Inflation Hedging Products

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Abstract

We discuss the possibilities for hedging inflation in U.S. financial markets, reviewing the literature and providing some new evidence. We emphasize that there is no one-size-fits-all approach to inflation hedging; the optimal hedge depends on the particular types of prices that an investor is exposed to and at which horizons. In addition, the relative attractiveness of different inflation hedging instruments evolves over time, depending on the growth-inflation regime. This is reflected in the inflation risk premium (IRP), which measures the cost of inflation hedging. Our review of the empirical evidence on the IRP embedded in various assets illustrates how, since the global financial crisis, inflation risk has evolved into disinflation risk, dictating a negative IRP for nominal bonds and a positive IRP for equities.

Keywords: Inflation, real assets, inflation risk premium

JEL codes:

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1 Introduction

This chapter reviews the efficacy and cost of some simple strategies for hedging inflation risk in financial markets, focusing on evidence from the United States. Although the question of which assets provide good inflation hedges may seem straightforward, we emphasize that there is no one-size-fits-all portfolio prescription as different investors may have different types of inflation-hedging objectives. Economists' knee-jerk instinct is to deflate every nominal series by some broad index like the CPI or PCE deflator. But for individual investors this may be a very misleading way of measuring the relevant "real" cash flows.

For example, suppose a consumer's only income is her monthly wage, her only asset is her house, and her only expense is her fixed-rate mortgage payment. This consumer is exposed to the risk of wage inflation (or, more precisely, wage *dis*inflation). She also may be exposed to house-price changes, but the nature of that exposure will depend on her housing plans—whether to move to a substantially different housing market or switch to renting, and at what point in the future this might occur. In any case, a calculation of her real debt burden that deflated her mortgage by the CPI would make no sense, and a hedging strategy that involved a CPI-linked product would leave her exposed to the basis between consumer prices and her wage, and possibly to the basis between consumer prices and house prices.

Of course, most consumers don't just pay a mortgage. But even a household that consumes exactly the CPI basket every month will also have assets, liabilities, and an income stream that will make the CPI an imperfect proxy for its net exposure to price changes. Similarly, even well diversified firms have costs and revenues that are likely to diverge dramatically from consumer and producer price indices and that may diverge by different amounts over different horizons.

In general terms, any investor i (household, business, financial institution, pension fund, insurance company) wants to protect the real value of her own expected future net worth over an horizon τ:

$$NW^i_{t,\tau} \quad = \quad E_t \left[\int_t^{t+\tau} \left(x^A_{i,s} - x^L_{i,s} \right) M^N_s ds \right] \tag{1}$$

where $x^A_{i,t}$ and $x^L_{i,t}$ are nominal cash flows that the investor receives and pays, respectively, at time t, and M^N_t is the nominal pricing kernel. Equivalently, the investor

discounts real quantities by the *real* pricing kernel $M^R_{i,s}$:

$$NW^i_{t,\tau} = E_t \left[\int_t^{t+\tau} \left(\frac{x^A_s}{P^A_s} - \frac{x^L_s}{P^L_s} \right) M^R_{i,s} ds \right] \tag{2}$$

where P^A_t and P^L_t are the prices associated with the respective cash flows (i.e., the asset and liability prices). The real pricing kernel is indexed by i because it is defined in relation to a particular price index, which, in turn, is unique to each specific agent's situation:

$$P_{i,t} = M^R_{i,t} / M^N_t \tag{3}$$

$P_{i,t}$ is a weighted difference of P^A_t and P^L_t. For investor i, hedging inflation risk means minimizing the variance of this index.

This simple framework allows us to think about different aspects of hedging inflation risk. If the asset and liability prices do not change at the same rate, then the inflation risk originates from the gap between the two inflation rates. Furthermore, asset inflation and liability inflation can vary across investor types. For instance, most households will be concerned about the difference between wage inflation and CPI inflation, while businesses will be concerned about input inflation (wage and capital-investment inflation) versus output inflation (depending on the firm's industry, e.g., technology versus energy inflation). Long-term institutional investors, such as insurance companies and public pension funds, typically have cost-of-living-adjusted liabilities and therefore need assets that adjust accordingly. Even within a certain investor class, the need for protection against inflation may change with specific investor characteristics. For instance, within the household category, the relevant inflation may depend on age: an average retiree may be more exposed to medical expenses than an average urban consumer; and an average student may be more exposed to education expenses (Parikh et al., 2019).

Finally, the timing of the cash flows matters. The differences in the asset and liability inflation rates can be magnified if there is a duration gap between assets and liabilities. Even when the price index for assets and liabilities is the same, the investor may still face inflation risk due to the duration gap. A special case that illustrates the importance of this point is an investor who needs to hedge a cash flow at a particular horizon. In the absence of real yield fluctuations, a 10-year inflation-linked bond should be a perfect hedge for its underlying price index over a period of exactly 10

years. But, as we show, it can be quite a poor hedge at shorter horizons.

These considerations are relevant because different types of inflation are imperfectly correlated with each other. Consequently, a given asset's hedging abilities can be good for one type of inflation but not for another type. For example, commonly used "real assets" such as stocks, currencies, commodity futures, and real estate are generally good hedges for energy inflation but not for core inflation (Fang, Liu, Roussanov, 2021; henceforth FLR). Treasury Inflation Protected Securities (TIPS) on the other hand, are highly exposed to core CPI inflation but do not protect from energy inflation at short to medium horizons.

We review the literature on the inflation-hedging ability of different assets and add some new evidence of our own. Over the last twenty years, we find that commodities are generally successful in hedging headline inflation, but this mostly seems to reflect their significantly positive relation with energy prices. Related assets, such as the stocks of oil-and-gas and metals-mining firms and some emerging-market (EM) currencies, share this property. Hedging core inflation is harder. At horizons of less than a year, there is little protection available, except for TIPS. At longer horizons, short-term nominal bonds and real estate provide a decent hedge. Certain stock-market strategies can also work, but here one has to be careful because performance varies substantially across different types of stocks. There are also some significant differences in how stocks and bonds strategies perform against core CPI vs. core PCE. For instance, post 1999, 2-year nominal bonds are a good hedge for core CPI at longer horizons, while certain stock-market sectors such as oil and gas are a good hedge for core PCE. We find that core producer prices (PPI) and wages are the most difficult types of inflation to hedge, although real estate and short-term nominal bonds provide some protection.

Most of consumer-price inflation stems from three sources: real estate costs, the passthrough of materials and energy prices to consumer goods, and the passthrough of labor costs to goods and services. Materials and energy prices are closely tied to commodities, which can be hedged very effectively through futures markets or closely related assets like sectoral equities. Real estate can now be effectively hedged through REITs and other instruments that provide broad exposure to this sector. But the literature does not identify any financial instruments that effectively hedge labor costs, and our empirical exercise also comes up largely empty-handed here. Since wages are a particularly large component of the cost of nonhousing services, hedging service and

core inflation outside of real estate proves to be quite difficult.

Another consideration is that the nature of inflation risk that needs to be hedged depends on the composite economic-inflation regime (e.g., high inflation, high growth–demand shocks dominate; high inflation, low growth–supply shocks dominate; low inflation, low growth–deflation bias dominates; and transition among those regimes which creates inflation uncertainty as shown in David and Veronesi, 2013). Apparently, core and energy prices are also driven by different demand shocks, hence the simple distinction between regimes in which supply shocks dominate and regimes in which demand shocks dominate is not sufficient (FLR). We also document that the properties of inflation hedging products have changed over time, especially because, in the U.S., after the global financial crisis (2007-09), disinflation/deflation risk has dominated inflation risk.

Finally, we turn to the cost of inflation risk by focusing on measures of inflation risk premia (IRP). These premia are a strong indicator of the attractiveness of an asset as inflation hedge. They have typically been measured from no-arbitrage dynamic pricing models of the nominal and real term structure, but methods have recently been developed to extract them from other asset classes as well. The changing nature of inflation risks over time has strongly affected the IRP embedded in various assets. The size and sign of the IRP is determined by the covariance between inflation and the real side of the economy, and as this covariance has transitioned from mostly negative to mostly positive over the last 20 years, nominal bonds have commanded a negative IRP and stocks a positive IRP.

In a nutshell, this chapter shows that an asset's inflation-hedging abilities are time varying as they depend on: the measure of inflation (e.g., core versus energy CPI), the investment horizon, and the composite growth-inflation regime.

2 Literature review

In this section, we review the evidence from previous studies on how different assets have performed in hedging inflation. It is useful to distinguish between "real assets" and "nominal assets." By "real assets" we mean those whose value is directly tied to physical assets. The primary assets in this category are equities, real estate, and commodities.

Real assets contrast with currencies and bonds. Currencies generally lose value

in response to inflation in the home country, which means that in some cases foreign currencies can be a good inflation hedge. Bond yields compensate investors for expected inflation over the life of the bond, but if inflation is higher than expected the real purchasing power of the cash flows will be eroded. To the extent that unexpected inflation leads to revisions of future expected inflation, this loss of real purchasing power can be significant. An exception to this is inflation-indexed bonds (which might also be considered "real assets," though in a slightly different sense).

2.1 Stocks: Broad Indices and Individual Stocks

Stocks represent claims against real assets, such as factories, equipment, and inventories. However, as pointed out in Gorton and Rouwenhorst (2006), firms also have contracts with suppliers of inputs, labor, and capital, that are fixed in nominal terms and hence act very much like nominal bonds. Furthermore, if inflation is negatively correlated with real economic performance, firms may suffer losses in high-inflation regimes: their equity prices may fall even if they are adjusting perfectly to inflation. These observations imply that whether stocks provide a good hedge against inflation is an empirical question.

Numerous studies have documented the poor inflation-hedging ability of the aggregate stock market in the U.S. and in most countries. Some work shows that using individual equities or equity sectors can provide a good inflation hedge, but the performance is time-varying and depends on the measure of inflation under consideration.

Ang et al. (2012) show that there is considerable heterogeneity in how individual stock returns covary with CPI inflation, as different companies have different pricing power. They construct portfolios based on individual S&P500 stocks realized inflation betas and analyze their performance in- and out-of sample.[1] They find that since the 1990s, the top 20 stocks with the highest realized-inflation betas have had CPI inflation betas exceeding 5. The quintile portfolio with the highest ex post inflation betas overweighted oil/gas, which benefits from rising commodity prices, and technology, which benefits from technological innovation. However, they also show that trying to forecast ex ante inflation betas at the individual stock level is difficult, as inflation betas exhibit pronounced time variation, including change in sign post 2008. This makes it hard to construct portfolios of stocks that are good out-of-sample inflation

[1]Inflation betas are the slope coefficient in a (full-sample or rolling) regressions of stock returns on inflation, which can be measured either by realized, expected, or unexpected inflation rates.

hedges.

However, Parikh et al. (2019) show that some equities also have a good out-of-sample performance against CPI inflation over the period between January 1990 and January 2014. In particular, they also rank the equities in the S&P500 based on their individual inflation betas to construct quintile portfolios and analyze their returns' relation to the CPI.[2] They find that their top-quintile portfolio has a positive and significant relation with CPI out of sample and that the best performing stocks are concentrated in the energy and technology sectors, in line with Ang et al. (2012). When they use equity sectors rather than individual equities (which helps reducing the rebalancing costs), they find that although the energy, utilities, and materials sectors perform quite well in hedging inflation, the portfolios constructed from individual equities are superior.

While the previous two studies evaluate the short-run performance of individual stocks, Bampinas and Panagiotidis (2016) focus on the long-run (LR) perspective. That is, the stocks are ranked based on their cointegrating relation with CPI, and are used to build in- and out-of-sample portfolios sorted by their long-run CPI betas. The in-sample estimates over the period 1993-2012 indicate that the LR relation between the aggregate stock market and CPI inflation is insignificant, while a substantial set of individual stocks has significantly positive LR betas, with the top two being in the health care sector. Overall, the industrials and energy sectors perform quite well in the long run. The out-of-sample portfolio with three-year rebalancing period has the highest covariation with inflation. And the energy sector has the highest inflation beta, followed by materials and consumer staples sectors. However, there is considerable time variation in the LR betas.

The results about a statistically insignificant LR relation between the aggregate stock market and CPI inflation contrast with the results of Boudoukh and Richardson (1993) over the sample period 1802-1990. They find that five-year stock returns and five-year inflation are positively and significantly related both *ex ante* and *ex post*. Further these findings are robust with respect to subperiods as well as in the case of the U.S. and U.K markets. This suggests that the inflation-hedging ability of the aggregate stock market deteriorated post 1990.

Importantly, after decomposing headline CPI inflation into core and energy, FLR

[2]Unlike Ang et al. (2012), instead of using current month CPI Parihk et al. use the subsequent one-month change in CPI as the regressor, and they do not use 5-year rolling regressions but the full sample available at each point in time.

find that stocks' exposure to the two components are very different. Stock portfolios over the 1963:Q2-2019:Q4 sample period have significantly negative core-inflation betas but positive energy-inflation betas, which implies that the insignificant relation between stocks and headline CPI may be due to the two opposite betas offsetting each other. Even across five industry stock portfolios (consumer, manufacturing, high tech, health, and others), all the core betas are significant and negative, while the energy betas are positive (though only the one for the manufacturing sector is statistically significant). Overall, these results suggest that an asset's inflation hedging properties may depend on the measure of inflation, and this is why in the next section we analyze multiple inflation indices.

2.2 House prices and REITs

A real estate investment trust (REIT) is essentially an investment company that owns real-estate-related assets. Shares in REITs trade on organized exchanges or in the over-the-counter market and their ownership allows investors to "participate" in large real-estate investments selected and managed by professionals. There are three major types of REITs. Mortgage trusts primarily hold long-term mortgages. Equity trusts are more focused on ownership of commercial property such as shopping centers, office headquarters, and so on. And finally hybrid REITs hold a mix of mortgages and property. Since equity REITs are backed directly by physical real-estate assets, one might expect *a priori* that they would be superior to mortgage REITs in hedging against inflation.

However, Park et al. (1990), using REIT returns over monthly, quarterly, semiannual, and annual horizons in the sample period January 1972-December 1986, find that none of the three types of REIT investments display reliable inflation hedging properties. Similarly to aggregate stock indices, REITs appear to have negative inflation betas. Similar results were obtained when the producer price index (PPI) replaced the CPI in their analysis.

Over the sample period 1980-2019, also FLR find that REITs' headline CPI inflation beta is close to 0 and not statistically significant. However, all REITs have highly significantly negative core inflation betas, and their magnitude is similar to those of stocks. They are also positively exposed to energy inflation, but only the beta of equity REITs is statistically significant. Hence, similarly to stocks they only hedge energy inflation.

2.3 Commodities: Broad Indices and Individual Futures

A commodity futures contract is an agreement to buy (or sell) a specified quantity of a commodity at a future date, at a predetermined price specified in the contract–the futures price. Commodities, and hence commodity futures, display many differences. Some commodities are storable and some are not; some are input goods and some are intermediate goods.

Many commodity futures are traded on U.S. exchanges–with the exception of some metals that are traded in London. Physical delivery occurs at a location within the contiguous 48 states, and settlement is in U.S. dollars. The U.S. markets for some commodity futures (gold, crude oil) should be integrated with global markets, but prices of others are likely to be influenced by local conditions (natural gas, live hogs).

Gorton and Rouwenhorst (2006) construct monthly time series of equally-weighted indices of both commodity spot and commodity futures prices to assess the performance of this asset class as a whole. They show that average returns of monthly and annually re-balanced futures and spot indices have outpaced CPI inflation over the period between 1959 and 2004. But the average buy-and-hold spot return of 3.47% per annum is lower than the average inflation of 4.15% over the same sample period, suggesting that over the long term commodities' inflation-hedging performance deteriorates. They also show that commodity futures are a better inflation hedge than stocks or bonds. One obvious reason is that commodity futures represent a bet on commodity prices, which are directly linked to the components of inflation. Further, all the results carry trough when the authors use unexpected rather than actual CPI inflation.

Gorton and Rouwenhorst (2006) also examine whether the equities of companies involved in producing commodities are a good substitute for commodity futures, and to do so they construct an index of the stock returns on such companies and then compare its performance to the equally weighted commodity futures index. Their findings indicate that over the 41-year period between 1962 and 2003 the cumulative performance of futures has exceeded the cumulative performance of "matching" equities and the correlation between the two investments was only 0.40. This is because commodity company stocks behave more like other stocks than their counterparts in the commodity futures market, and hence are not a good substitute.

Erb and Harvey (2006) point out that over the 1982-2003 period not all commodity futures were good inflation hedges. In particular, three sectors (energy, livestock, and

industrial metals) and three individual commodity futures (heating oil, cattle, and copper) had statistically significant and positive inflation betas, but the precious metal sector, gold, and silver had statistically significant negative betas.

