generating some relatively high real yields; investors may need to consider the inclusion of the FRBI bonds, mainly because of where the bonds are located on the curve, which is a relatively liquid part of the curve.

One may need to consider the shared volatility of specific bonds to the market (or CILI). As reflected below, 3 of the corporate bonds; ABKI02, ABKI03 and FRBI46 shared some volatility with the market. As a consequence of the shared volatility with the CILI, both ABIL bonds recorded beta coefficients of 2.36, each. This indicates that the two bonds reflected some high volatility in their yields relative to the CILI. For every 100 basis point change in the CILI, the two ABIL bonds (in terms of their yields) would change by 236 basis points, suggesting a higher degree of volatility relative to the CILI. Moreover, 82% of the volatility was attributable to the CILI, which indicates that a high proportion of ABIL bonds' volatility was "market specific". Although the yield changes in the two bonds were higher than the CILI, the rate of change in the value of the bonds due to changes in the yields were far lower than that the CILI as reflected by the bonds' respective MDs relative to the CILI's MD.

Table 3: Selected Corporate Bonds

Corporate Bonds	ABKI01	ABKI02	ABKI03	FRBI46	FRBI50
Average yield (%)	6.42	6.45	7.71	4.31	4.41
Modified duration (%)	1.07	2.48	3.62	18.14	19.50
Beta coefficient		2.36	2.36	2.15	
% volatility attributable to the market		82%	82%	74%	
Portfolio modififed duration (%)	8.96				
CILI modified duration (%)	11.06				
Portfolio tracking error	0.008				

Source: EAR and Bloomberg

The table below shows selected government bonds (GOVIS), which are benchmarks to the selected corporate bonds. Benchmark GOVIS generated lower real yields compared to the selected corporate bonds and provided a higher MD relative to the corporate bonds. Assuming an investor preferred a fair mix of the corporate bonds, which provide higher yields and some GOVIS in an effort to have some mix of yield and "quality"; how would the holdings be? EAR's approach was to assess some shared volatility between some select corporate bonds and GOVIS. An investor could forgo the ABKI01 to replace it with the R212 to add "quality" to the portfolio given the perfect shared volatility between the R212 and the ABKI01 (as well as the ABKI02) and therefore the "model" portfolio would have laddered maturities mixed with quality for 2020, 2021 (both ABKI02 and ABKI03) and 2022 for the R212. A portfolio comprising of all the aforementioned corporate bonds as well as the benchmark bonds shown below indicates that an investor would have remained below the index's MD (portfolio MD of 9.84 vs the index's MD of 11.06) and generated higher yields whilst achieving some relative degree of quality. However, the portfolio would suffer from correlation risk, given the 100% correlation between the R212 and the ABKI02 as well as the ABKI03; and another perfect correlation between the I2050 and the FRBI50.

Table 4: Government Bonds

Government bonds	R212	I2046	I2050
Average yield (%)	2.45	2.56	2.56
Modified duration (%)	4.08	19.99	22.28
Beta coefficient	2.36		
% volatility attributable to the market	82%		
Portfolio modififed duration (%)	15.45		
CILI modified duration (%)	11.06		
Portfolio tracking error	0.002		

Source: EAR and Bloomberg

An investor preferring a midpoint between "corporate" and government may opt for government guaranteed SOC bonds. A portfolio mainly constructed of SOC bonds (guaranteed) would be shy from reaching the CILI's MD, however, at relatively lower yields compared to the selected corporate bonds. However, an investor would be better off in terms of quality

and liquidity, but would have given away an average real yield of 2.69% for a portfolio sensitivity not too far off from the index measured by the MD.

Table 5: Government Bonds

SOC Bonds	EL037	EL28	EL29	EL31	EL36	HWAY23	HWAY24	HWAY33
Average yield (%)	3.26	3.21	3.22	3.30	3.24	3.10	2.81	3.19
Modified duration (%)	15.11	9.06	10.53	11.53	14.53	5.24	5.98	12.73
Beta coefficient						2.00	2.00	
% volatility attributable to the market						81%	81%	
Portfolio modififed duration (%)	10.59							
CILI modified duration (%)	11.06							
Portfolio tracking error	0.001							

Source: EAR and Bloomberg

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Equities: Induced Volatility

Over the past few years, the chase for so-called "hedges" has intensified for most investors in an effort to deal with some market-wide risk. The chase for the so-called Rand hedges has become popular for some domestic investors that a critical assessment of some shared volatility between most major stocks (Top 40 stocks) and major currencies to the Rand is necessary. The question remains; how effective is such an approach? Does it provide investors with more risks that tend to be unknown? Is such an approach effective?

