Carry and Trend in Lots of Places[1]

Vineer Bhansali, Managing Director, PIMCO, 650 Newport Center Drive, CA, 92660, vineer.bhansali@pimco.com

Josh Davis, Executive Vice President, PIMCO, 650 Newport Center Drive, CA, 92660, josh.davis@pimco.com

Matt Dorsten, Senior Vice President, PIMCO, 650 Newport Center Drive, CA, 92660, matt.dorsten@pimco.com

Graham Rennison, Senior Vice President, PIMCO, 650 Newport Center Drive, CA, 92660, graham.rennison@pimco.com

Abstract:

Investors intuitively know two fundamental principles of investing: (1) Don't fight the trend, (2) Don't pay too much to hold an investment. But do these simple principles actually lead to superior returns? In this paper we report the results of an empirical study covering twenty major markets across four asset classes, and an extended sample period from 1960 to 2014. The results confirm overwhelmingly that having the trend and carry in your favor leads to significantly better returns, on both an absolute and a risk-adjusted basis. Furthermore, this finding appears remarkably robust across samples, including the period of rising interest rates from 1960 to 1982. In particular, we find that while carry predicts returns almost unconditionally, trend-following works far better when carry is in agreement. We believe that this simple two-style approach will continue to be an important insight for building superior investment portfolios.

[1] This paper will appear in the Summer 2015 issue of the Journal of Portfolio Management.

Investors intuitively know two fundamental principles of investing: (1) Don't fight the trend, (2) Don't pay too much to hold an investment. But do these simple principles actually lead to superior returns? In this paper we report the results of an empirical study covering twenty major markets across four asset classes, and an extended sample period from 1960 to 2014. The results confirm overwhelmingly that having the trend and carry in your favor leads to significantly better returns, on both an absolute and a risk-adjusted basis. Furthermore, this finding appears remarkably robust across samples, including the period of rising interest rates from 1960 to 1982. In particular, we find that while carry predicts returns almost unconditionally, trend-following works far better when carry is in agreement. We believe that this simple two-style approach will continue to be an important insight for building superior investment portfolios.

There is a long history of using yields as the baseline for prospective asset returns for a wide variety of asset classes. For instance, Cochrane points out that yields predicting future returns is a "pervasive phenomenon" across markets (Cochrane [2011]) and Leibowitz [2014] applies this systematically to various types of bond portfolios. "Carry" is used by practitioners in an analogous way to yield, especially for derivatives markets like futures, and indeed is more general than yield in that it incorporates the cost of funding the investment. For fixed income investments, this distinction between yield and carry can be important, for instance, when yield curves are inverted.

If we decompose the total return of any investment as the sum of returns from change in the underlying pricing factors and from the passage of time, then carry can be best thought of as

the return attributable to the second component, i.e., the expected return from the passage of time. Carry is defined by Koijen [2011] as the "expected return on an asset assuming that market conditions, including its price, stay the same." Thus, carry may be thought of as a naïve, yet robust, model-free measure of the risk premium in a given asset class. In this regard, it is plausible that being on the side of positive carry should earn a higher return, on average, but accepting potentially greater risk as well since the assumption of static prices is rarely true in practice.

Historically, the literature has focused on the concept of carry mainly in the currency markets. Following the collapse of Bretton Woods, market practitioners started broadly pursuing currency carry trade strategies in the 1980s and 1990s. Academia has followed this closely, and a host of plausible explanations have been put forth for the effectiveness and persistence of currency carry as a predictor of future returns. In a no-arbitrage finance setting, for currency carry to predict returns, it must be compensation for "market" risk that cannot be diversified away. Academic finance posits that the currency risk premium is a direct consequence of the co-variation of returns with the stochastic discount factor. Lustig [2007] observes that currency carry tends to work empirically due to the co-variation of the payoff on carry trades with consumption growth. Viewing currency carry through the lens of locally hedged option prices, Bhansali [2007] and Menkhoff [2012] offer an intuitive connection between this carry risk premium as compensation for exposure to volatility risk.

In his seminal work "Treatise on Money" [1930], Keynes proposed that backwardation in commodities, or the tendency of futures contracts to trade below spot contracts, is normal and

related to producers of commodities seeking to hedge by locking in future prices, thus constructing a premium that can be earned by speculators who provide the insurance. Gorton [2012] provides a comprehensive analysis of the drivers of these risk premia (including current and future levels of inventories) and shows that price measures, such as the futures basis (a measure of carry), contain relevant information for predicting future returns.