Kat and Oomen (2006) use daily settlement prices on 142 commodity futures contracts covering the period from 1973 to early 2005. Importantly, they also analyze three different types of inflation: CPI, PPI, and the employment cost index (ECI, from 1982). In the case of CPI and PPI they consider both headline and core versions the index. They show that overall, at annual frequency, commodity futures returns and inflation are positively correlated. The average correlation with CPI is 25.1%, with PPI 23.3%, and with ECI 22.8%. Energy, metals, cattle, and sugar display the highest correlation with inflation. While grains and oil seeds, pork, and palladium have little or even negative relations with inflation. There are not significant differences across the three measures of inflation, although correlation with ECI are substantially lower. When they consider core CPI and PPI the correlation with energy, meat and livestock are notably reduced. These results are broadly consistent with those we will report in Section 3.

2.4 Treasury Inflation-Protected Securities

TIPS are fixed-income securities whose semiannual coupons and principal payments are indexed to the non-seasonally-adjusted CPI for all urban consumers. The Treasury began issuing them in 1997. Importantly, when TIPS mature, the investor is paid the adjusted principal amount or the original principal, whichever is greater. Hence, there is an embedded floor for the principal value that cannot decrease in case of deflation.[3]

The adjustment of the TIPS principal is done scaling it up by the "index ratio," which is obtained by dividing the reference CPI by the CPI at the time of issuance. The reference CPI has an indexation lag of about 2.5 months, which means that investors cannot precisely lock in a real return. The price at time t of a zero-coupon (ZC) TIPS with maturity τ and indexation lag l is determined as follows:

$$P_{t,\tau}^{ZC} = E_t\left[\frac{M_{t+\tau}^N}{M_t^N}\frac{CPI_{t+\tau-l}}{CPI_{t-l}}\right] = E_t\left[\frac{M_{t+\tau}^N}{M_t^N}\frac{CPI_{t+\tau-l}}{CPI_t}\right]\frac{CPI_t}{CPI_{t-l}}; \tag{4}$$

where M_t^N is the nominal discount factor (also known as pricing kernel). The last term

[3]See Grishchenko et al. (2016) and Christensen et al. (2012).

illustrates that the price of TIPS can be decomposed in the price of a zero-coupon bond that perfectly hedges CPI inflation until maturity $\tau - l$ times the CPI inflation realized over the previous 2.5 months (l). Hence, TIPS holders receive compensation for the inflation that occurred 2.5 months before the purchase date, but are still exposed to inflation during the 2.5 months just preceding the maturity or sale of the bond. As a consequence, the price of TIPS will reflect the expected divergence between these two rates of inflation plus an indexation lag premium for the inflation risk associated to this expected divergence. D'Amico et al. (2018) show that the indexation lag premium is generally very small, varying between -5 and 3 basis points at the 10-year maturity, and slightly larger at shorter maturities. But at times it can rise to 30 or 70 basis points at the 10- and 5-year maturity respectively, as happened in December 2008. Overall, these findings indicate that the shorter the horizon of the inflation hedging strategy, the more relevant the indexation lag premium will be.

From a portfolio management perspective, TIPS provide a stream of known "real" payments at horizons up to 30 years and are therefore highly attractive to long-term investors, such as retirement savings accounts. Alternatively, investors can hold TIPS mutual funds and ETFs. In 2021, as inflation concerns were rising, flows into TIPS mutual funds and ETFs were exceptionally strong. As of July 2021, those flows accounted for roughly 25% of total assets under management. Since 2018, the cumulative fund flows into TIPS ETFs has been of about $250 billion.[4]

Despite their intuitive inflation-hedging properties, there is little formal empirical work on TIPS' success in this regard. Based on returns from 2001 to 2019, FLR report that a TIPS index's headline inflation beta was 0.64, implying that TIPS are not a perfect hedge against headline CPI inflation. However, the TIPS index's exposure to core CPI inflation was 4.54, that is, TIPS return increases by 4.54 percent in response to 1 percent increase in core inflation rate. In contrast, the TIPS index does not hedge against energy inflation. It is interesting that TIPS are the only real asset found to be useful against core inflation in the FLR study. Indeed, we will show in Section 3 that it is quite difficult to find instruments to hedge core measures of inflation.

2.5 Inflation Derivatives

We mainly focus on the most traded U.S. inflation derivatives and mention some of the less popular ones briefly, just for completeness.

[4]Based on Haver and EPFR Global, which tracks fund flows, and Bloomberg data.

An inflation swap (IS) is a derivative transaction in which one party agrees to swap fixed payments for floating payments tied to the non-seasonally-adjusted CPI for urban consumers, for a given notional amount and period of time (Fleming and Sporn, 2013). U.S. ISs were introduced when the Treasury began issuing TIPS in 1997. Indeed, the inflation index used in an IS matches precisely the inflation index for TIPS, including the same indexation lag. Hence, in theory, the IS rate and the TIPS-implied BEI rate should be equal in the absence of market frictions. In practice, IS rates are almost always higher (with the spread exceeding 100 basis points during the global financial crisis). This is mostly because the market is characterized by one-way flows with a lack of natural sellers of inflation protection. The only parties that sell protections are dealers or real money investors whose positions are ultimately hedged with TIPS cash flows and, therefore, they pass on the hedging costs to the receivers of inflation, charging a fee.

Zero-coupon ISs are the most commonly used. They have only one cash flow (CF) at expiration. For instance, in the case of a 10-year zero-coupon IS with rate equal to 200 basis points at inception, the cash flow exchange at maturity will be:

$$CF_{t+\tau} = (1 + 0.0200)^{10} - I_{t+\tau}; \tag{5}$$

where $I_{t+\tau}$ is the inflation index.

ISs trade in a dealer-based over-the-counter market. The predominant market makers are the G14 dealers, which trade with one another and with their customers.[5] Differently from TIPS, ISs can be tailored to more precisely meet investor needs because the IS maturity, notional amount, and other terms are agreed upon at the time of the trade. Hence, some entities might prefer ISs to TIPS. Further, ISs are often favored by pension funds and insurance companies because they allow to hedge inflation risk without borrowing and without explicit short positions.

Fleming and Sporn (2013) analyze all electronically matched zero-coupon IS U.S. trades involving a G14 dealer from June 1 to August 31, 2010. They find that just over two trades per day occurred. Daily notional trading volume was estimated to average $65 million. In the TIPS market, in comparison, an estimated $5 billion

[5]As reported in Fleming and Sporn (2013), the G14 dealers are the largest derivatives dealers and, during the period covered by their study, include Bank of America, Barclays, BNP Paribas, Citigroup, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JP Morgan Chase, Morgan Stanley, Royal Bank of Scotland, Société Générale, UBS, and Wells Fargo.

per day traded over the same period, on average. However, their analysis reveals that, despite the over-the-counter nature and low level of trading activity, the market is reasonably liquid and transparent. Transaction prices are typically near widely available end-of-day quoted prices and realized bid-ask spreads are modest. In recent years, following regulatory initiatives, ISs have increasingly moved to central clearing, which may enhance their liquidity further.

It is worth mentioning that, in February 2004, the Chicago Mercantile Exchange (CME) started trading futures on the U.S. CPI inflation index. The main advantage of CPI futures over zero-coupon ISs was to mitigate counterparty risk. However, as reported in Kerkhof (2005), likely due to the ill-design of the CPI future (the contract traded annualized quarterly inflation), the market never really took off.

Finally, in the U.S., the inflation options market started in 2002 with the introduction of caps and floors on the realized inflation rate. An Inflation-Indexed Caplet (IIC) is a call option on the inflation rate implied by the CPI index. Analogously, an Inflation-Indexed Floorlet (IIF) is a put option on the same inflation rate. Trading in inflation caps and floors gained momentum following the global financial crisis, but has dried up recently.

Using quotes from inflation caps and floors during the years in which the market was active, Kitsul and Wright (2013) analyze the economic properties of the probability density of inflation. Interestingly, by comparing the option-implied densities to those derived from time-series models, they show that the empirical pricing kernel is U-shaped, with investors having high marginal utility in states of the world characterized by either deflation or high inflation. This would explain why assets that pay off in those states are particularly attractive, as we will discuss in Section 4.

2.6 Currencies

The rationale for currencies to hedge inflation risk is purchasing power parity (PPP). When the U.S. experiences a higher inflation, the purchasing power of the dollar declines and the foreign currency appreciates.

The literature has considered different types of currency portfolios. Menkhoff et al. (2017) built value portfolios that are sorted based on the deviation from PPP. For instance, their first value portfolio would contain currencies that are most undervalued relative to their real exchange rates five years before. Undervalued currencies are expected to appreciate as they should revert back to their fundamental values. Verdelhan

(2018) has constructed currency portfolios sorted on dollar betas, interacted with the sign of average forward discount. Lustig et al. (2011) use interest-rate-sorted currency carry portfolios, and Lustig et al (2014) consider the dollar carry portfolio.

FLR analyze the performance of all of these portfolios relative to headline CPI, as well as core and energy inflation. They find that the value portfolios have positive headline inflation betas, which mostly come from energy inflation. All value portfolios have negative core inflation betas, though statistically insignificant. The results obtained using currency portfolios sorted by their dollar betas indicate that currencies that have higher dollar betas have more negative core inflation betas and more positive energy inflation betas. So also in this case the hedge is only against energy inflation. The currency carry portfolios are almost a perfect hedge with respect to headline inflation, but they mostly load negatively on core inflation and the loadings decline with the interest rate. High-interest-rate currencies load more negatively on core inflation and more positively on energy inflation. The dollar carry portfolio has a large negative beta with respect to core inflation.

Another strategy to hedge inflation risk using currencies is to focus on those of emerging markets (EM) that are commodities exporters, such as, Russian Ruble, South African Rand, and Brazil Real. Those currencies gain when there is a rise in the prices of major commodities exported by the country. For instance, in July 2021, the South African Rand was the best performing EM currency, supported by rising gold, base metal, and iron ore prices. The Ruble also gained as oil prices in July 2021 reached their highest level since 2018.

3 Empirical properties of inflation hedges

In this section, we present evidence on the inflation-hedging properties of various types of financial assets. As emphasized above, there is no single metric for this–it depends on what *type* of inflation an investor needs to hedge and over what horizon. With that in mind, we consider several different price indices over investment horizons ranging from one month to 30 years. The inflation measures we consider are listed in Table 1, while all the financial assets and their sources are listed in Table B1 in Appendix.[6] Note that we include commodity prices in both categories, since, depending on the

[6]We use realized inflation in our simple analysis, since we are interested in the actual relation between asset returns and inflation, regardless of whether it was expected or unexpected.

investor, a particular commodity may either represent a cost that needs to be hedged or a potential hedging instrument. We also include the CPI among the asset returns, even though it is not itself a traded instrument, as a proxy for how a standard inflation swap would have performed in hedging various types of inflation over time.

Table 1: Measures of Inflation

CPI: Headline; Core; Energy; Services; Durables; Nondurables
PCE: Headline and Core
PPI: Finished Goods and Finished Goods Core
Wage Inflation: Hourly Earnings
Broad Commodity Indices: BCOM and GSCI

Our measure of a given asset's inflation-hedging ability is its nominal price's simple (Pearson) correlation with each type of inflation (abstracting from transactions costs). Computing these correlations at short horizons is straightforward. But, at investment horizons of more than a few years, the raw data are not sufficient to estimate correlations precisely. For 10-year correlations, for example, even our longer sample contains only five non-overlapping observations. To overcome this problem, we estimate time-series models of each price index/asset price pair, and we use these models to project the correlations at different horizons. Specifically, for each pair of variables for which we have monthly data, we search across possible VARIMA(p,1,q) models, where $p \in [0, 12]$ and $q \in [0, 3]$, in log-levels. For the few quarterly series, we take $p \in [0, 4]$ and $q \in [0, 1]$. In each case, we select the best model using the AIC, simulate 1 million observations, and compute the correlations between changes in log-levels at various horizons.

We begin our baseline sample in 1999. The focus on this relatively short period allows us to bring in TIPS and many other inflation and asset-return series that cannot be considered in longer samples. It is also valuable to look mainly at recent behavior, since there is evidence that correlations have shifted over time, and Section 2 has already reported a lot of evidence related to older and longer periods. We also consider a second sample beginning in 1972 using a subset of the series that are available over that period. Both samples end in 2020.

3.1 Buying and holding bonds

The treatment of equities and commodities in this exercise is relatively straightforward, but some difficulty arises when considering hedging using bonds in this context. A strategy of holding a bond for its entire life is very different from a strategy of continuously rolling over to maintain a bond portfolio of constant maturity. For instance, if the real yield did not vary much, when held to maturity, TIPS could provide an almost perfect hedge against headline CPI (setting aside some technical issues). But, if the real yield fluctuates, TIPS can perform quite poorly at short and long investment horizons. This is because real yields generally move in the same direction as inflation.[7] Thus, capital losses on TIPS typically offset some of their built-in inflation protection. Further, these losses can be worse for longer duration TIPS, which are more sensitive to yield volatility.

Consider a zero-coupon nominal bond of maturity τ and an investment horizon $h \leq \tau$.[8] Denote the initial (time-t) yield on the nominal bond by $y^N_{t,\tau}$ and real yield on the TIPS by $y^R_{t,\tau}$. Define each bond's return as the change in its log price, and recall that the price of a nominal bond is just $\exp[-\tau y^N_{t,\tau}]$. Then, the total nominal return on the nominal bond over the investment horizon is:

$$r^{N(\tau)}_{t,t+h} = \tau \left(y^N_{t,\tau} - y^N_{t+h,\tau-h} \right) + h y^N_{t+h,\tau-h}. \tag{6}$$

When it comes to TIPS, the nominal return is:

$$r^{R(\tau)}_{t,t+h} = \tau \left(y^R_{t,\tau} - y^R_{t+h,\tau-h} \right) + h y^R_{t+h,\tau-h} + \pi_{t,t+h} \tag{7}$$

where $\pi_{t,t+h} = \log \frac{CPI_{t+h}}{CPI_t}$ is the log change in the CPI between periods t and $t+h$. Thus, to calculate the return on a holding strategy for both types of bonds, one needs to know the τ-period yields at the beginning of the investment and the $(\tau - h)$-period yields at the end. In the case of TIPS, one also needs to know the intervening rate of inflation.[9]

With this in mind, we modify our strategy by extending the considered VARIMA

[7] Although the inflation component in equation (7) is itself a perfect hedge at every horizon, it is generally correlated with the changes in the real yield. In particular, under the Taylor principle, real yields will generally rise when inflation rises.

[8] If $\tau > m$ some rollover will be necessary. We sidestep this more-complicated case in the interest of space.

[9] The calculation for TIPS abstracts from the deflation floor and the indexation lag.

models to include three variables rather than two: a price index, an τ-maturity bond yield, and an $(\tau - h)$-maturity bond yield. Then, in our simulations, we calculate the returns on the bonds using equations (6) and (7) and compute the correlations with the simulated inflation series over the same period.

3.2 Results

Here we summarize our most important results, starting with the post-1999 sample (Tables 1A through 3A in Appendix) and then turning briefly to the post-1972 sample (Tables 4A and A5 in Appendix).

3.2.1 Headline inflation

Hedging food and energy inflation is relatively easy, since these prices are closely linked to commodities, with oil and natural gas spot and future prices displaying some of the highest correlations. Because variation in food and energy prices makes up most of the variation in headline inflation indices, this also means that commodities are generally a good hedge for headline inflation. The broad commodity indices and oil futures have correlations as high as 70% at the 6-month horizon and beyond with headline CPI, PCE, and PPI. Broad stock indices can also provide a good hedge for headline inflation, although much of the correlation is driven by energy-related stocks.[10] For similar reasons, EM currencies tied to energy prices also provide some protection. Contrary to conventional wisdom, we do not find any ability of gold to hedge headline inflation over the post-1999 sample. Finally, real estate, as proxied by the Case-Schiller index, does a surprisingly good job of hedging consumer prices at longer horizons, while the Wilshire REIT index effectively hedges the PPI.[11]

Generally speaking, returns on longer-term nominal bonds are negatively correlated with headline inflation, so that their inclusion in an investor's portfolio increases the exposure to inflation risk, rather than hedging it. This is true whether the bonds are held to maturity, continually rolled over to constant maturities, or held for an

[10] The strong correspondence between energy-sector stocks and headline CPI is consistent with Ang et al. (2012) and Parikh et al. (2019). However, those studies also find that technology stocks are important. In contrast, we find only weak correlations between headline inflation and the semiconductor and telecommunications sectors and significant *negative* correlations with the software sector at longer horizons.

[11] We caution that the results involving the Case-Schiller index in this sample are strongly influenced by the run-up to the 2008 housing crisis and its aftermath.

intermediate period.[12] On the other hand, 3-month Treasury bills (T-bills) provide relatively good protection against headline inflation because these rates rise when monetary policy tightens. Further, as we discuss in Section 4, the inflation-hedging ability of nominal bonds has improved over the last decade, as disinflation/deflation risk has dominated inflation risk until very recently.