An analysis of some Top40 stocks and mid-cap stocks reflects that since the start of February this year, there has been some shared volatility to the three major currencies against the Rand, i.e. USDZAR; EURZAR and GBPZAR, on a rolling basis. One notable stock that has reflected some consistent shared volatility with the three major currencies is British American Tobacco (BTI). Given the shared volatility in the returns with the three currency pairs, BTI's volatility for the most part of the year since February was attributable to the USDZAR, GBPZAR as well as EURZAR. The degree of

systemic risk (as indicated by the beta) of BTI, which ranged from 0.0.3 to 1.07, suggests that during certain periods, BTI would be more volatile than the USDZAR and during certain months, BTI would be less volatile than the USDZAR. Another large industrial large cap stock in the form of Bidvest (BVT) also reflected some shared volatility with the three currency pairs; however, such a shared volatility was negative over the various rolling periods. What has been observed is that BVT would be less volatile than the USDZAR with a beta coefficient ranging from -0.5 to -0.7; suggesting that some of the returns on BVT were be attributable to the USDZAR. This indicates that when the Rand generated positive returns for short sellers of the Rand (weakening of the Rand against the USD); BVT would also generate some positive returns. Standard Bank and Nedbank also reflected some currency induced volatility, although the shared volatility between the returns of the stocks and the currency pairs was negative. What has been interesting on the two banks is that much of the volatility of their returns was attributable to the GBPZAR. Furthermore, between the two banks and the beta for various periods would range from -0.9 to -1.46; suggesting that the returns for long only traders of the Rand against the GBP would induce some volatility in the two banking stock returns. As a consequence, a 1% return for an investor who would have taken a short position on the Rand against the GBP would have seen investors on SBK and NED generating positive returns on the stocks ranging from 0.9% and 1.46%.

On the mid cap end of the JSE, Barloworld (BAW) reflected some currency induced volatility. The GBPZAR, EURZAR and USDZAR induced some volatility in the returns of BAW and the volatility attributable to any of the three currency pairs would range from -0.18 to 0.13 over the various rolling periods since February. KAP Industrial (KAP), as a relatively "small" industrial stock compared to BTI for example, experienced some induced volatility in one period and later reflected some break in correlations to the three currency pairs. For instances where the volatility was attributable to

the three currency pairs, the beta would range from -0.03 to -1.6, of which the highest would be attributable to the USDZAR. Interestingly, there was a negative relationship between the two industrials (BTI and KAP) during the rolling period where KAP's volatility was attributable to the three currency pairs.

EAR's assessment is that much of this induced volatility was observed during periods of significant "noise" in the market. Where there tends to be too much uncertainty or perceived risk in the market, these stocks would experience some high induced volatility. As mentioned above, some induced volatility on the stocks from a returns perspective would result in a co-movement between the forex pairs and the stocks.

Residual Risk

In its nature, predictive modelling that is predicated upon probabilistic techniques lays bare the underlying principle that governs asset prices. That is, asset prices are random, continuously so! This ushers another strand of modelling which seeks to measure the unknown and thus residual sources of randomness. As EAR would assert; the job is not done once the market closes. Similarly, EAR intimates that the investment process is not complete once some current systemic sources of volatility are identified and measured. The search for returns, especially in emerging markets such as South Africa would lead investors to take on more risks. These risks may not be fully priced into the various assets. It is for this reason that residual risk, contrary to the meaning, ought to be analyzed. Whilst this is a research topic on its own, it is worth flashing upon, albeit fleetingly. Both active and passive investment strategies somewhat would focus on systemic risk. The onus remains on quantifying the non-systemic/idiosyncratic risk. In this regard, risk is measured through a suite of probabilistic measures and for asset prices; these ought to be anchored by distributional assumptions, which in turn would resemble some prevailing market and economic conditions/scenarios. To

an extent there is a huge degree of residual risk, the prediction power of the model to help investors hedge, naturally so, against systemic volatility outbursts, would be compromised. For the equity section of this research note, EAR zooms into systemic volatility as measured by beta. The shift from systemic to idiosyncratic volatility would be linked to underlying volatility regimes.

As mentioned, many investors may opt for specific stocks in an effort to hedge against some "risk". Often, investors will aim for the so-called Rand-hedge stocks to hedge against some expected risk in SA. However, how often does this yield benefits? Although the mentioned stocks BTI, BVT, NED and SBK) reflected some induced volatility attributable to major currency pairs, i.e. USDZAR, EURZAR and GBPZAR; to what extent is the volatility driven by some unobserved factors? A multi-factor model reflects that BTI, for example, would respond by some 0.6% to 0.8% for every 1% weakening in the USDZAR and/or EURZAR most of the time. However, an analysis of the underlying residuals indicates that the actual response in the price would, in some instances be poor. The question is; does it still hold to consider BTI as a Rand-hedge stock? In fact, these stocks may be responsive to other factors most of the time outside the expected currency volatilities. With an R-squared of 82%; most of BTI's volatility was attributable to the USDZAR, EURZAR as well the GBPZAR in most months. However, the gap or 18% of the volatility was attributable to some unknown factors, which could not be accounted for by the model. BTI may hold as a Rand-hedge investment case from an earnings perspective. Even so, the model suggests that from share trading perspective, such an argument may not hold strongly, more so when there is too much risk in the system.

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