In fixed income markets, the nominal U.S. Treasury bond risk premium is often directly measured by the steepness of the yield curve, which is related to the term premium. Fama and Bliss [1987] show that expected returns on bonds vary through time and the variation of the term premium is closely related to the business cycle. Cochrane and Piazzesi [2005] and Campbell, Sunderam and Viciera [2013] relate the bond risk premium directly to the concavity in the yield curve, defined loosely as the level of intermediate interest rates relative to the average of short- and longer-term bond yields. Using an empirical data set spanning 150 years, Giesecke, Longstaff, Schaefer and Strebulaev [2011] show that, on average, at least half of the carry on corporate bonds, given by credit spread corresponding to the yield difference between corporate bonds and duration-matched Treasury bonds, is a risk premium. Furthermore, these authors show that actual defaults are closely related to equity returns and volatility.

While the computation of carry in equities is less analogous, in equity futures, the implied dividend yield less the local risk-free rate is one determinant of carry. Fama and French [1988] document that dividend yields help to forecast equity returns, with better predictive ability at longer horizons. Because carry as a concept is less popular in equity markets, our

approximation used below should be taken as one attempt at making it similar to the one used for other assets, with further room for improvement.

In contrast to carry, where there is a naturally intuitive explanation in terms of a compensation for risk transfer, trend-following (or its cross-sectional cousin, momentum) has long been a conundrum of financial markets, potentially delivering returns over multiple decades (and even centuries, according to some recent studies, e.g., Geczy [2013], Lemperiere [2014], Moskowitz [2013]). While there are numerous behavioral explanations for returns from trend-following, it is hard to find explanations that are consistent with classical finance, and thus, trend-following has been largely thought of as a persistent anomaly in the classical context.

Despite this lack of a convincing model to explain trend-following, there is much evidence that in the portfolio construction context, carry and trend are mutually diversifying, especially in extreme states. Thus, it is intuitively appealing to combine them. Conceptually, we can think of carry as a position that harvests risk premiums, and thus, performs best when prices don't move much, whereas trend-following is a long-tail option-replicating strategy (Fung [2002]), which benefits when prices move as a consequence of fat-tail events such as those experienced during the financial crisis. Thus, combining these two strategies should intuitively result in better portfolio outcomes in a broad set of states.

We view this work as highly complementary to that of Asness, Moskowitz and Pedersen [2013]. In that work, the authors investigate the ability of value and momentum signals to predict returns across markets and asset classes. These authors focus on value from the perspective of "book value," or a measure of long-run value relative to its current market value. Thus, their

work implicitly depends on invoking some model for valuation. We believe that in most asset classes, focusing on model-independent carry and time-series properties of asset prices that are basically arithmetic operations provides essentially the same gains to portfolio construction. Further, due to the practical ease of implementation of both carry and trend portfolio using plain-vanilla futures contracts, our work is likely to be of appeal to a wider variety of investors.

Carry and Trend: Definitions, Data and Empirical Study

To assess the empirical relevance of carry and trend to futures returns we assembled an extensive dataset covering the four major asset classes: equities, bonds, currencies and commodities. We selected five markets in each asset class that represent the major, most liquid markets available now and historically. For equity indices we use the S&P 500, Euro Stoxx 50, Nikkei 225, FTSE 100 and S&P ASX 200[2]. For bond markets, we use U.S. 10-year, German 10-year, Japan 10-year, U.K. 10-year and Australian 10-year government bonds. In currencies we use the euro (switching to the Deutsche mark prior to 1999), Japanese yen, British pound, Australian dollar and Swiss franc. And lastly, in commodities we use corn, WTI crude, gold, copper and natural gas.

To make this study relevant for actual implementation, and since we are interested only in excess returns above risk-free rates, we used primarily futures data, where available, though more efficient implementation with swaps is frequently possible and should be undertaken. To avoid biases associated with the long recent period of falling interest rates, we wanted to cover, to the extent possible, also the period of rising interest rates in the 1970s and early

[2] Since our focus is generally on derivatives markets, we do not cover single stocks in this study.

1980s. In order to do so, we had to extend some data sets back before futures data was available using simple proxies from cash security markets. Exhibit 1 provides data sources and summary statistics. For each market we have used actual futures data, where available (the majority of each sample), and proxy futures returns prior to that (for the S&P 500, bonds and currencies only). Proxy futures returns are calculated from corresponding cash market data as follows:

S&P 500: We take total returns, including reinvested dividends, minus the 3-month T-bill return.