Finally, short- and medium-term TIPS have performed quite well at protecting against headline CPI over short investment horizons (from 1 month to 1 year). At those same horizons, also the 10-year TIPS has provided some protection against headline PCE and PPI, with correlations higher than those for the 2- and 5-year TIPS at horizons between 6 months and 2 years.

3.2.2 Consumer and producer inflation components

While there are multiple attractive strategies for hedging non-core inflation, the prospects are somewhat dimmer when it comes to core. At horizons of less than a year, few of the assets we consider provide good protection. (This is arguably not a very serious problem, however, because core inflation displays very little volatility at short horizons.) One exception is TIPS. The 10-year TIPS returns from the 3-month to the 1-year horizon have correlations of about 0.3-0.4 with core CPI, while the 2-year TIPS has a similar size correlation at the 1-month horizon. Correlations with core PCE are also positive but a bit smaller. The correlations with core PPI are mostly negative, however.

At longer horizons, there are substantial differences across the different core indices. Core PCE behaves somewhat similarly to headline PCE. It is correlated with the broad commodity indices and oil futures, certain stock-market sectors including oil and gas, and real estate. However, in all of these cases the correlations are at most around 60%, which is significantly lower than the best-performing assets for headline inflation. For core CPI, on the other hand, the only assets that provide some hedging value are the 2- and 5-year nominal bonds rolling returns, some of the Fama-French factors, and the Case-Schiller price index.[13] Unlike with headline inflation, broad commodity indices and oil futures do not perform well with core CPI. Gold and most stock-market

[12] In principle, a strategy of shorting nominal bonds provides protection against headline inflation, although such strategies can be costly to implement.

[13] It is perhaps unsurprising that house prices perform well with core CPI as housing services constitute a large percentage of the core basket.

indices are significantly *negatively* correlated with core CPI.[14] To hedge core PPI is even harder. Only the 30-year nominal bond rolling returns and the Case-Schiller price index offer some protection.

Decomposed somewhat differently, the nondurable (ND) components of the CPI are dominated by food and energy, so their results are similar to the headline CPI correlations discussed above. Broad commodity indices and oil futures provide an almost perfect hedge against ND CPI at the 1-year horizon and beyond. Moreover, energy prices have high passthrough to the cost of durable goods, so CPI durables are also highly correlated with broad commodity indices and oil futures. Stock market sectors such as metals-mining, financials, and insurance also perform well with durables. In contrast, very few assets provide a decent hedge for CPI Services. Only the 2-year nominal bond rolling returns, T-bills, and the Case-Schiller price index display positive correlation larger than 30%. (At very long horizons, the S&P Oil and Gas Exploration and Production sector returns and 2-year future on WTI also have correlations around 30%.) Thus, the weak correlations noted for core CPI inflation stems from the lack of a good hedge for prices in the service sector. Further, also TIPS can provide a decent protection against CPI services. In particular, the 2-year TIPS works well at the 3-month horizon, the 5-year TIPS at the 6-month horizon, and the 10-year TIPS for horizons longer than 6 months.

Not surprisingly, strategies of holding nominal bonds for long periods, including to maturity, almost always generate additional exposure to inflation, rather than providing a hedge. Across bond maturities and holding periods, the correlations with various components of consumer and producer inflation range from slightly positive to -40%. The exception is CPI services, where we find that ten-year bonds held to maturity have a positive 50% correlation.

3.2.3 Wages and house prices

One reason that hedging service prices is difficult seems to be that a large fraction of those prices reflect labor costs. We find few good hedges for wage inflation. Indeed,

[14]The opposite signs on the correlation of the stock market with headline and core inflation are roughly consistent with the findings in FLR. Interestingly, although the overall stock market is negatively exposed to core inflation, the "robust-minus-weak" and "conservative-minus-aggressive" Fama-French factors seem to provide good protection at longer horizons, perhaps suggesting that profitable and conservative firms are more resilient to inflation. However, this result is not robust to the longer sample discussed below.

most of the asset returns we consider display a negative correlation with average hourly earnings. However, these are also generally small in magnitude, so that even potential short positions would not be successful in hedging wages. The main exception is rolling returns in shorter-term nominal Treasuries. T-bills and 2-year bonds have correlations with average hourly earnings of more than 50% at horizons beyond one year, and ten-year bonds have a 34% correlation if held to maturity. Further, also TIPS provide some protection, with the 2-year TIPS hedging relatively well at the 3-month horizon, the 5-year TIPS at the 6-month horizon, and the 10-year TIPS at the 10-year horizon.[15]

Finally, although we have discussed real estate as a potential hedging instrument (and, indeed, we have shown that it performs well as a hedge in many cases), one might also want to hedge real-estate costs themselves. Our results using the Case-Schiller index show that there are a variety of ways of doing this successfully at horizons of 1 year and longer. Most components of the stock market, including the SMB and HML factors, as well as most commodities and some currencies are strongly correlated with house prices at these horizons. Rolling returns on longer-term bonds, on the other hand, display strong negative correlations.

3.2.4 Results for the longer sample

To examine the stability of the above results over time, we re-estimate the models using data since 1972, where possible. One interesting feature of the longer sample is that measures of headline and core inflation are considerably more highly correlated than in the 1999 sample.[16] This means that they are more likely to be hedged well by the same set of instruments. Most notably, commodities–in particular oil–do a better job of hedging core inflation over the longer sample period. This is consistent with oil's large role in driving business-cycle fluctuations throughout the 1970s and is quite different from what emphasized in FLR.

Gold and silver perform quite well against most inflation measures in the post-1972 sample, suggesting that those commodities' inflation-hedging abilities must have been particularly good in the pre-1999 period. This behavior may have contributed to the common perception that precious metals are robust inflation hedges. However,

[15]The Case-Schiller index also appears to provide a good hedge for wages at long horizons, but this result may be spurious since it does not hold for our other measure of real estate prices (the Wilshire REIT) and there is no obvious economic reason that it should be true.

[16]For example, at the five-year horizon, core and headline CPI have a correlation of 0.97 in the post-1972 sample, compared to just 0.55 in the post-1999 sample.

as we showed above, that property seems to have disappeared over the last 20 years. In contrast, the two currencies that we can track do worse (against both headline or core) over the longer sample period.

We continue to find relatively few possibilities for hedging wage inflation in the longer sample. Unlike in the post-1999 sample, average hourly earnings are positively correlated with commodity prices, but, except at very long horizons those correlations are still quite modest.

3.3 Discussion

Overall, assets such as short-term nominal bonds and the Case-Schiller price index, which display sizable correlations with CPI headline and hourly earnings, would be a good hedge for household balance sheets. Those same assets would also provide a good inflation hedge for firms in the services sector, as they hedge wage and CPI services inflation quite similarly.

Meanwhile, very robust inflation-hedging products, such as broad commodity indices and oil futures, would protect against input and output inflation in most non-services firms' balance sheet.

Finally, investors mostly focused on hedging core inflation might want to use TIPS over shorter horizons, but the 2- and 5-year nominal bonds rolling returns, some of the Fama-French factors, and the Case-Schiller price index for longer horizons investments.

4 Cost of inflation hedges: The inflation risk premium

In this section, we consider the cost of hedging inflation, that is, the returns investors are willing to forgo to hold inflation-hedging products, also known as inflation risk premium (IRP). To this purpose, we have to consider the price of inflation risk embedded in various asset classes. While it is natural to start from the IRP implied by the nominal term structure, as no-arbitrage dynamic term-structure models (DTSMs) have become increasingly more sophisticated and deliver estimates of the IRP that can adjust to different inflation regimes, the literature has been provided new insights in the price of inflation risk embedded in the stock market (Boons et al., 2020) and in other real assets (FLR). Recent findings indicate that, similarly to the IRP implied by

DTSMs, the inflation risk priced in stock returns is strongly time-varying and changes sign.

Just as there is no one-size-fits-all strategy for hedging inflation, there is no unique premium for inflation risk, even within a given asset class. Each type of inflation commands its own IRP. In particular, across the various real assets examined in Sections 2 and 3, the price of core inflation risk is negative, while the price of energy inflation risk is positive but statistically insignificant. This implies that it is only hedging against core inflation that is costly. The magnitude of the IRP for other types of inflation—including producer prices, housing, and wages—remains an open empirical question.

4.1 Cost of inflation risk in the nominal term structure

We start by focusing on estimates of the IRP implied by state-of-the-art DTSMs, especially those augmented with data on inflation and inflation hedges.[17]

In these models, the IRP at any maturity τ is obtained by subtracting from the nominal yield the real yield and expected inflation:

$$IRP_{t,\tau} = y^N_{t,\tau} - y^R_{t,\tau} - \pi_{t,\tau} = -\frac{1}{\tau}\log\left[1 + \frac{Cov_t\left(\frac{M^R_{t+\tau}}{M^R_t}, \frac{CPI_t}{CPI_{t+\tau}}\right)}{E_t\left(\frac{M^R_{t+\tau}}{M^R_t}\right)E_t\left(\frac{CPI_t}{CPI_{t+\tau}}\right)}\right] + J_{t,\tau}. \tag{8}$$

The last two terms indicate that in DTSMs the IRP is given by the negative covariance between the real pricing kernel and inflation and a Jensen's inequality term, which is fairly small and therefore ignored from now on.

Under the simplifying assumption that the real pricing kernel can be approximated by either the real yield (Campbell et al., 2017), the IRP can be rewritten as follows:

$$IRP_{t,\tau} \approx -\frac{1}{\tau}\log\left[1 + Cov_t\left(y^R_{t,\tau}, \pi_{t,\tau}\right)/E_t\left(y^R_{t,\tau}\right)E_t\left(\pi_{t,\tau}\right)\right], \tag{9}$$

which implies that in DTSMs the sign and size of the IRP is determined by the sign and size of the conditional covariance between the real economy and inflation, also known as the nominal-real covariance in the literature.[18] Empirical evidence suggests

[17] See for example, Chernov and Mueller, 2012; Haubrich et al., 2012; Fleckenstein et al., 2017; D'Amico et al. 2018; Ajello et al., 2020; Breach et al., 2020

[18] A similar result holds in Gourio and Ngo, 2016, where the real pricing kernel is approximated by stock-market returns.

that this covariance has been changing over time (e.g., Campbell et al., 2017; Gourio and Ngo, 2016), reflecting the changing hedging characteristics of nominal bonds, especially at the ZLB. Specifically, nominal bonds become more attractive when this covariance is positive, as they pay off in inflationary or deflationary scenarios. They therefore command a very low or even negative IRP (Kitsul and Wright, 2013). Based on the evidence for the nominal-real covariance, it should not be surprising that the IRP estimated in very flexible DTSMs, such as those of D'Amico et al. (2018) and Breach et al. (2020), displays a time-varying size and at times flips sign.

DTSMs can encompass the diverse dynamics of the IRP over extreme episodes like the early 1980s, characterized by high actual and expected inflation as well as high inflation uncertainty, and the post-2008 period, characterized by low inflation (and mild deflation) as well as very low expected inflation and inflation uncertainty. The early 1980s and post-2008 years are periods during which investors' perceptions of inflation risk evolved from high-inflation scares (Goodfriend, 1993) to deflation fear (Kitsul and Wright, 2013).

Figure 1 plots the time-series of the 5- and 10-year IRP estimates implied by the Breach et al. (2020) model. The estimates are larger and positive in the earlier part of the sample, with peaks of about 1 and 1.4 percentage points, respectively, in the early 1980s; in contrast, they are quite small and often negative after 2008. This is the "deflationary bias" period, during which inflation kept falling rather than stabilizing around the Federal Reserve's desired target of 2% (Bianchi et al., 2021).

These negative estimates of the IRP have important implications for the inflation hedging properties of nominal bonds. As shown in Fleckenstein et al. (2017) the average probability of deflation perceived by investors in the 2009-15 sample period was about 19%, 14%, 6%, and 1.4%, at the 1-, 2-, 5-, and 10-year horizon, respectively. But, at the shorter horizons, this probability sometimes went above 30%. These are all episodes in which nominal bonds are a very good hedge as they offer high real returns when investors need them the most. These are also times in which stocks are very poor hedges. For example, Fleckenstein et al. (2017) find a strong negative relation between deflation risk and the stock market for all horizons. The evidence reported in the next section expands on this finding.

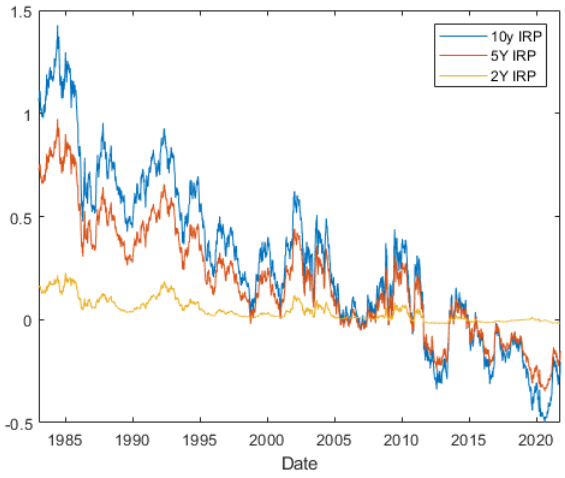

Figure 1: Estimates of the 5- and 10-year Inflation Risk Premium from Breach, D'Amico, and Orphanides (2020)

4.2 Cost of inflation risk in other asset classes

In order to obtain the inflation risk priced in stock returns, Boons et al. (2020) measure the quantity of inflation risk by their conditional inflation betas, that is, the slope coefficient in a rolling regression of stock returns on inflation shocks. Then, they separate the conditional inflation betas into a portfolio-specific and time-specific components. Finally, to obtain the price of inflation risk, each month they run cross-sectional regressions of individual stock returns on lagged inflation betas, controlling for capitalization, book-to-market, and momentum. The time-series of estimated slope coefficients represent their IRP estimates.

They show that IRP varies over time with the nominal-real covariance, that is, the same object that drives the IRP embedded in nominal bonds (shown in equation 8). For a one-standard-deviation increase in this covariance, the IRP increases by about 3% to 4%, with larger effects as the holding period grows from one to 12 months. In particular, from 1960s to early 2000s, the IRP is strongly statistically significant and almost monotonically decreasing in inflation betas, indicating that investors are willing to loose about a 7% return to hold the portfolio with the highest inflation beta. Post-2002, the IRP becomes positive, increasing rather than decreasing in inflation betas, indicating that investors require extra compensation to hold stock portfolios highly exposed to inflation. This is consistent with the reversal in the nominal-real covariance from negative to positive since the early 2000s. In other words, during

periods characterized by disinflation or deflation risk, stocks are not attractive as a hedge anymore, while nominal bonds become extremely attractive, as demonstrated by their very low or negative IRP estimates.

Turning to the IRP estimates for other real assets, FLR also run Fama-McBeth cross-sectional regressions of average returns onto asset inflation betas. Across all 38 portfolios that include stock industry portfolios, Treasury maturity-sorted portfolios, corporate bond maturity-sorted portfolios, currency carry portfolios, commodities, REITs, and international stocks, the price of headline CPI inflation risk is not statistically significant, the price of energy inflation risk is positive but also insignificant, and the price of core inflation risk is negative and significant (nearly for all assets). Their estimates imply that if an asset increases one unit of exposure to core inflation, investors require 1.07% of excess returns per annum.

Bibliography

Ajello, A., L. Benzoni, and O. Chyruk, 2020. Core and 'Crust': Consumer Prices and the Term Structure of Interest Rates. The Review of Financial Studies, 33 (8), 3719–65.

Ang, A., Brière, M., and Signori, O., 2012. Inflation and individual equities. Financial Analysts Journal, 68(4), 36–55.

Bampinas, G., and T., Panagiotidis, 2016. Hedging inflation with individual stocks: A long-run portfolio analysis. North American Journal of Economics and Finance, 37, 374-392.

Bakshi, G., X. Gao, and A. G. Rossi, 2019. Understanding the Sources of Risk Underlying the Cross Section of Commodity Returns. Management Science 65 (2), 619-641.

Bianchi, F., L. Melosi, and M. Rottner, 2021. Hitting the Elusive Inflation Target. NBER Working Paper, No. 26279, September.

Boons, M., F. Duarte, F. de Roon, and M. Szymanowska, 2020. Time-varying inflation risk and stock returns. Journal of Financial Economics 136, 444-470.

Boudoukh, J. and M. Richardson, 1993. Stock returns and inflation: A long-horizon perspective. The American economic review 83 (5), 1346-1355.

Breach, T., S., D'Amico, and A., Orphanides, 2020. The term structure and inflation uncertainty. Journal of Financial Economics 138, 388-414.

Campbell JY, Sunderam A, Viceira LM., 2017. Inflation Bets or Deflation Hedges? The Changing Risks of Nominal Bonds. Critical Finance Review, 6(2), 263-301.

Chernov, M., P. Mueller, 2012. The term structure of inflation expectations. Journal of Financial Economics 106, 367-394.

Christensen, J. H.E., J. A. Lopez, and G. D. Rudebusch, 2012. Extracting deflation probability forecasts from treasury yields. International Journal of Central Banking 8(4), 21-60.

D'Amico, S., D. Kim and M. Wei, 2018. Tips from TIPS: the information content of Treasury inflation-protected security prices. Journal of Financial and Quantitative Analysis 53, 395-436.

David, A. , Veronesi, P. ,2013. What ties return volatilities to price valuations and fundamentals? Journal of Political Economy 121 (4), 682–746 .

Downing, C. T., Longstaff, F. A., and Rierson, M. A., 2012. Inflation tracking portfolios. National Bureau of Economic Research, w18135.

Erb, C., and C. R. Harvey, 2006. The strategical and tactical value of commodity futures. Financial Analysts Journal, 62(2), 69-97.

Fang, X., Y., Liu, and N. Roussanov. 2021. Getting to the core: Inflation risks within and across asset classes. Working Paper, May.

Fleckenstein, M., F. A. Longstaff, and H. Lustig, 2017. Deflation risk. The Review of Financial Studies 30 (8), 2719-2760.

Fleming, M. J. and J. R. Sporn, 2013. Trading activity and price transparency in the inflation swap market. FRBNY Economic Policy Review, May.

Goodfriend, M., 1993. Interest Rate Policy and the Inflation Scare Problem: 1979–1992. Reserve Bank of Richmond Economic Quarterly Volume 79/1 Winter 1993.

Gorton, G. and K. G. Rouwenhorst, 2006. Facts and fantasies about commodity futures. Financial Analysts Journal 62 (2), 47-68.

Gourio, F. and P. Ngo, 2020. Risk Premia at the ZLB: a Macroeconomic Interpretation. Working Paper.

Grishchenko, O. V., J. Vanden, and J. Zhang, 2016. The Information Content of the Embedded Deflation Option in TIPS. Journal of Banking and Finance 65, 1-26.

Gürkaynak, Refet S., Brian Sack, and Jonathan H. Wright, 2007. The U.S. Treasury Yield Curve: 1961 to the Present. Journal of Monetary Economics, 54(8), 2291-2304.

Haubrich J., G. Pennacchi, P. Ritchken, 2012. Inflation Expectations, Real Rates,

and Risk Premia: Evidence from Inflation Swaps. Review of Finacial Studies 25, 1588-1629.

Kat, H. M., and R. C. A. Oomen, 2006. What every investor should know about commodities (Part II). Alternative Investment Research Center Working Paper, No.0033.

Katz, M., H. Lustig, and L. Nielsen, 2017. Are Stocks Real Assets? Sticky Discount Rates in Stock Markets. Review of Financial Studies 30 (2), 539-587.

Kerkhof, J. 2005. Inflation derivatives explained, Fixed Income Quantitative Research, Lehman Brothers (July), 1–80.

Kitsul, Y. and J. H. Wright, 2013. The Economics of Options-Implied Inflation Probability Density Functions. Journal of Financial Economics 110, 696-711.

Leombroni, M., M. Piazzesi, M. Schneider, and C. Rogers, 2020. Inflation and the price of real assets. Technical report, National Bureau of Economic Research.

Lustig, H., N. Roussanov, and A. Verdelhan, 2011. Common risk factors in currency markets. The Review of Financial Studies 24 (11), 3731-3777.

Lustig, H., N. Roussanov, and A. Verdelhan, 2014. Countercyclical currency risk premia. Journal of Financial Economics 111 (3), 527-553.

Menkhoff, L., L. Sarno, M. Schmeling, and A. Schrimpf (2017). Currency value. The Review of Financial Studies 30 (2), 416-441.

Parikh, H., R. K. Malladi, and F. J. Fabozzi, 2019. Preparing for higher inflation: Portfolio solutions using U.S. equities. Review of Financial Economics, 542-554.

Park, J., Mullineaux, D.J., Chew, I.K., 1990. Are REITs inflation hedges? The Journal of Real Estate Finance and Economics, 3, 91-103.

Verdelhan, A., 2018. The share of systematic variation in bilateral exchange rates. The Journal of Finance 73 (1), 375-418.

TABLE A1: Correlations of inflation indices with asset returns, since 1999

Headline CPI VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.05	0.18	0.31	0.56	0.59	0.64	0.67	0.69
Energy_Subindex	0.32	0.58	0.70	0.73	0.77	0.80	0.82	0.83
Gold_Subindex	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.05
Copper_Subindex	0.23	0.41	0.51	0.55	0.57	0.58	0.58	0.58
Natural Gas_Subindex	0.07	0.24	0.34	0.55	0.57	0.59	0.61	0.62
Alluminum_Subindex	0.18	0.37	0.51	0.57	0.60	0.62	0.62	0.63
Silver_Subindex	0.09	0.14	0.16	0.16	0.16	0.17	0.18	0.19
GSCI_Index	0.33	0.60	0.70	0.75	0.78	0.81	0.83	0.84
WTI_Crude	0.52	0.64	0.73	0.74	0.76	0.78	0.80	0.80
Brent_Crude	0.56	0.67	0.74	0.76	0.76	0.76	0.77	0.78
S&P 500	0.04	0.21	0.32	0.36	0.38	0.40	0.41	0.42
Wilshire_5000	0.04	0.21	0.31	0.35	0.36	0.38	0.38	0.37
S&P_Oil and Gas_Equipment	0.13	0.38	0.50	0.54	0.57	0.58	0.59	0.59
S&P_Oil and Gas_Production	0.09	0.37	0.55	0.68	0.72	0.77	0.79	0.81
S&P_Technology_Hardware	0.04	0.12	0.16	0.17	0.18	0.18	0.18	0.18
S&P_Metals_Mining	0.02	0.22	0.32	0.33	0.34	0.34	0.35	0.36
S&P_Financials	0.06	0.25	0.33	0.25	0.22	0.20	0.19	0.18
S&P_Insurance	0.01	0.23	0.32	0.33	0.33	0.33	0.33	0.31
S&P_Softwares	0.05	0.10	0.11	0.00	-0.18	-0.33	-0.38	-0.43
S&P_Semiconductors	0.00	0.11	0.17	0.20	0.21	0.21	0.22	0.24
S&P_Telecom	-0.06	0.01	0.09	0.13	0.15	0.15	0.15	0.14
BCOM Index	0.27	0.55	0.63	0.72	0.72	0.73	0.74	0.75
WTI_1Month future	0.31	0.55	0.69	0.70	0.75	0.79	0.81	0.82
WTI_2Year future	0.38	0.63	0.75	0.79	0.81	0.82	0.83	0.84
Brent_1Month future	0.33	0.56	0.70	0.72	0.77	0.80	0.82	0.83
Silver	0.09	0.14	0.15	0.15	0.16	0.16	0.16	0.16
Corn	0.03	0.13	0.24	0.46	0.43	0.43	0.42	0.42
Wheat	-0.03	0.02	0.03	0.04	0.05	0.04	0.05	0.06
Soybean	0.09	0.22	0.31	0.36	0.38	0.39	0.40	0.40
Hogs	0.10	0.33	0.47	0.37	0.40	0.41	0.42	0.43
Wilshire_REIT	0.09	0.30	0.41	0.43	0.45	0.45	0.45	0.44
EM_Bonds	0.06	0.18	0.24	0.26	0.27	0.27	0.28	0.27
JPY/USD	0.01	0.10	0.14	0.16	0.17	0.18	0.18	0.19
USD/EUR	0.05	0.17	0.25	0.29	0.31	0.32	0.32	0.33
RUB/USD	-0.24	-0.41	-0.50	-0.53	-0.54	-0.55	-0.56	-0.57
BRL/USD	-0.12	-0.29	-0.37	-0.40	-0.42	-0.42	-0.43	-0.43
ZAR/USD	-0.10	-0.24	-0.30	-0.32	-0.34	-0.34	-0.34	-0.34
Treas 2Y_RollingReturn	-0.09	-0.15	-0.08	0.14	0.22	0.32	0.36	0.38
Treas 5Y_RollingReturn	-0.15	-0.25	-0.28	-0.28	-0.29	-0.28	-0.29	-0.30
Treas 10Y_RollingReturn	-0.19	-0.27	-0.29	-0.29	-0.30	-0.29	-0.30	-0.30
Treas 30Y_RollingReturn	-0.24	-0.31	-0.31	-0.32	-0.32	-0.33	-0.33	-0.32
Fama-French: MKT_ER	0.03	0.19	0.27	0.30	0.32	0.33	0.33	0.33
Fama-French: SMALL - BIG	0.02	0.04	0.07	0.09	0.09	0.10	0.09	0.09
Fama-French: HIGH - LOW	0.05	0.16	0.29	0.35	0.38	0.39	0.39	0.39
Fama-French: ROBUST - WEAK	-0.03	0.02	0.08	0.10	0.12	0.12	0.12	0.12
Fama-French: CONSERV. – AGRESS.	-0.07	-0.06	-0.04	-0.03	-0.02	-0.01	-0.02	-0.04
T-bill	0.12	0.16	0.22	0.39	0.48	0.52	0.50	0.50
Gold	0.07	0.06	0.03	0.01	0.00	-0.01	-0.01	-0.01
Case_Shiller	0.30	0.38	0.43	0.41	0.48	0.60	0.68	0.76

GSCI Index VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.44	0.46	0.47	0.48	0.48	0.48	0.48	0.48
Energy_Subindex	0.97	0.98	0.98	0.98	0.98	0.99	0.99	0.99
Gold_Subindex	0.26	0.21	0.21	0.20	0.20	0.20	0.20	0.21
Copper_Subindex	0.56	0.66	0.70	0.72	0.72	0.72	0.72	0.73
Natural Gas_Subindex	0.40	0.42	0.56	0.69	0.76	0.80	0.82	0.83
Alluminum_Subindex	0.44	0.55	0.63	0.62	0.62	0.63	0.63	0.63
Silver_Subindex	0.37	0.42	0.46	0.49	0.49	0.50	0.49	0.50
GSCI_Index	0.65	0.86	0.90	0.93	0.96	0.98	0.99	1.00
WTI_Crude	0.68	0.89	0.93	0.95	0.96	0.97	0.97	0.97
Brent_Crude	0.33	0.60	0.70	0.75	0.78	0.81	0.83	0.84
S&P 500	0.39	0.51	0.57	0.60	0.62	0.63	0.63	0.63
Wilshire_5000	0.41	0.53	0.59	0.62	0.64	0.65	0.65	0.66
S&P_Oil and Gas_Equipment	0.67	0.77	0.82	0.84	0.85	0.85	0.85	0.86
S&P_Oil and Gas_Production	0.67	0.75	0.80	0.82	0.83	0.84	0.84	0.84
S&P_Technology_Hardware	0.28	0.33	0.35	0.36	0.36	0.36	0.36	0.37
S&P_Metals_Mining	0.49	0.56	0.57	0.56	0.56	0.56	0.56	0.56
S&P_Financials	0.28	0.45	0.52	0.46	0.40	0.37	0.36	0.36
S&P_Insurance	0.28	0.47	0.55	0.57	0.58	0.58	0.58	0.57
S&P_Softwares	0.26	0.30	0.39	0.43	0.44	0.45	0.46	0.48
S&P_Semiconductors	0.25	0.26	0.26	0.26	0.27	0.27	0.27	0.28
S&P_Telecom	0.07	0.16	0.24	0.28	0.30	0.31	0.31	0.31
BCOM Index	0.89	0.91	0.91	0.91	0.91	0.91	0.91	0.91
WTI_1Month future	0.91	0.94	0.96	0.97	0.97	0.98	0.98	0.98
WTI_2Year future	0.83	0.87	0.89	0.89	0.89	0.89	0.90	0.90
Brent_1Month future	0.91	0.95	0.96	0.96	0.97	0.97	0.97	0.97
Silver	0.38	0.43	0.47	0.50	0.50	0.50	0.50	0.49
Corn	0.27	0.38	0.49	0.54	0.54	0.54	0.54	0.54
Wheat	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.21
Soybean	0.29	0.39	0.45	0.48	0.50	0.50	0.51	0.50
Hogs	0.15	0.25	0.38	0.52	0.56	0.62	0.64	0.65
Wilshire_REIT	0.25	0.45	0.51	0.54	0.55	0.55	0.55	0.55
EM_Bonds	0.37	0.43	0.46	0.48	0.48	0.49	0.48	0.48
JPY/USD	0.02	0.04	0.05	0.05	0.05	0.06	0.06	0.08
USD/EUR	0.35	0.37	0.37	0.37	0.37	0.37	0.37	0.39
RUB/USD	-0.49	-0.57	-0.61	-0.62	-0.62	-0.63	-0.63	-0.63
BRL/USD	-0.29	-0.39	-0.41	-0.43	-0.43	-0.44	-0.44	-0.44
ZAR/USD	-0.34	-0.47	-0.51	-0.52	-0.53	-0.54	-0.54	-0.54
Treas 2Y_RollingReturn	-0.19	-0.26	-0.21	-0.17	-0.14	-0.13	-0.13	-0.12
Treas 5Y_RollingReturn	-0.21	-0.39	-0.37	-0.35	-0.34	-0.34	-0.35	-0.35
Treas 10Y_RollingReturn	-0.23	-0.41	-0.44	-0.45	-0.46	-0.46	-0.46	-0.45
Treas 30Y_RollingReturn	-0.29	-0.48	-0.51	-0.52	-0.53	-0.53	-0.53	-0.52
Fama-French: MKT_ER	0.41	0.51	0.57	0.60	0.61	0.61	0.62	0.63
Fama-French: SMALL - BIG	0.22	0.25	0.26	0.26	0.26	0.26	0.26	0.26
Fama-French: HIGH - LOW	0.12	0.20	0.21	0.20	0.20	0.20	0.20	0.19
Fama-French: ROBUST - WEAK	-0.10	-0.11	-0.11	-0.12	-0.12	-0.12	-0.13	-0.13
Fama-French: CONSERV. – AGRESS.	-0.11	-0.05	-0.03	-0.02	-0.01	-0.01	-0.01	0.00
T-bill	0.03	0.06	0.10	0.14	0.20	0.29	0.33	0.36
Gold	-0.04	-0.14	-0.17	-0.18	-0.19	-0.19	-0.19	-0.19
Case_Shiller	0.14	0.23	0.31	0.37	0.47	0.62	0.72	0.83