Bond futures: Using yield data, we calculate the returns of a 10-year bond financed at the short-term interest rate, and including roll-down.

Currencies: We use return from spot exchange rates plus the difference between domestic and foreign deposit rates as carry.

Exhibit 1: Data sources and summary statistics

Market	Begins	Data Sources	Avg Excess Return /yr	Volatility /yr	Avg Ex-Ante Carry /yr
Commodities					
Corn	Jun-60	Bloomberg	-2.2%	22.0%	-4.7%
Oil	Apr-87	Bloomberg	9.7%	34.8%	4.1%
Gold	Jan-76	Bloomberg	2.2%	19.6%	-5.1%
Copper	Dec-89	Bloomberg	8.7%	26.5%	3.6%
Nat Gas	Mar-91	Bloomberg	-7.1%	49.7%	-6.9%
Equities					
Nikkei	May-93	Bloomberg	2.4%	24.4%	0.5%
S&P 500	Jan-60	Bloomberg, Haver	5.5%	16.9%	-2.0%
EuroStoxx	Jun-99	Bloomberg	3.1%	25.0%	1.0%
S&P ASX	Apr-01	Bloomberg	5.6%	16.4%	-0.7%
FTSE 100	May-93	Bloomberg	5.9%	18.6%	-1.0%
Currencies					
AUD	Dec-77	Bloomberg, R.B.A.	2.5%	11.2%	2.7%
GBP	Dec-72	Bloomberg, IMF, DMS*	1.6%	9.7%	2.1%
EUR	Dec-72	Bloomberg, IMF, DMS*	1.2%	10.3%	-0.9%
JPY	Dec-72	Bloomberg, IMF, DMS*	0.1%	10.6%	-2.6%
CHF	Dec-72	Bloomberg, IMF, DMS*	1.3%	11.8%	-2.6%
Bond Futures					
UK Gilt	Nov-83	Bloomberg	2.8%	7.4%	1.1%
JGB	Aug-75	Bloomberg, B.O.J.	2.9%	4.6%	1.3%
Bund	Jul-92	Bloomberg	4.6%	5.5%	1.6%
US 10Y Note	Aug-72	Bloomberg, GSW**	2.9%	7.1%	1.4%
Australia 10Y	Jun-02	Bloomberg	2.4%	7.6%	0.5%

** Dimson, Marsh and Staunton database*

*** Gurkaynak, Sack, Wright database*

Consistent with the definitions above, we define (ex-ante) carry in each market as the annualized excess return assuming that spot prices remain unchanged. This quantity is calculated daily for each market.[3] Market specific definitions of carry are as follows:

Commodities: Roll yield measured between 1) the first future with an expiry greater than one year, and 2) the nearby future, to eliminate seasonality effects.

[3] To guard against occasional bad data in the early part of the sample we in fact use a trailing average of the last 10 days, with the two biggest outliers removed (i.e., a central 8/10 mean).

Currencies: Roll yield between first and second future (since no seasonality concern) or, prior to futures data being available, the short-term deposit rate differential.

Equities: Trailing 12-month total dividend divided by current spot index level, minus local short-term interest rate (we do not use futures roll yield since futures beyond one year to expiry are not available and therefore there is no way to adjust for seasonality in dividend payments).

Bond futures: Calculated directly from the yield curve (not from futures prices), defined as the yield, plus roll-down the curve, minus the short-term interest rate.

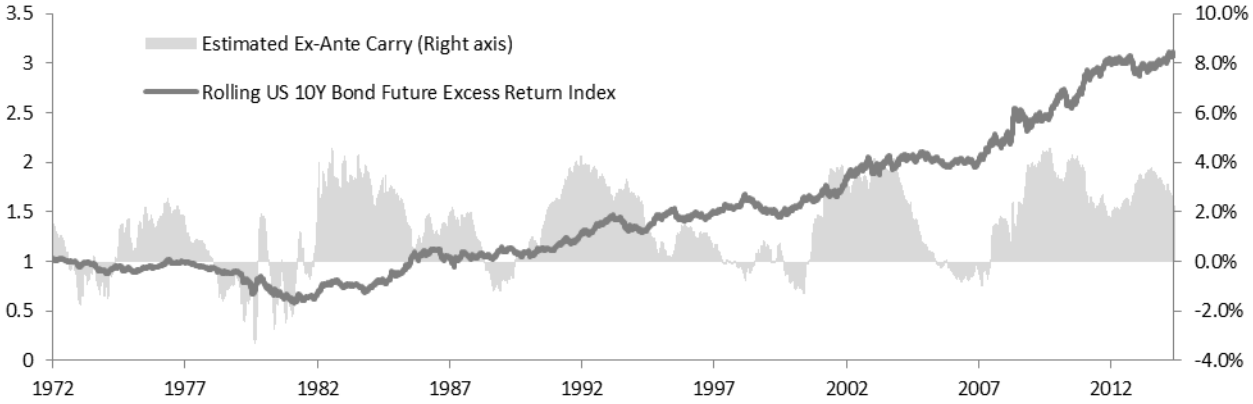
We define trend in the simplest way possible, by setting trend as positive if the futures price today is above the one-year trailing moving average futures price, adjusted for rolls, and negative if the price is below. More sophisticated methods of identifying trends can certainly improve the performance of trend following strategies, but the benefit of our approach is to capture the beta of such strategies without any sign of data-mining.