Core CPI VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.01	0.03	0.05	0.00	-0.06	-0.13	-0.15	-0.16
Energy_Subindex	0.11	0.19	0.25	0.09	0.01	-0.07	-0.10	-0.12
Gold_Subindex	-0.02	-0.02	-0.10	-0.24	-0.32	-0.42	-0.46	-0.48
Copper_Subindex	0.10	0.13	0.08	-0.15	-0.29	-0.44	-0.50	-0.53
Natural Gas_Subindex	0.01	0.00	0.00	0.18	0.23	0.29	0.32	0.35
Alluminum_Subindex	0.11	0.11	0.14	0.05	-0.04	-0.12	-0.15	-0.17
Silver_Subindex	0.02	0.04	-0.06	-0.28	-0.40	-0.51	-0.56	-0.59
GSCI_Index	0.12	0.20	0.23	0.07	-0.04	-0.13	-0.17	-0.19
WTI_Crude	0.23	0.28	0.29	0.13	0.05	-0.02	-0.05	-0.07
Brent_Crude	0.23	0.29	0.30	0.12	0.02	-0.09	-0.13	-0.17
CPI_Headline	0.58	0.64	0.62	0.51	0.51	0.55	0.57	0.60
S&P 500	-0.04	-0.02	-0.02	-0.17	-0.28	-0.39	-0.44	-0.47
Wilshire_5000	-0.05	-0.04	-0.03	-0.21	-0.32	-0.44	-0.49	-0.54
S&P_Oil and Gas_Equipment	-0.02	0.08	0.15	-0.06	-0.19	-0.33	-0.39	-0.44
S&P_Oil and Gas_Production	-0.02	0.11	0.21	0.13	0.03	-0.05	-0.09	-0.14
S&P_Technology_Hardware	0.01	-0.04	-0.11	-0.29	-0.35	-0.43	-0.47	-0.50
S&P_Metals_Mining	-0.04	0.04	0.10	-0.04	-0.11	-0.17	-0.19	-0.19
S&P_Financials	-0.04	0.02	0.05	0.04	-0.03	-0.10	-0.13	-0.16
S&P_Insurance	-0.09	-0.04	0.01	-0.02	-0.11	-0.20	-0.25	-0.27
S&P_Softwares	-0.02	-0.06	-0.08	-0.26	-0.38	-0.49	-0.54	-0.56
S&P_Semiconductors	0.03	-0.01	-0.03	-0.23	-0.33	-0.43	-0.46	-0.49
S&P_Telecom	-0.05	-0.05	-0.08	-0.28	-0.39	-0.51	-0.55	-0.58
BCOM Index	0.10	0.18	0.20	0.09	-0.01	-0.09	-0.12	-0.15
WTI_1Month future	0.13	0.21	0.29	0.10	0.04	-0.03	-0.06	-0.09
WTI_2Year future	0.18	0.26	0.31	0.13	0.03	-0.06	-0.11	-0.14
Brent_1Month future	0.13	0.22	0.29	0.11	0.03	-0.04	-0.07	-0.09
Silver	0.03	0.05	-0.05	-0.27	-0.38	-0.51	-0.55	-0.57
Corn	0.05	0.09	0.11	0.08	-0.02	-0.11	-0.14	-0.16
Wheat	-0.06	-0.03	-0.03	0.07	0.08	0.09	0.11	0.14
Soybean	0.06	0.13	0.18	-0.03	-0.06	-0.10	-0.12	-0.13
Hogs	0.01	0.20	0.34	-0.07	-0.18	-0.30	-0.36	-0.40
Wilshire_REIT	-0.05	0.02	0.06	-0.05	-0.17	-0.29	-0.34	-0.35
EM_Bonds	0.02	0.07	-0.01	-0.18	-0.27	-0.36	-0.39	-0.42
JPY/USD	-0.01	0.03	0.09	0.27	0.34	0.41	0.45	0.46
USD/EUR	-0.08	-0.02	0.00	-0.11	-0.28	-0.43	-0.48	-0.52
RUB/USD	-0.15	-0.24	-0.25	-0.05	0.02	0.10	0.13	0.14
BRL/USD	-0.05	-0.11	-0.13	0.05	0.16	0.28	0.32	0.36
ZAR/USD	0.05	0.01	0.05	0.30	0.45	0.58	0.63	0.67
Treas 2Y_RollingReturn	0.04	0.04	0.08	0.31	0.40	0.53	0.59	0.64
Treas 5Y_RollingReturn	0.02	0.00	-0.05	0.12	0.23	0.36	0.41	0.44
Treas 10Y_RollingReturn	0.00	0.00	-0.07	0.02	0.10	0.19	0.22	0.23
Treas 30Y_RollingReturn	-0.04	-0.06	-0.09	-0.01	0.05	0.10	0.13	0.14
Fama-French: MKT_ER	-0.06	-0.05	-0.07	-0.28	-0.40	-0.53	-0.58	-0.63
Fama-French: SMALL - BIG	-0.07	-0.06	0.03	-0.08	-0.17	-0.25	-0.28	-0.31
Fama-French: HIGH - LOW	-0.01	0.08	0.14	0.32	0.29	0.28	0.28	0.28
Fama-French: ROBUST - WEAK	0.02	0.09	0.18	0.41	0.54	0.64	0.68	0.71
Fama-French: CONSERV. – AGRESS.	-0.05	-0.04	0.03	0.21	0.29	0.37	0.39	0.43
T-bill	0.05	0.07	0.11	0.20	0.20	0.14	0.08	0.05
Gold	0.00	0.01	-0.09	-0.22	-0.31	-0.40	-0.45	-0.47
Case_Shiller	0.16	0.26	0.42	0.52	0.56	0.62	0.66	0.70

CPI Energy VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.06	0.21	0.36	0.60	0.66	0.71	0.73	0.75
Energy_Subindex	0.30	0.62	0.76	0.89	0.93	0.96	0.97	0.98
Gold_Subindex	0.00	-0.01	-0.01	0.00	0.00	0.00	-0.01	-0.02
Copper_Subindex	0.23	0.46	0.55	0.62	0.66	0.68	0.69	0.69
Natural Gas_Subindex	0.06	0.29	0.42	0.67	0.69	0.73	0.75	0.77
Alluminum_Subindex	0.18	0.40	0.54	0.56	0.55	0.56	0.56	0.57
Silver_Subindex	0.07	0.11	0.20	0.35	0.52	0.66	0.72	0.75
GSCI_Index	0.34	0.67	0.78	0.88	0.91	0.94	0.96	0.97
WTI_Crude	0.55	0.70	0.79	0.89	0.92	0.94	0.95	0.96
Brent_Crude	0.60	0.75	0.82	0.90	0.93	0.95	0.96	0.96
CPI_Headline	0.92	0.94	0.95	0.90	0.84	0.77	0.73	0.70
S&P 500	0.08	0.29	0.40	0.44	0.46	0.48	0.48	0.50
Wilshire_5000	0.07	0.25	0.39	0.40	0.40	0.41	0.40	0.41
S&P_Oil and Gas_Equipment	0.18	0.45	0.63	0.73	0.79	0.83	0.84	0.84
S&P_Oil and Gas_Production	0.11	0.44	0.62	0.76	0.81	0.85	0.86	0.87
S&P_Technology_Hardware	0.05	0.14	0.15	0.16	0.17	0.17	0.16	0.15
S&P_Metals_Mining	0.07	0.27	0.44	0.55	0.60	0.63	0.64	0.65
S&P_Financials	0.08	0.31	0.43	0.42	0.40	0.39	0.39	0.39
S&P_Insurance	0.04	0.28	0.36	0.37	0.35	0.34	0.33	0.33
S&P_Softwares	0.06	0.15	0.17	0.18	0.19	0.19	0.20	0.20
S&P_Semiconductors	0.01	0.10	0.12	0.13	0.14	0.14	0.14	0.14
S&P_Telecom	-0.03	0.03	0.10	0.17	0.21	0.24	0.25	0.24
BCOM Index	0.29	0.65	0.76	0.91	0.93	0.94	0.95	0.95
WTI_1Month future	0.30	0.58	0.73	0.85	0.90	0.94	0.95	0.96
WTI_2Year future	0.38	0.67	0.80	0.86	0.89	0.92	0.93	0.93
Brent_1Month future	0.34	0.62	0.75	0.87	0.91	0.94	0.95	0.96
Silver	0.09	0.13	0.21	0.35	0.52	0.68	0.74	0.79
Corn	-0.01	0.09	0.20	0.48	0.53	0.59	0.61	0.63
Wheat	-0.01	0.00	0.10	0.22	0.24	0.25	0.26	0.28
Soybean	0.09	0.22	0.29	0.35	0.36	0.38	0.39	0.39
Hogs	0.13	0.32	0.45	0.49	0.54	0.58	0.60	0.62
Wilshire_REIT	0.13	0.35	0.41	0.46	0.48	0.50	0.51	0.52
EM_Bonds	0.07	0.22	0.28	0.31	0.32	0.34	0.35	0.35
JPY/USD	0.02	0.10	0.04	-0.10	-0.13	-0.16	-0.17	-0.19
USD/EUR	0.08	0.22	0.30	0.30	0.28	0.28	0.27	0.27
RUB/USD	-0.24	-0.45	-0.61	-0.70	-0.76	-0.82	-0.84	-0.85
BRL/USD	-0.13	-0.30	-0.44	-0.56	-0.64	-0.69	-0.71	-0.73
ZAR/USD	-0.19	-0.36	-0.40	-0.44	-0.44	-0.45	-0.45	-0.45
Treas 2Y_RollingReturn	-0.14	-0.23	-0.17	-0.05	-0.03	-0.02	-0.01	-0.01
Treas 5Y_RollingReturn	-0.20	-0.34	-0.36	-0.37	-0.38	-0.38	-0.37	-0.37
Treas 10Y_RollingReturn	-0.26	-0.37	-0.39	-0.40	-0.40	-0.40	-0.40	-0.40
Treas 30Y_RollingReturn	-0.30	-0.40	-0.42	-0.42	-0.43	-0.44	-0.44	-0.45
Fama-French: MKT_ER	0.08	0.28	0.37	0.41	0.43	0.44	0.45	0.45
Fama-French: SMALL - BIG	0.10	0.14	0.15	0.16	0.16	0.16	0.16	0.15
Fama-French: HIGH - LOW	0.06	0.18	0.27	0.24	0.18	0.15	0.13	0.09
Fama-French: ROBUST - WEAK	-0.09	-0.10	-0.10	-0.10	-0.11	-0.11	-0.10	-0.09
Fama-French: CONSERV. – AGRESS.	-0.05	-0.10	-0.11	-0.12	-0.12	-0.12	-0.12	-0.14
T-bill	0.08	0.10	0.13	0.21	0.30	0.41	0.47	0.51
Gold	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.04
Case_Shiller	0.30	0.38	0.41	0.42	0.52	0.67	0.76	0.85

CPI Durables VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.10	0.16	0.25	0.34	0.45	0.58	0.67	0.74
Energy_Subindex	0.10	0.17	0.30	0.40	0.53	0.67	0.74	0.80
Gold_Subindex	0.00	0.00	-0.02	-0.06	-0.10	-0.16	-0.21	-0.26
Copper_Subindex	0.13	0.19	0.24	0.31	0.41	0.55	0.64	0.72
Natural Gas_Subindex	0.10	0.16	0.18	0.21	0.21	0.21	0.22	0.22
Alluminum_Subindex	0.22	0.36	0.46	0.59	0.72	0.84	0.90	0.94
Silver_Subindex	0.02	0.02	-0.01	-0.05	-0.10	-0.16	-0.21	-0.26
GSCI_Index	0.11	0.16	0.25	0.31	0.40	0.52	0.61	0.69
WTI_Crude	0.13	0.21	0.35	0.46	0.59	0.73	0.80	0.86
Brent_Crude	0.13	0.20	0.33	0.44	0.56	0.70	0.78	0.84
CPI_Headline	0.23	0.29	0.36	0.48	0.52	0.57	0.59	0.60
S&P 500	0.09	0.17	0.29	0.36	0.46	0.58	0.65	0.71
Wilshire_5000	0.07	0.13	0.25	0.33	0.42	0.53	0.60	0.67
S&P_Oil and Gas_Equipment	0.05	0.09	0.16	0.22	0.30	0.41	0.48	0.56
S&P_Oil and Gas_Production	0.04	0.09	0.23	0.30	0.37	0.45	0.49	0.52
S&P_Technology_Hardware	-0.05	-0.08	-0.06	-0.10	-0.14	-0.23	-0.29	-0.35
S&P_Metals_Mining	0.14	0.25	0.32	0.43	0.55	0.70	0.78	0.84
S&P_Financials	0.10	0.18	0.31	0.44	0.56	0.70	0.77	0.83
S&P_Insurance	0.13	0.25	0.39	0.51	0.63	0.76	0.83	0.88
S&P_Softwares	0.04	0.06	0.13	0.15	0.19	0.24	0.28	0.31
S&P_Semiconductors	0.00	0.02	0.10	0.16	0.23	0.28	0.30	0.29
S&P_Telecom	0.07	0.14	0.20	0.26	0.33	0.45	0.54	0.62
BCOM Index	0.11	0.18	0.24	0.29	0.36	0.48	0.56	0.63
WTI_1Month future	0.11	0.18	0.31	0.42	0.54	0.68	0.75	0.80
WTI_2Year future	0.13	0.19	0.29	0.39	0.51	0.64	0.72	0.78
Brent_1Month future	0.07	0.12	0.27	0.36	0.48	0.62	0.70	0.77
Silver	0.04	0.07	0.07	0.07	0.08	0.10	0.13	0.16
Corn	0.18	0.18	0.16	0.28	0.36	0.44	0.47	0.50
Wheat	0.10	0.12	0.15	0.21	0.28	0.39	0.47	0.56
Soybean	0.04	0.05	0.01	0.04	0.06	0.10	0.11	0.10
Hogs	0.10	0.17	0.23	0.43	0.57	0.71	0.76	0.79
Wilshire_REIT	0.06	0.14	0.25	0.39	0.45	0.51	0.53	0.55
EM_Bonds	0.00	-0.01	0.00	-0.02	-0.01	0.00	0.01	0.03
JPY/USD	0.04	0.09	0.16	0.24	0.33	0.47	0.57	0.68
USD/EUR	0.08	0.07	-0.09	-0.26	-0.41	-0.53	-0.58	-0.59
RUB/USD	-0.21	-0.24	-0.19	-0.19	-0.12	-0.03	0.00	0.02
BRL/USD	-0.10	-0.12	-0.13	-0.17	-0.20	-0.25	-0.26	-0.26
ZAR/USD	-0.05	-0.07	-0.02	0.07	0.23	0.41	0.47	0.52
Treas 2Y_RollingReturn	0.06	0.09	0.05	0.07	0.10	0.16	0.21	0.27
Treas 5Y_RollingReturn	0.04	0.04	-0.06	-0.09	-0.13	-0.17	-0.20	-0.24
Treas 10Y_RollingReturn	0.08	0.11	0.02	0.04	0.04	0.08	0.11	0.13
Treas 30Y_RollingReturn	0.12	0.17	0.08	0.13	0.17	0.25	0.30	0.34
Fama-French: MKT_ER	0.05	0.09	0.17	0.21	0.27	0.35	0.41	0.46
Fama-French: SMALL - BIG	-0.10	-0.14	-0.13	-0.10	-0.10	-0.11	-0.13	-0.14
Fama-French: HIGH - LOW	0.19	0.32	0.46	0.59	0.72	0.84	0.90	0.94
Fama-French: ROBUST - WEAK	0.16	0.27	0.42	0.50	0.59	0.71	0.77	0.82
Fama-French: CONSERV. – AGRESS.	-0.07	-0.04	0.03	0.12	0.18	0.26	0.30	0.32
T-bill	0.38	0.41	0.46	0.48	0.52	0.60	0.71	0.83
Gold	0.01	0.01	-0.04	-0.07	-0.12	-0.19	-0.25	-0.33
Case_Shiller	0.20	0.22	0.27	0.33	0.31	0.26	0.21	0.15

CPI Services VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.05	0.11	0.14	0.14	0.15	0.15	0.16	0.16
Energy_Subindex	0.03	0.16	0.20	0.20	0.22	0.27	0.29	0.32
Gold_Subindex	0.06	0.09	0.10	0.10	0.11	0.11	0.10	0.11
Copper_Subindex	0.08	0.05	0.02	0.00	0.00	-0.01	-0.02	-0.03
Natural Gas_Subindex	-0.17	0.11	0.21	0.26	0.36	0.46	0.51	0.54
Alluminum_Subindex	0.16	0.17	0.16	0.09	0.02	-0.02	-0.03	-0.04
Silver_Subindex	0.04	0.04	0.00	-0.03	-0.04	-0.05	-0.05	-0.04
GSCI_Index	0.05	0.16	0.18	0.17	0.20	0.24	0.26	0.27
WTI_Crude	0.17	0.22	0.21	0.19	0.21	0.25	0.28	0.31
Brent_Crude	0.16	0.21	0.21	0.19	0.21	0.25	0.27	0.29
CPI_Headline	0.35	0.39	0.43	0.57	0.60	0.67	0.71	0.73
S&P 500	-0.01	-0.07	-0.13	-0.23	-0.30	-0.37	-0.40	-0.42
Wilshire_5000	-0.02	-0.09	-0.15	-0.26	-0.33	-0.41	-0.44	-0.46
S&P_Oil and Gas_Equipment	0.03	0.12	0.16	0.12	0.12	0.13	0.14	0.14
S&P_Oil and Gas_Production	-0.05	0.12	0.22	0.29	0.32	0.33	0.33	0.31
S&P_Technology_Hardware	0.05	-0.08	-0.13	-0.15	-0.17	-0.17	-0.17	-0.18
S&P_Metals_Mining	0.04	0.09	0.11	0.12	0.12	0.12	0.12	0.13
S&P_Financials	-0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
S&P_Insurance	-0.04	0.00	0.02	-0.03	-0.09	-0.15	-0.16	-0.17
S&P_Softwares	0.03	-0.11	-0.20	-0.26	-0.29	-0.30	-0.31	-0.30
S&P_Semiconductors	0.03	-0.11	-0.21	-0.29	-0.23	-0.14	-0.11	-0.09
S&P_Telecom	-0.01	-0.10	-0.17	-0.21	-0.22	-0.23	-0.24	-0.24
BCOM Index	0.09	0.23	0.23	0.22	0.23	0.25	0.25	0.27
WTI_1Month future	0.11	0.17	0.20	0.19	0.23	0.29	0.32	0.34
WTI_2Year future	0.16	0.26	0.34	0.39	0.41	0.43	0.44	0.46
Brent_1Month future	0.08	0.15	0.18	0.17	0.19	0.24	0.26	0.28
Silver	0.04	0.04	0.00	-0.02	-0.03	-0.04	-0.04	-0.06
Corn	0.00	0.07	0.06	0.03	0.02	0.01	0.01	0.00
Wheat	-0.01	0.03	0.06	0.07	0.07	0.08	0.08	0.08
Soybean	0.04	0.04	0.00	0.04	0.06	0.08	0.08	0.06
Hogs	-0.02	0.10	0.05	-0.02	-0.12	-0.20	-0.22	-0.25
Wilshire_REIT	0.04	0.09	0.08	0.02	-0.04	-0.09	-0.11	-0.12
EM_Bonds	0.08	0.10	0.01	-0.05	-0.09	-0.13	-0.14	-0.14
JPY/USD	0.04	0.11	0.14	0.15	0.16	0.17	0.17	0.18
USD/EUR	0.04	0.07	0.09	0.09	0.09	0.09	0.09	0.09
RUB/USD	-0.02	-0.06	-0.08	-0.09	-0.09	-0.09	-0.09	-0.09
BRL/USD	-0.14	-0.17	-0.14	-0.13	-0.12	-0.11	-0.10	-0.10
ZAR/USD	0.02	-0.01	0.03	0.06	0.07	0.08	0.08	0.09
Treas 2Y_RollingReturn	0.05	0.13	0.26	0.41	0.50	0.60	0.63	0.66
Treas 5Y_RollingReturn	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	-0.01
Treas 10Y_RollingReturn	-0.02	-0.01	-0.02	-0.03	-0.03	-0.04	-0.05	-0.07
Treas 30Y_RollingReturn	-0.01	0.01	0.00	-0.01	-0.02	-0.02	-0.03	-0.03
Fama-French: MKT_ER	-0.02	-0.11	-0.20	-0.32	-0.40	-0.50	-0.53	-0.57
Fama-French: SMALL - BIG	0.06	0.02	0.00	0.00	-0.01	-0.01	-0.02	-0.03
Fama-French: HIGH - LOW	0.05	0.24	0.36	0.43	0.47	0.48	0.49	0.49
Fama-French: ROBUST - WEAK	-0.06	0.05	0.09	0.11	0.12	0.13	0.13	0.12
Fama-French: CONSERV. – AGRESS.	-0.04	0.10	0.23	0.27	0.25	0.19	0.18	0.17
T-bill	0.39	0.52	0.62	0.72	0.80	0.87	0.89	0.90
Gold	0.08	0.08	-0.05	-0.16	-0.22	-0.25	-0.27	-0.28
Case_Shiller	0.27	0.36	0.46	0.55	0.62	0.76	0.84	0.91