For each market, we can categorize each day then into one of four groups: 1) positive carry and positive trend, 2) positive carry and negative trend, 3) negative carry and positive trend, or 4) negative carry and negative trend. Finally, we can calculate average subsequent excess returns for each market, in each group, and annualize these. As described above, this computation is not only intuitively clean, but is similar to how these measures have been used in a model-independent way by investors for long periods.

Carry and Trend in Interest Rate Futures

To set the stage, we will first consider U.S. 10-year Treasury note futures. These futures started trading in June 1982, but we extend back to 1972 using proxy futures returns based on yield data. Exhibit 2 shows an index of excess returns of rolling futures positions beginning at one in August 1972. The chart also shows the estimated carry on the right-hand axis. The carry is positive 1.4% on average, but varies significantly and indeed goes negative in various episodes in the 1970s, late 80s and 90s and in 2006. These episodes roughly correspond to periods of inverted yield curves.

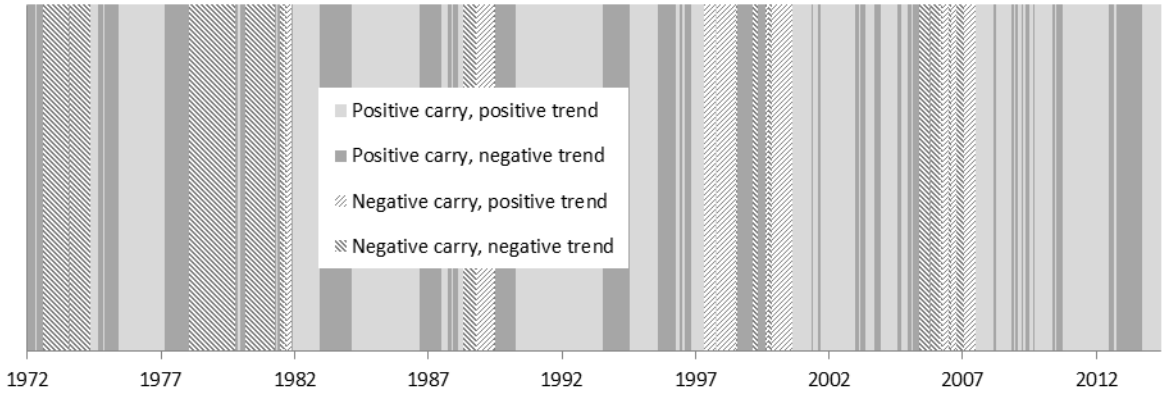
Exhibit 2: Excess return index and estimated carry for rolling U.S. 10-year note futures



Source: Bloomberg, PIMCO.

Exhibit 3 shows a decomposition of the history of returns for the 10-year futures contract into our four groups listed above. We find that positive-carry, positive-trend periods were the most common over this window (53% of the sample), consistent with the bull market in bonds from 1982–present. However, 24% of the episode was positive carry but trending negative (i.e., interest rates rising and bonds selling off). Of the negative-carry episodes (the remaining 23% of the sample), this was split roughly equally between trending up and down.

Exhibit 3: Decomposing history of U.S. 10-year note futures by carry and trend



Source: Bloomberg, PIMCO.