CPI Nondurables VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.09	0.23	0.42	0.58	0.66	0.72	0.74	0.75
Energy_Subindex	0.33	0.68	0.79	0.85	0.87	0.89	0.89	0.89
Gold_Subindex	0.03	0.05	0.05	0.05	0.06	0.05	0.05	0.06
Copper_Subindex	0.26	0.50	0.64	0.69	0.72	0.74	0.74	0.74
Natural Gas_Subindex	0.10	0.32	0.38	0.41	0.42	0.43	0.44	0.44
Alluminum_Subindex	0.22	0.49	0.60	0.65	0.68	0.69	0.70	0.70
Silver_Subindex	0.06	0.15	0.28	0.47	0.63	0.76	0.81	0.84
GSCI_Index	0.35	0.68	0.81	0.86	0.89	0.90	0.91	0.91
WTI_Crude	0.55	0.71	0.80	0.83	0.84	0.85	0.86	0.86
Brent_Crude	0.60	0.75	0.82	0.83	0.84	0.85	0.85	0.85
CPI_Headline	0.69	0.68	0.70	0.93	0.88	0.83	0.81	0.81
S&P 500	0.08	0.32	0.44	0.49	0.52	0.53	0.54	0.53
Wilshire_5000	0.09	0.33	0.45	0.50	0.52	0.54	0.54	0.55
S&P_Oil and Gas_Equipment	0.18	0.48	0.60	0.65	0.68	0.69	0.70	0.69
S&P_Oil and Gas_Production	0.10	0.41	0.53	0.58	0.60	0.62	0.63	0.63
S&P_Technology_Hardware	0.08	0.18	0.20	0.22	0.22	0.22	0.22	0.22
S&P_Metals_Mining	0.07	0.29	0.43	0.49	0.52	0.53	0.54	0.54
S&P_Financials	0.09	0.33	0.49	0.55	0.58	0.60	0.61	0.61
S&P_Insurance	0.04	0.28	0.35	0.27	0.17	0.10	0.07	0.06
S&P_Softwares	0.08	0.20	0.23	0.25	0.25	0.26	0.26	0.27
S&P_Semiconductors	0.05	0.14	0.17	0.18	0.18	0.18	0.19	0.19
S&P_Telecom	-0.05	0.05	0.15	0.18	0.20	0.22	0.22	0.21
BCOM Index	0.29	0.62	0.76	0.82	0.84	0.86	0.87	0.87
WTI_1Month future	0.30	0.63	0.76	0.82	0.86	0.88	0.88	0.89
WTI_2Year future	0.38	0.67	0.80	0.85	0.87	0.89	0.89	0.90
Brent_1Month future	0.31	0.65	0.77	0.83	0.86	0.88	0.88	0.89
Silver	0.07	0.18	0.33	0.46	0.54	0.59	0.60	0.62
Corn	0.02	0.12	0.29	0.46	0.51	0.55	0.56	0.57
Wheat	0.02	0.09	0.12	0.13	0.13	0.15	0.15	0.16
Soybean	0.06	0.16	0.29	0.43	0.43	0.46	0.47	0.48
Hogs	0.02	0.15	0.29	0.47	0.48	0.53	0.55	0.57
Wilshire_REIT	0.10	0.35	0.50	0.57	0.60	0.62	0.63	0.63
EM_Bonds	0.07	0.23	0.33	0.37	0.40	0.42	0.43	0.43
JPY/USD	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.02
USD/EUR	0.08	0.23	0.33	0.38	0.40	0.41	0.42	0.41
RUB/USD	-0.21	-0.41	-0.57	-0.61	-0.64	-0.65	-0.65	-0.66
BRL/USD	-0.12	-0.34	-0.45	-0.49	-0.51	-0.53	-0.53	-0.53
ZAR/USD	-0.18	-0.33	-0.43	-0.47	-0.49	-0.50	-0.51	-0.52
Treas 2Y_RollingReturn	-0.12	-0.21	-0.17	-0.13	-0.11	-0.10	-0.10	-0.11
Treas 5Y_RollingReturn	-0.21	-0.34	-0.37	-0.38	-0.38	-0.39	-0.39	-0.37
Treas 10Y_RollingReturn	-0.28	-0.40	-0.41	-0.42	-0.42	-0.42	-0.42	-0.41
Treas 30Y_RollingReturn	-0.30	-0.42	-0.43	-0.43	-0.43	-0.43	-0.43	-0.43
Fama-French: MKT_ER	0.08	0.31	0.42	0.46	0.48	0.49	0.49	0.50
Fama-French: SMALL - BIG	0.07	0.16	0.21	0.23	0.24	0.25	0.25	0.26
Fama-French: HIGH - LOW	0.07	0.19	0.33	0.39	0.42	0.45	0.45	0.46
Fama-French: ROBUST - WEAK	-0.11	-0.16	-0.17	-0.17	-0.17	-0.16	-0.17	-0.16
Fama-French: CONSERV. – AGRESS.	-0.04	-0.10	-0.11	-0.12	-0.12	-0.12	-0.13	-0.15
T-bill	0.08	0.11	0.15	0.21	0.26	0.33	0.36	0.39
Gold	0.08	0.17	0.19	0.20	0.20	0.21	0.20	0.20
Case_Shiller	0.12	0.17	0.20	0.16	0.16	0.17	0.20	0.25

Headline PCE VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.14	0.28	0.34	0.37	0.38	0.39	0.40	0.40
Energy_Subindex	0.34	0.60	0.70	0.74	0.76	0.78	0.78	0.79
Gold_Subindex	0.05	0.08	0.10	0.10	0.11	0.10	0.10	0.10
Copper_Subindex	0.26	0.47	0.53	0.51	0.49	0.48	0.47	0.46
NG_Subindex	0.11	0.34	0.43	0.47	0.49	0.51	0.52	0.53
Alluminum_Subindex	0.26	0.53	0.64	0.69	0.71	0.73	0.73	0.74
Silver_Subindex	0.10	0.18	0.20	0.22	0.23	0.23	0.22	0.24
GSCI_Index	0.35	0.63	0.73	0.77	0.79	0.80	0.81	0.81
WTI_Crude	0.54	0.67	0.72	0.74	0.75	0.76	0.76	0.75
Brent_Crude	0.55	0.69	0.74	0.77	0.78	0.79	0.79	0.80
CPI_Headline	0.80	0.82	0.85	0.97	0.97	0.96	0.96	0.96
S&P 500	0.12	0.30	0.37	0.40	0.42	0.43	0.44	0.44
Wilshire_5000	0.13	0.31	0.38	0.41	0.43	0.44	0.44	0.45
S&P_Oil and Gas_Equipment	0.19	0.41	0.49	0.54	0.56	0.58	0.58	0.57
S&P_Oil and Gas_Production	0.14	0.41	0.60	0.68	0.72	0.75	0.76	0.77
S&P_Technology_Hardware	0.13	0.22	0.26	0.28	0.29	0.30	0.30	0.31
S&P_Metals_Mining	0.09	0.30	0.42	0.48	0.51	0.53	0.54	0.54
S&P_Financials	0.13	0.36	0.50	0.56	0.59	0.60	0.60	0.61
S&P_Insurance	0.08	0.33	0.42	0.45	0.46	0.47	0.47	0.48
S&P_Softwares	0.13	0.23	0.26	0.28	0.29	0.29	0.29	0.28
S&P_Semiconductors	0.09	0.17	0.21	0.23	0.24	0.25	0.25	0.25
S&P_Telecom	-0.09	-0.02	0.01	0.02	0.03	0.03	0.03	0.02
BCOM Index	0.33	0.64	0.75	0.81	0.83	0.85	0.86	0.86
WTI_1Month future	0.33	0.55	0.64	0.68	0.70	0.71	0.72	0.72
WTI_2Year future	0.38	0.66	0.79	0.84	0.87	0.88	0.88	0.88
Brent_1Month future	0.33	0.57	0.66	0.70	0.72	0.74	0.74	0.74
Silver	0.10	0.18	0.21	0.23	0.24	0.24	0.25	0.26
Corn	0.07	0.16	0.28	0.46	0.53	0.57	0.59	0.59
Wheat	0.05	0.10	0.12	0.14	0.14	0.15	0.15	0.16
Soybean	0.08	0.17	0.25	0.28	0.29	0.30	0.31	0.31
Hogs	0.07	0.20	0.31	0.45	0.45	0.48	0.48	0.49
Wilshire_REIT	0.15	0.39	0.53	0.60	0.63	0.64	0.65	0.65
EM_Bonds	0.10	0.19	0.23	0.26	0.27	0.27	0.27	0.26
JPY/USD	0.04	0.11	0.02	-0.05	-0.08	-0.10	-0.10	-0.12
USD/EUR	0.12	0.21	0.25	0.27	0.27	0.28	0.28	0.27
RUB/USD	-0.26	-0.45	-0.59	-0.64	-0.67	-0.68	-0.68	-0.69
BRL/USD	-0.16	-0.31	-0.37	-0.41	-0.42	-0.43	-0.44	-0.46
ZAR/USD	-0.19	-0.32	-0.38	-0.41	-0.42	-0.42	-0.41	-0.42
Treas 2Y_RollingReturn	-0.11	-0.17	-0.12	-0.06	-0.03	-0.01	-0.01	-0.03
Treas 5Y_RollingReturn	-0.18	-0.29	-0.33	-0.35	-0.35	-0.36	-0.36	-0.37
Treas 10Y_RollingReturn	-0.23	-0.33	-0.36	-0.37	-0.37	-0.38	-0.37	-0.36
Treas 30Y_RollingReturn	-0.26	-0.36	-0.37	-0.38	-0.38	-0.38	-0.38	-0.39
Fama-French: MKT_ER	0.12	0.28	0.35	0.39	0.40	0.41	0.42	0.42
Fama-French: SMALL - BIG	0.10	0.12	0.13	0.13	0.13	0.14	0.15	0.16
Fama-French: HIGH - LOW	0.07	0.23	0.36	0.43	0.47	0.49	0.49	0.49
Fama-French: ROBUST - WEAK	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Fama-French: CONSERV. – AGRESS.	-0.11	-0.11	-0.08	-0.07	-0.07	-0.06	-0.07	-0.07
T-bill	0.13	0.17	0.21	0.27	0.34	0.43	0.48	0.51
Gold	0.07	0.12	0.14	0.15	0.15	0.15	0.16	0.16
Case_Shiller	0.24	0.32	0.39	0.42	0.50	0.62	0.71	0.79

Core PCE VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.14	0.27	0.30	0.32	0.33	0.34	0.36	0.37
Energy_Subindex	0.16	0.34	0.47	0.54	0.57	0.59	0.59	0.59
Gold_Subindex	0.01	0.06	0.07	0.08	0.08	0.08	0.07	0.07
Copper_Subindex	0.12	0.27	0.36	0.42	0.44	0.45	0.45	0.47
Natural Gas_Subindex	0.07	0.18	0.24	0.27	0.28	0.28	0.27	0.27
Alluminum_Subindex	0.18	0.37	0.43	0.45	0.46	0.47	0.47	0.46
Silver_Subindex	0.03	0.13	0.11	0.10	0.09	0.09	0.09	0.09
GSCI_Index	0.18	0.36	0.49	0.55	0.59	0.60	0.61	0.61
WTI_Crude	0.28	0.40	0.48	0.51	0.53	0.53	0.54	0.55
Brent_Crude	0.19	0.37	0.47	0.52	0.55	0.56	0.57	0.57
CPI_Headline	0.34	0.53	0.61	0.65	0.66	0.67	0.67	0.66
S&P 500	0.09	0.24	0.29	0.31	0.32	0.33	0.33	0.32
Wilshire_5000	0.10	0.24	0.29	0.31	0.32	0.33	0.33	0.34
S&P_Oil and Gas_Equipment	0.06	0.20	0.24	0.26	0.28	0.28	0.29	0.32
S&P_Oil and Gas_Production	0.05	0.26	0.42	0.50	0.55	0.57	0.58	0.57
S&P_Technology_Hardware	0.13	0.17	0.18	0.19	0.19	0.18	0.19	0.20
S&P_Metals_Mining	0.08	0.22	0.35	0.43	0.47	0.50	0.51	0.52
S&P_Financials	0.10	0.27	0.33	0.35	0.36	0.37	0.37	0.38
S&P_Insurance	0.07	0.26	0.34	0.41	0.45	0.47	0.47	0.45
S&P_Softwares	0.11	0.18	0.20	0.21	0.21	0.22	0.22	0.20
S&P_Semiconductors	0.14	0.14	0.14	0.14	0.14	0.13	0.12	0.11
S&P_Telecom	-0.11	0.00	0.04	0.06	0.06	0.07	0.07	0.06
BCOM Index	0.18	0.39	0.51	0.58	0.60	0.62	0.62	0.64
WTI_1Month future	0.18	0.33	0.45	0.52	0.55	0.57	0.58	0.59
WTI_2Year future	0.19	0.36	0.41	0.43	0.44	0.45	0.45	0.46
Brent_1Month future	0.14	0.32	0.42	0.47	0.49	0.50	0.49	0.49
Silver	0.03	0.13	0.10	0.08	0.08	0.08	0.08	0.06
Corn	0.11	0.18	0.22	0.25	0.26	0.27	0.27	0.26
Wheat	0.08	0.16	0.18	0.19	0.20	0.21	0.20	0.21
Soybean	0.07	0.13	0.13	0.13	0.12	0.12	0.11	0.14
Hogs	0.04	0.15	0.14	0.18	0.24	0.28	0.29	0.30
Wilshire_REIT	0.09	0.31	0.40	0.47	0.51	0.54	0.55	0.56
EM_Bonds	0.06	0.11	0.13	0.14	0.14	0.14	0.15	0.16
JPY/USD	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.07
USD/EUR	0.08	0.15	0.18	0.18	0.19	0.18	0.18	0.19
RUB/USD	-0.15	-0.30	-0.35	-0.37	-0.39	-0.39	-0.40	-0.40
BRL/USD	-0.11	-0.26	-0.30	-0.31	-0.32	-0.32	-0.32	-0.32
ZAR/USD	-0.07	-0.19	-0.23	-0.24	-0.25	-0.26	-0.26	-0.26
Treas 2Y_RollingReturn	-0.05	-0.06	-0.02	0.05	0.11	0.17	0.20	0.22
Treas 5Y_RollingReturn	-0.07	-0.12	-0.14	-0.14	-0.15	-0.15	-0.15	-0.16
Treas 10Y_RollingReturn	-0.05	-0.16	-0.21	-0.24	-0.26	-0.27	-0.28	-0.29
Treas 30Y_RollingReturn	-0.04	-0.15	-0.20	-0.24	-0.26	-0.27	-0.27	-0.30
Fama-French: MKT_ER	0.08	0.22	0.26	0.28	0.29	0.31	0.31	0.30
Fama-French: SMALL - BIG	0.03	-0.02	-0.04	-0.05	-0.05	-0.05	-0.05	-0.04
Fama-French: HIGH - LOW	0.03	0.20	0.26	0.29	0.30	0.30	0.30	0.30
Fama-French: ROBUST - WEAK	0.00	0.05	0.07	0.07	0.08	0.08	0.08	0.08
Fama-French: CONSERV. – AGRESS.	-0.10	-0.06	-0.04	-0.04	-0.04	-0.04	-0.04	-0.03
T-bill	0.09	0.12	0.15	0.17	0.21	0.27	0.30	0.32
Gold	0.03	0.09	0.10	0.11	0.12	0.12	0.12	0.11
Case_Shiller	0.21	0.33	0.43	0.49	0.50	0.53	0.57	0.62

PPI Final Goods VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.15	0.37	0.51	0.67	0.75	0.80	0.81	0.83
Energy_Subindex	0.40	0.67	0.76	0.79	0.81	0.82	0.83	0.83
Gold_Subindex	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.03
Copper_Subindex	0.22	0.44	0.51	0.54	0.55	0.56	0.57	0.58
Natural Gas_Subindex	0.05	0.36	0.49	0.56	0.60	0.62	0.62	0.63
Alluminum_Subindex	0.24	0.48	0.54	0.57	0.58	0.59	0.59	0.57
Silver_Subindex	0.16	0.25	0.35	0.43	0.48	0.51	0.52	0.54
GSCI_Index	0.41	0.69	0.77	0.81	0.84	0.86	0.86	0.87
WTI_Crude	0.67	0.74	0.78	0.78	0.78	0.78	0.78	0.77
Brent_Crude	0.67	0.76	0.78	0.79	0.80	0.80	0.80	0.81
CPI_Headline	0.69	0.71	0.74	0.89	0.83	0.78	0.76	0.75
S&P 500	0.09	0.32	0.40	0.43	0.45	0.47	0.48	0.48
Wilshire_5000	0.10	0.34	0.41	0.44	0.46	0.47	0.47	0.49
S&P_Oil and Gas_Equipment	0.17	0.48	0.59	0.65	0.68	0.70	0.70	0.72
S&P_Oil and Gas_Production	0.10	0.45	0.54	0.59	0.61	0.62	0.62	0.63
S&P_Technology_Hardware	0.08	0.21	0.26	0.28	0.29	0.30	0.30	0.31
S&P_Metals_Mining	0.01	0.32	0.48	0.57	0.61	0.64	0.65	0.64
S&P_Financials	0.10	0.36	0.41	0.30	0.19	0.11	0.08	0.07
S&P_Insurance	0.07	0.34	0.39	0.37	0.35	0.33	0.32	0.32
S&P_Softwares	0.09	0.22	0.25	0.27	0.28	0.29	0.29	0.29
S&P_Semiconductors	0.02	0.17	0.22	0.24	0.25	0.26	0.26	0.28
S&P_Telecom	-0.05	0.04	0.06	0.07	0.08	0.09	0.09	0.10
BCOM Index	0.32	0.66	0.74	0.76	0.75	0.73	0.73	0.73
WTI_1Month future	0.43	0.62	0.71	0.79	0.84	0.87	0.88	0.88
WTI_2Year future	0.41	0.65	0.71	0.74	0.75	0.76	0.76	0.76
Brent_1Month future	0.41	0.64	0.71	0.75	0.76	0.77	0.78	0.78
Silver	0.15	0.25	0.35	0.43	0.48	0.51	0.52	0.53
Corn	0.06	0.22	0.34	0.46	0.37	0.35	0.34	0.32
Wheat	-0.02	0.08	0.10	0.12	0.13	0.13	0.13	0.13
Soybean	0.07	0.20	0.28	0.33	0.35	0.37	0.37	0.39
Hogs	0.05	0.25	0.38	0.56	0.56	0.58	0.60	0.60
Wilshire_REIT	0.12	0.36	0.47	0.52	0.54	0.56	0.57	0.59
EM_Bonds	0.10	0.23	0.28	0.30	0.31	0.32	0.32	0.32
JPY/USD	0.02	0.11	0.13	0.15	0.16	0.17	0.17	0.18
USD/EUR	0.09	0.22	0.26	0.28	0.29	0.30	0.30	0.29
RUB/USD	-0.22	-0.43	-0.50	-0.53	-0.54	-0.56	-0.56	-0.56
BRL/USD	-0.12	-0.31	-0.36	-0.39	-0.40	-0.40	-0.40	-0.41
ZAR/USD	-0.15	-0.36	-0.42	-0.45	-0.46	-0.47	-0.47	-0.47
Treas 2Y_RollingReturn	-0.13	-0.22	-0.18	-0.15	-0.13	-0.12	-0.12	-0.11
Treas 5Y_RollingReturn	-0.20	-0.37	-0.41	-0.44	-0.45	-0.45	-0.46	-0.46
Treas 10Y_RollingReturn	-0.25	-0.38	-0.39	-0.40	-0.40	-0.40	-0.40	-0.40
Treas 30Y_RollingReturn	-0.29	-0.37	-0.36	-0.36	-0.36	-0.36	-0.35	-0.35
Fama-French: MKT_ER	0.09	0.32	0.39	0.42	0.44	0.44	0.44	0.44
Fama-French: SMALL - BIG	0.11	0.19	0.21	0.22	0.23	0.23	0.23	0.23
Fama-French: HIGH - LOW	0.08	0.25	0.35	0.40	0.43	0.44	0.44	0.45
Fama-French: ROBUST - WEAK	-0.08	-0.04	-0.02	-0.01	-0.01	-0.01	-0.01	0.00
Fama-French: CONSERV. – AGRESS.	-0.06	-0.06	-0.06	-0.06	-0.06	-0.05	-0.04	-0.02
T-bill	0.06	0.09	0.11	0.14	0.15	0.16	0.16	0.17
Gold	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.07
Case_Shiller	0.09	0.14	0.18	0.16	0.11	0.07	0.05	0.03

PPI Final Goods Core VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.06	-0.09	-0.08	-0.08	-0.07	-0.07	-0.07	-0.08
Energy_Subindex	-0.07	-0.09	-0.07	-0.05	-0.04	-0.04	-0.03	-0.02
Gold_Subindex	-0.06	-0.08	-0.07	-0.07	-0.06	-0.05	-0.05	-0.06
Copper_Subindex	-0.15	-0.27	-0.30	-0.33	-0.35	-0.36	-0.36	-0.37
Natural Gas_Subindex	-0.12	-0.04	-0.07	-0.09	-0.11	-0.11	-0.12	-0.14
Alluminum_Subindex	-0.03	-0.12	-0.16	-0.20	-0.24	-0.26	-0.27	-0.27
Silver_Subindex	-0.05	-0.19	-0.19	-0.20	-0.21	-0.21	-0.21	-0.22
GSCI_Index	-0.10	-0.12	-0.12	-0.11	-0.11	-0.11	-0.11	-0.10
WTI_Crude	-0.01	-0.09	-0.08	-0.06	-0.04	-0.04	-0.04	-0.04
Brent_Crude	0.02	-0.08	-0.07	-0.05	-0.04	-0.03	-0.03	-0.04
CPI_Headline	0.17	0.17	0.19	0.21	0.22	0.24	0.24	0.24
S&P 500	-0.06	-0.10	-0.11	-0.13	-0.14	-0.15	-0.14	-0.16
Wilshire_5000	-0.04	-0.09	-0.10	-0.10	-0.11	-0.10	-0.10	-0.11
S&P_Oil and Gas_Equipment	-0.13	-0.19	-0.19	-0.18	-0.18	-0.18	-0.18	-0.18
S&P_Oil and Gas_Production	-0.10	-0.10	-0.08	-0.05	-0.03	-0.01	-0.01	-0.01
S&P_Technology_Hardware	-0.01	-0.05	-0.06	-0.07	-0.07	-0.08	-0.08	-0.08
S&P_Metals_Mining	-0.18	-0.27	-0.28	-0.31	-0.33	-0.35	-0.35	-0.35
S&P_Financials	-0.07	-0.17	-0.24	-0.31	-0.36	-0.40	-0.42	-0.43
S&P_Insurance	-0.12	-0.19	-0.22	-0.25	-0.27	-0.29	-0.30	-0.31
S&P_Softwares	-0.02	-0.05	-0.04	-0.03	-0.03	-0.02	-0.02	-0.02
S&P_Semiconductors	-0.05	-0.11	-0.14	-0.17	-0.19	-0.21	-0.22	-0.21
S&P_Telecom	-0.04	-0.06	-0.05	-0.04	-0.02	-0.01	-0.01	0.00
BCOM Index	-0.13	-0.20	-0.22	-0.27	-0.32	-0.36	-0.38	-0.40
WTI_1Month future	-0.06	-0.12	-0.13	-0.16	-0.19	-0.21	-0.21	-0.19
WTI_2Year future	-0.02	-0.04	-0.02	-0.01	0.00	0.01	0.01	0.01
Brent_1Month future	-0.02	-0.08	-0.04	-0.01	0.00	0.01	0.01	0.03
Silver	-0.04	-0.18	-0.19	-0.20	-0.21	-0.21	-0.22	-0.21
Corn	-0.02	-0.04	-0.03	-0.02	-0.02	-0.01	-0.01	0.00
Wheat	-0.07	-0.10	-0.11	-0.13	-0.13	-0.14	-0.14	-0.13
Soybean	-0.02	-0.10	-0.13	-0.15	-0.16	-0.17	-0.18	-0.18
Hogs	-0.04	-0.03	-0.05	-0.10	-0.14	-0.20	-0.22	-0.23
Wilshire_REIT	-0.04	-0.15	-0.20	-0.27	-0.32	-0.35	-0.36	-0.37
EM_Bonds	-0.15	-0.26	-0.29	-0.32	-0.34	-0.35	-0.35	-0.35
JPY/USD	-0.11	-0.07	-0.03	0.07	0.13	0.18	0.19	0.20
USD/EUR	-0.09	-0.19	-0.21	-0.23	-0.23	-0.24	-0.23	-0.23
RUB/USD	-0.02	0.02	0.01	0.00	0.00	0.00	-0.01	-0.01
BRL/USD	0.00	0.02	-0.04	-0.09	-0.12	-0.14	-0.15	-0.16
ZAR/USD	0.15	0.11	0.12	0.12	0.13	0.13	0.13	0.15
Treas 2Y_RollingReturn	-0.01	-0.09	-0.11	-0.13	-0.15	-0.16	-0.17	-0.16
Treas 5Y_RollingReturn	0.02	-0.03	-0.01	0.00	0.00	0.01	0.02	0.03
Treas 10Y_RollingReturn	0.02	0.03	0.07	0.11	0.13	0.14	0.15	0.15
Treas 30Y_RollingReturn	0.04	0.12	0.16	0.19	0.21	0.23	0.24	0.25
Fama-French: MKT_ER	-0.04	-0.09	-0.10	-0.10	-0.10	-0.10	-0.10	-0.11
Fama-French: SMALL - BIG	-0.01	-0.15	-0.23	-0.29	-0.32	-0.34	-0.35	-0.37
Fama-French: HIGH - LOW	-0.04	-0.03	-0.04	-0.04	-0.04	-0.04	-0.03	-0.04
Fama-French: ROBUST - WEAK	0.00	0.20	0.30	0.36	0.39	0.41	0.41	0.40
Fama-French: CONSERV. – AGRESS.	-0.07	-0.12	-0.19	-0.24	-0.27	-0.28	-0.29	-0.31
T-bill	-0.06	-0.12	-0.14	-0.16	-0.20	-0.26	-0.29	-0.30
Gold	-0.04	-0.07	-0.08	-0.09	-0.09	-0.09	-0.09	-0.06
Case_Shiller	0.08	0.13	0.15	0.18	0.22	0.30	0.37	0.48

Hourly Earnings VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.01	-0.08	-0.11	-0.13	-0.14	-0.14	-0.14	-0.14
Energy_Subindex	-0.06	-0.18	-0.22	-0.24	-0.25	-0.25	-0.25	-0.23
Gold_Subindex	0.09	0.04	0.13	0.15	0.17	0.18	0.19	0.19
Copper_Subindex	0.00	-0.06	-0.08	-0.09	-0.10	-0.11	-0.11	-0.10
Natural Gas_Subindex	0.10	0.07	0.06	0.05	0.05	0.05	0.05	0.06
Alluminum_Subindex	-0.02	-0.09	-0.04	-0.01	0.01	0.03	0.03	0.04
Silver_Subindex	0.02	-0.11	-0.07	-0.05	-0.05	-0.04	-0.04	-0.05
GSCI_Index	-0.04	-0.14	-0.17	-0.18	-0.19	-0.19	-0.19	-0.19
WTI_Crude	-0.37	-0.38	-0.39	-0.39	-0.40	-0.40	-0.40	-0.40
Brent_Crude	-0.18	-0.24	-0.21	-0.20	-0.19	-0.19	-0.19	-0.20
CPI_Headline	-0.08	-0.01	0.08	0.12	0.14	0.15	0.15	0.16
S&P 500	0.07	-0.14	-0.23	-0.28	-0.30	-0.32	-0.32	-0.31
Wilshire_5000	0.07	-0.15	-0.24	-0.29	-0.31	-0.33	-0.33	-0.34
S&P_Oil and Gas_Equipment	0.09	-0.17	-0.19	-0.21	-0.21	-0.21	-0.22	-0.21
S&P_Oil and Gas_Production	0.16	-0.08	-0.08	-0.10	-0.12	-0.13	-0.14	-0.14
S&P_Technology_Hardware	-0.01	-0.12	-0.18	-0.21	-0.23	-0.24	-0.25	-0.25
S&P_Metals_Mining	0.13	0.04	0.00	-0.02	-0.03	-0.04	-0.03	-0.03
S&P_Financials	0.03	-0.18	-0.26	-0.30	-0.33	-0.34	-0.34	-0.35
S&P_Insurance	0.00	-0.19	-0.18	-0.16	-0.14	-0.13	-0.12	-0.09
S&P_Softwares	0.05	-0.07	-0.11	-0.13	-0.15	-0.16	-0.16	-0.16
S&P_Semiconductors	0.01	-0.07	-0.12	-0.14	-0.16	-0.17	-0.18	-0.17
S&P_Telecom	0.03	-0.11	-0.17	-0.21	-0.23	-0.24	-0.24	-0.24
BCOM Index	-0.02	-0.11	-0.03	0.05	0.09	0.11	0.12	0.12
WTI_1Month future	-0.13	-0.22	-0.25	-0.26	-0.27	-0.26	-0.26	-0.26
WTI_2Year future	-0.08	-0.13	-0.15	-0.16	-0.16	-0.17	-0.17	-0.17
Brent_1Month future	-0.04	-0.21	-0.26	-0.29	-0.30	-0.31	-0.31	-0.33
Silver	0.03	-0.12	-0.07	-0.05	-0.05	-0.04	-0.04	-0.06
Corn	-0.02	-0.06	-0.07	-0.08	-0.09	-0.09	-0.09	-0.10
Wheat	0.03	0.00	-0.03	-0.05	-0.05	-0.06	-0.06	-0.06
Soybean	-0.02	-0.07	-0.09	-0.10	-0.11	-0.11	-0.10	-0.09
Hogs	0.06	0.00	-0.02	-0.02	-0.03	-0.04	-0.05	-0.05
Wilshire_REIT	0.06	-0.16	-0.17	-0.16	-0.16	-0.15	-0.15	-0.14
EM_Bonds	-0.04	-0.24	-0.25	-0.27	-0.28	-0.28	-0.29	-0.29
JPY/USD	-0.04	0.00	-0.01	0.00	0.00	0.00	0.00	-0.02
USD/EUR	0.01	-0.02	-0.03	-0.04	-0.04	-0.04	-0.05	-0.06
RUB/USD	-0.08	-0.01	0.01	0.02	0.03	0.03	0.02	0.02
BRL/USD	0.07	0.15	0.18	0.19	0.19	0.20	0.21	0.25
ZAR/USD	0.07	0.16	0.19	0.20	0.21	0.21	0.21	0.21
Treas 2Y_RollingReturn	0.11	0.28	0.40	0.48	0.52	0.54	0.54	0.55
Treas 5Y_RollingReturn	0.09	0.17	0.21	0.23	0.24	0.25	0.25	0.25
Treas 10Y_RollingReturn	0.07	0.13	0.16	0.18	0.19	0.19	0.19	0.18
Treas 30Y_RollingReturn	0.06	0.10	0.13	0.14	0.15	0.16	0.15	0.17
Fama-French: MKT_ER	0.06	-0.16	-0.26	-0.31	-0.33	-0.35	-0.35	-0.37
Fama-French: SMALL - BIG	0.02	-0.08	-0.10	-0.11	-0.11	-0.12	-0.12	-0.11
Fama-French: HIGH - LOW	-0.02	-0.16	-0.19	-0.21	-0.22	-0.23	-0.24	-0.26
Fama-French: ROBUST - WEAK	0.05	0.05	0.04	0.04	0.05	0.05	0.06	0.06
Fama-French: CONSERV. – AGRESS.	0.00	-0.01	-0.03	-0.05	-0.06	-0.06	-0.07	-0.09
T-bill	0.11	0.24	0.37	0.51	0.63	0.73	0.77	0.78
Gold	0.08	0.03	0.11	0.14	0.16	0.18	0.18	0.17
Case_Shiller	0.15	0.24	0.34	0.45	0.54	0.68	0.77	0.84