Exhibit 4 shows the average excess returns (annualized) for each group, as well as for the full sample. Over the full sample, the average excess return was 2.9% per year, but in periods when both trend and carry were in favor (i.e., positive), the average annualized excess return was almost double the average, at 5.2% per year. Conversely, when both trend and carry were against the position, the average return was -4.2%. The mixed categories, with one of trend and carry against, and one in favor, the returns were in between, at 1.6% and 3.2%, respectively. We also report the returns normalized by volatility since we will compare the risk-adjusted returns in each of the different quadrants across assets. The same pattern is visible, and in fact enhanced, since not only were the positive-carry, positive-trend periods the highest returning, they also had lower volatility on average.

Exhibit 4: Average returns and risk-adjusted returns by category, U.S. 10-year note futures, 1972-2014.

Market	**Begins**	**Full Sample**	**Annualized Returns by Category**				**Annualized Return/Volatility by Category**			
			Carry>0		**Carry<0**		**Carry>0**		**Carry<0**	
		Avg Return	***Trend>0***	***Trend<0***	***Trend>0***	***Trend<0***	***Trend>0***	***Trend<0***	***Trend>0***	***Trend<0***
US 10Y Note	Aug-72	2.9%	5.2%	1.6%	3.0%	-4.2%	0.8	0.2	0.5	-0.5

Trend and Carry across asset classes

The rest of this paper generalizes these results to other asset classes to see if the same pattern holds, i.e., the best returns are when trend and carry are mutually reinforcing, and the worst returns are when they are opposing. We also detail the results for different interest rate regimes and find that the results favor being in positive-trend, positive-carry investments even when rates are rising.

Exhibit 5 shows the proportion that falls into each category split by sector into commodities, equities, currencies and bonds. Exhibit 6 details the performance of each asset class within the four combinations of trend and carry highlighted above.

Exhibit 5: Proportion of history in each carry and trend category by market

Market	Begins	Frequency by Category			
		Carry>0		Carry<0	
		Trend>0	*Trend<0*	*Trend>0*	*Trend<0*
Commodities					
Corn	Jun-60	17.5%	8.6%	19.5%	54.4%
Oil	Apr-87	47.7%	11.4%	11.1%	29.7%
Gold	Jan-76	0.0%	0.0%	48.4%	51.6%
Copper	Dec-89	37.6%	11.7%	17.3%	33.4%
Nat Gas	Mar-91	26.0%	10.2%	7.5%	56.4%
Sector Average		**25.8%**	**8.4%**	**20.8%**	**45.1%**
Equities					
Nikkei	May-93	41.4%	35.2%	10.8%	12.5%
S&P 500	Jan-60	17.9%	7.2%	48.1%	26.8%
EuroStoxx	Jun-99	44.9%	18.8%	18.0%	18.3%
S&P ASX	Apr-01	21.5%	12.6%	44.2%	21.7%
FTSE 100	May-93	21.9%	7.7%	44.6%	25.9%
Sector Average		**29.5%**	**16.3%**	**33.1%**	**21.0%**
Currencies					
AUD	Dec-77	51.9%	31.7%	6.0%	10.5%
GBP	Dec-72	54.0%	35.8%	3.2%	7.1%
EUR	Dec-72	19.8%	10.7%	33.3%	36.1%
JPY	Dec-72	8.1%	3.4%	43.3%	45.2%
CHF	Dec-72	6.1%	4.1%	44.9%	44.9%
Sector Average		**28.0%**	**17.1%**	**26.1%**	**28.8%**
Bond Futures					
UK Gilt	Nov-83	38.1%	15.5%	25.8%	20.6%
JGB	Aug-75	68.0%	16.1%	6.7%	9.1%
Bund	Jul-92	65.5%	22.4%	9.5%	2.6%
US 10Y Note	Aug-72	52.9%	23.6%	10.0%	13.5%
Australia 10Y	Jun-02	34.9%	27.4%	17.5%	20.2%
Sector Average		**51.9%**	**21.0%**	**13.9%**	**13.2%**

The results are striking and intuitive. In all but one case (Bund futures), the positive-carry, positive-trend buckets significantly outperform the negative-trend, negative-carry positions. The Bund futures example is from a shorter sample period (July 1992–December 2014), and the negative-carry, negative-trend category has less than six months of observations, far fewer than the other markets. While we do not claim to have an exhaustive set of assets, and indeed it is

possible that one can find assets where the strategy of having positive trend and positive carry is not the best performer, we expect that such occurrences are relatively rare.

In addition, looking at just the "with-the-trend" trades, we find that positive-trend trades are much more profitable when also positive carry versus negative carry. Going sector by sector, commodities show remarkably strong decomposition results, with the same pattern observed as in U.S. 10-year bond futures. Some of these are worth highlighting due to specific idiosyncratic characteristics. It is worth noting that corn futures have data stretching back to June 1960 in which these results hold. Natural gas shows an extreme negative return in the positive-carry, negative-trend category (however, coming from a relatively small number of observations). Gold has always been in contango so has no positive-carry observations. Importantly, risk-adjusted returns maintain the same pattern across all five commodity markets.

In equity markets the same patterns are evident, including for the S&P 500, for which we have data back to January 1960. In some markets the positive-carry, negative-trend returns are higher than the positive-carry, positive-trend category, but the negative-carry, negative-trend returns are uniformly negative, which confirms that for portfolio construction being against the market and paying too much for this privilege is not a good strategy. Interestingly, for equity markets, the volatilities are higher in negative-trend periods (which include stock market crashes), so that on average risk-adjusted returns of the positive-carry, positive-trend strategy are the highest, and are lowest in the negative-carry, negative-trend strategy.

Results for currencies are straightforward and cover a uniformly good sample period from the early-to-mid-1970s to the present. The same pattern persists, i.e., Japanese yen has seen outlier returns in the positive-carry, negative-trend category, but again, this was from a small set of observations and indeed can be traced to an extremely active and interventionist central bank.

Lastly, bond futures show more mixed results, although again, in every case except Bunds the positive-trend, positive-carry group outperforms the negative-carry, negative-trend group. Because the majority of the sample period occurs within the 30-year declining-rates regime, the average returns are naturally higher, even in the left-hand category. The three longest histories are for the U.S., Japan and U.K. The first two markets show fairly consistent patterns. The U.K. results are weaker – possibly due to technical demand factors in the long-end of the gilts curve.

Exhibit 6: Full table of results by market, maximum available sample periods 1960-2014.

Market	Begins	Full Sample	Annualized Returns by Quadrant				Annualized Return/Volatility by Quadrant			
			Carry>0		Carry<0		Carry>0		Carry<0	
		Avg Return	*Trend>0*	*Trend<0*	*Trend>0*	*Trend<0*	*Trend>0*	*Trend<0*	*Trend>0*	*Trend<0*
Commodities										
Corn	Jun-60	-2.2%	21.2%	-8.9%	-5.7%	-7.4%	0.8	-0.4	-0.2	-0.4
Oil	Apr-87	9.7%	27.6%	29.6%	-15.4%	-17.1%	0.8	0.9	-0.5	-0.4
Gold	Jan-76	2.2%	-	-	7.1%	-2.4%	-	-	0.3	-0.1
Copper	Dec-89	8.7%	20.6%	8.1%	1.9%	-0.9%	0.8	0.3	0.1	0.0
Nat Gas	Mar-91	-7.1%	10.5%	-46.8%	32.4%	-13.3%	0.2	-1.1	0.9	-0.3
Sector Average		**2.3%**	20.0%	**-4.5%**	4.1%	**-8.2%**	0.6	**-0.1**	0.1	**-0.3**
Equities										
Nikkei	May-93	2.4%	9.1%	1.9%	-15.6%	-2.5%	0.5	0.1	-1.0	-0.1
S&P 500	Jan-60	5.5%	13.4%	21.4%	6.0%	-4.9%	1.1	0.8	0.5	-0.2
EuroStoxx	Jun-99	3.1%	6.7%	27.4%	7.3%	-35.2%	0.4	0.8	0.4	-1.1
S&P ASX	Apr-01	5.6%	14.9%	10.4%	5.7%	-6.7%	1.2	0.4	0.5	-0.3
FTSE 100	May-93	5.9%	8.4%	29.2%	5.8%	-3.2%	0.6	1.0	0.4	-0.1
Sector Average		**4.5%**	10.5%	18.1%	1.9%	**-10.5%**	0.8	0.6	0.1	**-0.4**
Currencies										
AUD	Dec-77	2.5%	5.2%	2.1%	-6.5%	-4.6%	0.5	0.2	-0.9	-0.4
GBP	Dec-72	1.6%	4.7%	-2.1%	-1.5%	-2.0%	0.5	-0.2	-0.2	-0.2
EUR	Dec-72	1.2%	5.8%	3.2%	6.2%	-6.6%	0.6	0.3	0.6	-0.6
JPY	Dec-72	0.1%	5.1%	11.7%	4.7%	-6.1%	0.6	2.3	0.4	-0.6
CHF	Dec-72	1.3%	0.8%	7.4%	4.9%	-2.9%	0.1	0.6	0.4	-0.3
Sector Average		**1.3%**	4.3%	4.5%	1.6%	**-4.4%**	0.4	0.6	0.1	**-0.4**
Bond Futures										
UK Gilt	Nov-83	2.8%	2.8%	4.9%	2.2%	2.0%	0.4	0.6	0.3	0.3
JGB	Aug-75	2.9%	3.7%	5.3%	-2.1%	-3.4%	0.9	0.9	-0.4	-0.6
Bund	Jul-92	4.6%	4.7%	2.6%	6.6%	11.8%	0.9	0.5	1.2	2.1
US 10Y Note	Aug-72	2.9%	5.2%	1.6%	3.0%	-4.2%	0.8	0.2	0.5	-0.5
Australia 10Y	Jun-02	2.4%	7.3%	1.6%	-6.8%	3.1%	0.9	0.2	-0.8	0.5
Sector Average		**3.1%**	4.7%	3.2%	0.6%	1.8%	0.8	0.5	0.2	0.4

Carry and Trend across Rate Regimes

One important and natural question that leaps out from this analysis, however, is the extent to which these results are simply driven by the period of falling rates. We have addressed the general performance of trend-following strategies in rising rates in another paper (Rennison [2014]). Admittedly, the statistical analysis is challenging due to the limited availability of data

in the early part of the sample. Nonetheless, we do have sufficient data for roughly half the markets to restrict the analysis only to the period of broadly rising interest rates from 1960–December 1982. Exhibit 7 shows these results in the same format as Exhibit 6.

We find the same patterns broadly hold, albeit with some slightly more dramatic results due to smaller sample sets and a generally volatile period. All markets except the Australian dollar (which only has data for five years in this test) show the same pattern of positive carry, positive trend outperforming negative carry, negative trend. In our view, this analysis provides ample evidence in other regimes that the baseline strategy of being on the positive side of the trend and positive carry is indeed the superior strategy.

Exhibit 7: Full table of results by market, maximum available sample period from 1960-1982.

Market	**Begins**	**Full Sample**	**Annualized Returns by Category**				**Sharpe Ratios by Category**			
			Carry>0		**Carry<0**		**Carry>0**		**Carry<0**	
		Avg Return	***Trend>0***	***Trend<0***	***Trend>0***	***Trend<0***	***Trend>0***	***Trend<0***	***Trend>0***	***Trend<0***
Commodities										
Corn	Jun-60	-0.9%	42.6%	-0.9%	-7.6%	-11.4%	1.6	0.0	-0.4	-0.8
Gold	Jan-76	6.0%			30.8%	-20.6%			1.0	-0.8
Sector Average		**2.6%**	42.6%	**-0.9%**	11.6%	**-16.0%**	1.6	**0.0**	0.3	**-0.8**
Equities										
S&P 500	Jan-60	1.8%	16.0%	12.9%	5.2%	-11.6%	1.9	0.7	0.5	-0.8
Sector Average		**1.8%**	16.0%	12.9%	5.2%	**-11.6%**	1.9	0.7	0.5	**-0.8**
Currencies										
AUD	Dec-77	-0.3%	1.2%	-5.2%	-0.5%	1.9%	0.3	-1.3	-0.1	0.6
GBP	Dec-72	-0.5%	7.9%	-6.9%	-15.5%	-39.1%	1.1	-0.7	-1.8	-3.3
EUR	Dec-72	1.4%	13.9%	3.0%	5.4%	-6.4%	3.3	0.6	0.5	-0.6
JPY	Dec-72	0.4%	1.9%	4.8%	9.8%	-10.6%	0.5	1.4	0.9	-1.0
CHF	Dec-72	2.0%			5.8%	-1.8%			0.4	-0.2
Sector Average		**0.6%**	6.2%	**-1.1%**	1.0%	**-11.2%**	1.3	**0.0**	**0.0**	**-0.9**
Bond Futures										
JGB	Aug-75	0.1%	6.0%	-1.9%	-2.9%	-2.2%	2.7	-0.6	-0.9	-0.5
US 10Y Note	Aug-72	-1.9%	4.7%	-3.8%	-5.6%	-6.6%	0.7	-0.6	-0.8	-0.7
Sector Average		**-2.4%**	5.4%	**-2.9%**	**-4.2%**	**-4.4%**	1.7	**-0.6**	**-0.8**	**-0.6**

Conclusions

In this paper we first identified that the returns to carry and trend are robust over periods and asset classes. In particular, the combination of positive-carry and positive-trend positions is without exception better than negative-carry and negative-trend positions over each historical period and for (almost) every asset class and across rate regimes. In addition, we find that while carry in itself is a positive expected return strategy, positive-trend strategies can match and even exceed positive-carry strategies over a wide combination of periods and assets, but the best combination ex-ante is to build portfolios that democratically harvest the best trends and best carry.

The investment implications are straightforward: combining positive-carry and positive-trend positions has high positive risk-adjusted expected returns. As a corollary, if positive-carry positions cannot be found, then by extension of our results, positive-trend positions that minimize negative carry are high-expected-return strategies. This has significant impact for portfolio construction at a high level. In summary, it reminds us that the best strategy for long term portfolio construction is: “Be on the right side of the trend, and don’t pay too much while you are at it.”

References

Asness, Clifford S. and Moskowitz, Tobias J. and Pedersen, Lasse Heje, “Value and Momentum Everywhere,” *Journal of Finance*, 2013, vol. 68(3), pp. 929-985.

Bhansali, Vineer, “Volatility and the Carry Trade.” *Journal of Fixed Income*, 2007, 17(3), pp. 72-84.

Campbell, John and Sunderam, Adi and Viceira, Luis M., “Inflation Bets or Deflation Hedges? The Changing Risks of Nominal Bonds,” NBER Working Paper. February 2009.

Cochrane, John H., "Presidential Address: Discount Rates." *Journal of Finance*, 2011, 66(4), pp. 1047-1108.

Cochrane. John H. and Piazzesi, Monika, “Bond Risk Premia,” American Economic Review, 2005, 95, pp. 138-160.

Fama, Eugene F. and French, Kenneth, “Dividend Yields and Expected Stock Returns.” *Journal of Financial Economics*, 1988, vol. 22, issue 1, pp. 3-25.

Fama,Eugene F. and Bliss, Robert R. “The Information in Long-Maturity Forward Rates.” American Economic Review, 1987, 77(4), pp 680-692.

Fung, D. and Hsieh, D.A., “The Risk in Hedge Fund Strategies: Theory and Evidence from Trend Followers”, The Review of Financial Studies, 2002, 14(2), 313.

Geczy, C. and Samonov, M. (2013). “212 Years of Price Momentum”, Working Paper, URL:http://ssrn.com/abstract=2292544.

Giesecke, Kay and Longstaff, Francis A. and Schefer, Stephen and Strebulaev, Ilya A., "Macroeconomic Effects of Corporate Crisis: A Long-Term Perspective," *Journal of Financial Economics*, 2014, 111, pp. 297-310.

Gorton, Gary B. and Hayashi, Fumio and Rouwenhorst, K. Geert, "The Fundamentals of Commodity Futures Returns", Yale ICF Working Paper No. 07-08. February 2012.

Gurkaynak, R, Sack, B and J. Wright, "The U.S. Treasury Yield Curve: 1961 to the Present", Finance and Economics Discussion Series, Divisions of Research & Statistics and Monetary Affairs, Federal Reserve Board, 2006

Keynes, John M., Treatise on Money. Macmillan, London. Chapter 29, 1930.

Koijen, Ralph S. J. and Moskowitz, Tobias J. and Pedersen, Lasse Heje and Vrugt, Evert B., "Carry", Fama-Miller Working Paper, November 2007.

Leibowitz, M., Bova A., and Kogelman S., "Long-Term Bond Returns Under Duration Targeting", Financial Analysts Journal, Vol. 70, Issue 1, January/February 2014.

Lemperiere, Y., Deremble, C., Seager P., Potters, M., Bouchaud, J.P. "Two Centuries of Trend Following", Journal of Investment Strategies, 3, 41 (2014).

Lustig, Hanno and Verdelhan, Adrien, "The Cross Section of Foreign Currency Risk Premia and Consumption Growth Risk," *American Economic Review*, American Economic Association, vol. 97(1), pages 89-117, March 2007.

Menkhoff, Lukas and Sarno, Lucio and Schmeling, Maik and Schrimpf, Andreas, “Carry Trades and Global Foreign Exchange Volatility,” *Journal of Finance*, vol. 67, Issue 2, pp 681-718, April 2012.

Moskowitz, T.J., Ooi, Y.H., Pedersen. L.H. “Time Series Momentum”, Journal of Financial Economics, 2012, 104, 228.

Rennison, G., Dorsten, M. and Bhansali, V. “Trend Following and Rising Rates”, PIMCO, September 2014.