Case Shiller VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.03	-0.03	0.00	0.04	0.02	0.00	-0.01	-0.02
Energy_Subindex	0.15	0.24	0.34	0.40	0.51	0.67	0.76	0.86
Gold_Subindex	-0.12	-0.22	-0.30	-0.39	-0.48	-0.61	-0.70	-0.79
Copper_Subindex	0.18	0.27	0.37	0.50	0.62	0.76	0.84	0.91
Natural Gas_Subindex	0.19	0.34	0.45	0.62	0.76	0.87	0.92	0.96
Alluminum_Subindex	0.18	0.31	0.41	0.57	0.72	0.84	0.90	0.94
Silver_Subindex	-0.08	-0.14	-0.14	-0.17	-0.24	-0.34	-0.42	-0.52
GSCI_Index	0.14	0.23	0.31	0.37	0.47	0.62	0.72	0.83
WTI_Crude	0.15	0.24	0.33	0.37	0.48	0.63	0.74	0.84
Brent_Crude	0.13	0.20	0.26	0.27	0.32	0.42	0.51	0.63
CPI_Headline	0.30	0.38	0.43	0.41	0.48	0.60	0.68	0.76
S&P 500	0.16	0.27	0.37	0.48	0.57	0.71	0.79	0.86
Wilshire_5000	0.15	0.26	0.37	0.47	0.58	0.72	0.80	0.88
S&P_Oil and Gas_Equipment	0.09	0.17	0.26	0.30	0.32	0.37	0.41	0.46
S&P_Oil and Gas_Production	0.12	0.23	0.35	0.47	0.60	0.76	0.84	0.91
S&P_Technology_Hardware	0.03	0.05	0.07	0.06	0.07	0.11	0.14	0.16
S&P_Metals_Mining	0.13	0.22	0.34	0.49	0.64	0.79	0.87	0.92
S&P_Financials	0.30	0.47	0.60	0.76	0.86	0.93	0.96	0.98
S&P_Insurance	0.29	0.48	0.60	0.72	0.83	0.92	0.95	0.98
S&P_Softwares	0.03	0.06	0.11	0.13	0.14	0.16	0.18	0.22
S&P_Semiconductors	0.06	0.10	0.15	0.22	0.29	0.41	0.50	0.61
S&P_Telecom	0.04	0.04	0.06	0.05	0.06	0.09	0.13	0.18
BCOM Index	0.21	0.33	0.44	0.56	0.71	0.84	0.90	0.95
WTI_1Month future	0.11	0.20	0.30	0.35	0.44	0.59	0.68	0.78
WTI_2Year future	0.21	0.31	0.40	0.47	0.58	0.72	0.81	0.88
Brent_1Month future	0.12	0.21	0.30	0.34	0.43	0.57	0.66	0.77
Silver	-0.07	-0.11	-0.09	-0.10	-0.15	-0.22	-0.28	-0.35
Corn	-0.07	-0.11	-0.12	-0.14	-0.22	-0.34	-0.44	-0.55
Wheat	0.04	0.08	0.11	0.14	0.21	0.32	0.41	0.50
Soybean	-0.01	-0.03	-0.08	-0.18	-0.27	-0.41	-0.51	-0.63
Hogs	0.05	0.08	0.08	0.13	0.18	0.27	0.35	0.43
Wilshire_REIT	0.25	0.42	0.52	0.65	0.77	0.88	0.93	0.96
EM_Bonds	0.02	0.06	0.11	0.12	0.15	0.21	0.26	0.32
JPY/USD	0.15	0.24	0.39	0.61	0.72	0.83	0.89	0.93
USD/EUR	0.04	0.08	0.12	0.15	0.22	0.32	0.40	0.50
RUB/USD	-0.11	-0.16	-0.21	-0.21	-0.23	-0.27	-0.31	-0.36
BRL/USD	-0.02	-0.05	-0.06	-0.04	-0.02	0.00	0.02	0.06
ZAR/USD	-0.05	-0.08	-0.10	-0.08	-0.07	-0.05	-0.04	-0.04
Treas 2Y_RollingReturn	-0.08	-0.11	-0.12	-0.12	-0.09	-0.03	0.04	0.13
Treas 5Y_RollingReturn	-0.15	-0.24	-0.34	-0.47	-0.54	-0.66	-0.74	-0.82
Treas 10Y_RollingReturn	-0.11	-0.19	-0.29	-0.47	-0.59	-0.74	-0.82	-0.89
Treas 30Y_RollingReturn	-0.07	-0.12	-0.20	-0.34	-0.46	-0.62	-0.72	-0.82
Fama-French: MKT_ER	0.12	0.20	0.30	0.37	0.45	0.57	0.67	0.77
Fama-French: SMALL - BIG	0.06	0.10	0.15	0.23	0.34	0.49	0.59	0.69
Fama-French: HIGH - LOW	0.16	0.25	0.34	0.47	0.59	0.73	0.81	0.88
Fama-French: ROBUST - WEAK	0.04	0.04	0.02	0.00	0.02	0.04	0.06	0.09
Fama-French: CONSERV. – AGRESS.	0.00	0.01	0.06	0.15	0.18	0.23	0.28	0.34
T-bill	0.26	0.27	0.28	0.31	0.35	0.50	0.67	0.82
Gold	-0.14	-0.25	-0.34	-0.42	-0.53	-0.68	-0.76	-0.83

TABLE A2: Correlations of inflation indices with nominal bonds over alternative holding periods, since 1999

Headline CPI

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.12	-0.19	-0.14	0.00	0.00		
5y	-0.16	-0.26	-0.29	-0.26	-0.16	0.08	
10y	-0.18	-0.23	-0.20	-0.18	-0.16	-0.08	0.21

GSCI Index

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.22	-0.30	-0.26	-0.13	0.01		
5y	-0.21	-0.38	-0.40	-0.37	-0.30	0.02	
10y	-0.19	-0.36	-0.39	-0.38	-0.33	-0.17	0.16

Core CPI

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.00	-0.03	-0.06	0.08	0.00		
5y	0.00	-0.04	-0.17	-0.13	-0.13	-0.11	
10y	-0.01	-0.02	-0.13	-0.21	-0.28	-0.42	-0.44

CPI Energy

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.16	-0.27	-0.23	-0.12	0.01		
5y	-0.22	-0.35	-0.36	-0.32	-0.25	0.02	
10y	-0.24	-0.31	-0.29	-0.27	-0.27	-0.12	0.18

CPI Durables

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.08	-0.10	-0.14	-0.23	-0.05		
5y	-0.03	-0.04	-0.07	-0.14	-0.26	-0.14	
10y	0.00	-0.01	-0.07	-0.13	-0.22	-0.40	-0.51

CPI Services

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.01	0.07	0.18	0.36	0.10		
5y	-0.04	-0.06	-0.07	-0.01	0.11	0.31	
10y	-0.03	0.01	0.03	0.04	0.04	0.08	0.50

CPI Nondurables

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.15	-0.24	-0.21	-0.09	0.04		
5y	-0.23	-0.34	-0.35	-0.32	-0.25	0.04	
10y	-0.26	-0.35	-0.35	-0.32	-0.23	-0.02	0.19

Headline PCE

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.14	-0.21	-0.17	-0.06	0.01		
5y	-0.20	-0.31	-0.33	-0.32	-0.26	0.07	
10y	-0.21	-0.27	-0.29	-0.29	-0.29	-0.21	0.10

Core PCE

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.09	-0.14	-0.13	-0.07	-0.01		
5y	-0.07	-0.18	-0.21	-0.24	-0.23	0.05	
10y	-0.03	-0.05	-0.07	-0.10	-0.14	-0.20	-0.23

PPI Final Goods

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.16	-0.26	-0.22	-0.13	-0.01		
5y	-0.22	-0.34	-0.33	-0.32	-0.30	-0.04	
10y	-0.24	-0.32	-0.34	-0.33	-0.28	-0.12	-0.01

PPI Final Goods Core

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.00	-0.09	-0.15	-0.21	-0.05		
5y	0.00	-0.04	-0.05	-0.12	-0.24	-0.18	
10y	-0.03	-0.02	0.01	-0.01	-0.09	-0.29	-0.55

Hourly Earnings

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.10	0.23	0.36	0.48	0.10		
5y	0.08	0.13	0.17	0.17	0.17	0.15	
10y	0.06	0.08	0.08	0.04	-0.04	-0.15	0.34

Case-Shiller

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.09	-0.08	-0.08	0.01	0.01		
5y	-0.13	-0.22	-0.32	-0.45	-0.46	-0.23	
10y	-0.10	-0.18	-0.28	-0.46	-0.59	-0.65	-0.38

TABLE A3: Correlations of inflation indices with TIPS over alternative holding periods, since 1999

Headline CPI

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.58	0.63	0.60	0.59	0.45		
5y	0.40	0.47	0.45	0.44	0.36	0.50	
10y	0.21	0.30	0.31	0.33	0.42	0.31	0.11

GSCI Index

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.42	0.49	0.28	0.43	0.42		
5y	0.35	0.59	0.49	0.25	0.26	0.29	
10y	0.21	0.47	0.57	0.55	0.43	0.38	0.48

Core CPI

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.37	0.14	0.24	0.29	0.26		
5y	0.25	0.45	0.00	0.23	0.22	0.20	
10y	0.18	0.33	0.39	0.38	0.24	0.18	-0.22

CPI Energy

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.51	0.54	0.23	0.42	0.41		
5y	0.34	0.57	0.53	0.26	0.28	0.33	
10y	0.13	0.42	0.54	0.54	0.43	0.40	0.57

CPI Durables

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.09	0.01	0.16	0.24	0.14		
5y	0.09	0.15	-0.31	0.22	0.17	0.06	
10y	0.09	0.18	0.22	0.13	-0.04	-0.20	-0.45

CPI Services

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.15	0.45	0.12	0.19	0.22		
5y	0.13	0.25	0.60	0.13	0.14	0.17	
10y	0.07	0.18	0.30	0.40	0.34	0.30	0.61

CPI Nondurables

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.50	0.52	0.22	0.41	0.42		
5y	0.31	0.56	0.45	0.23	0.33	0.32	
10y	0.11	0.41	0.53	0.52	0.42	0.38	0.42

Headline PCE

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.46	0.47	0.22	0.35	0.36		
5y	0.32	0.52	0.36	0.22	0.24	0.22	
10y	0.14	0.40	0.48	0.47	0.35	0.22	0.29

Core PCE

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.13	0.23	0.18	0.28	0.24		
5y	0.11	0.27	0.10	0.22	0.22	0.18	
10y	0.08	0.25	0.34	0.30	0.17	0.05	-0.04

PPI Final Goods

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.42	0.36	0.19	0.36	0.33		
5y	0.29	0.50	0.16	0.21	0.22	0.24	
10y	0.10	0.38	0.45	0.38	0.28	0.23	0.13

PPI Final Goods Core

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.06	-0.29	-0.12	-0.22	-0.29		
5y	-0.02	-0.13	-0.54	-0.14	-0.17	-0.21	
10y	-0.03	-0.15	-0.19	-0.28	-0.40	-0.36	-0.59

Hourly Earnings

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.01	0.43	-0.05	0.00	0.02		
5y	0.04	-0.02	0.40	-0.06	-0.09	-0.11	
10y	0.07	-0.04	0.11	0.25	0.10	-0.07	0.31

Case-Shiller

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.02	-0.02	-0.07	-0.06	-0.13		
5y	-0.07	0.01	0.02	-0.10	-0.19	-0.27	
10y	-0.05	-0.07	0.08	0.12	-0.17	-0.31	0.00

TABLE A4: Correlations of inflation indices with asset returns, since 1972

CPI Headline VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.01	0.10	0.17	0.25	0.27	0.32	0.35	0.38
GSCI_Index	0.15	0.32	0.35	0.29	0.28	0.29	0.31	0.34
WTI_Crude	0.39	0.48	0.51	0.50	0.57	0.68	0.75	0.81
S&P 500	-0.09	-0.04	-0.06	-0.14	-0.20	-0.27	-0.32	-0.34
BCOM Index	0.16	0.35	0.41	0.42	0.44	0.51	0.56	0.61
Gold	0.10	0.16	0.24	0.35	0.39	0.47	0.51	0.56
Silver	0.05	0.08	0.12	0.20	0.25	0.34	0.40	0.44
Corn	-0.01	0.07	0.14	0.21	0.23	0.28	0.31	0.36
Wheat	-0.01	0.02	0.06	0.15	0.19	0.26	0.31	0.35
Soybean	0.00	0.06	0.08	0.04	0.03	0.01	0.00	0.01
JPY/USD	0.02	0.07	0.08	0.06	0.06	0.06	0.06	0.06
ZAR/USD	-0.05	-0.11	-0.12	-0.13	-0.12	-0.11	-0.12	-0.12
5Y_RollingReturn	-0.07	-0.11	-0.10	-0.03	0.02	0.09	0.13	0.17
10Y_RollingReturn	-0.14	-0.20	-0.21	-0.20	-0.19	-0.20	-0.21	-0.21
Fama-French: MKT_ER	-0.11	-0.08	-0.12	-0.21	-0.29	-0.39	-0.45	-0.50
Fama-French: SMALL - BIG	-0.01	0.04	0.10	0.16	0.23	0.33	0.39	0.43
Fama-French: HIGH - LOW	0.08	0.14	0.16	0.15	0.13	0.12	0.12	0.12
Fama-French: ROBUST - WEAK	-0.07	-0.07	-0.10	-0.13	-0.17	-0.23	-0.27	-0.32
Fama-French: CONSERV. – AGRESS.	0.04	0.07	0.11	0.15	0.16	0.19	0.22	0.23
T-bill	0.42	0.51	0.58	0.65	0.67	0.71	0.76	0.81
Willshire_5000	-0.07	-0.01	-0.01	-0.06	-0.09	-0.12	-0.14	-0.17
Case_Shiller	0.39	0.46	0.50	0.50	0.51	0.55	0.59	0.64

GSCI VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.59	0.60	0.68	0.75	0.79	0.81	0.81	0.82
WTI_Crude	0.53	0.71	0.74	0.80	0.82	0.83	0.84	0.84
CPI_Headline	0.15	0.32	0.35	0.29	0.28	0.29	0.31	0.34
S&P 500	0.18	0.13	0.11	0.11	0.10	0.10	0.11	0.12
BCOM Index	0.83	0.84	0.84	0.84	0.85	0.85	0.85	0.85
Gold	0.22	0.24	0.25	0.25	0.25	0.25	0.24	0.23
Silver	0.30	0.34	0.35	0.35	0.36	0.36	0.35	0.36
Corn	0.35	0.38	0.43	0.54	0.64	0.73	0.76	0.78
Wheat	0.35	0.37	0.43	0.52	0.61	0.69	0.71	0.73
Soybean	0.37	0.40	0.47	0.55	0.64	0.70	0.72	0.74
JPY/USD	0.03	0.02	0.02	0.02	0.01	0.01	0.00	-0.01
ZAR/USD	-0.23	-0.31	-0.33	-0.34	-0.35	-0.35	-0.36	-0.36
5Y_RollingReturn	-0.12	-0.26	-0.31	-0.34	-0.35	-0.36	-0.37	-0.39
10Y_RollingReturn	-0.16	-0.32	-0.39	-0.42	-0.44	-0.45	-0.45	-0.45
Fama-French: MKT_ER	0.20	0.13	0.12	0.11	0.11	0.10	0.10	0.10
Fama-French: SMALL - BIG	0.13	0.10	0.09	0.09	0.08	0.09	0.09	0.10
Fama-French: HIGH - LOW	0.07	0.14	0.11	0.05	0.01	-0.02	-0.03	-0.03
Fama-French: ROBUST - WEAK	-0.11	-0.08	-0.11	-0.12	-0.12	-0.12	-0.11	-0.10
Fama-French: CONSERV. – AGRESS.	0.00	0.08	0.10	0.10	0.11	0.11	0.11	0.11
T-bill	-0.02	-0.03	-0.03	-0.03	-0.03	-0.04	-0.05	-0.04
Willshire_5000	0.20	0.14	0.12	0.11	0.11	0.11	0.12	0.11
Case_Shiller	0.09	0.17	0.24	0.29	0.38	0.51	0.61	0.73

Core CPI VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.02	0.03	0.03	0.01	0.02	0.03	0.04	0.04
GSCI_Index	0.06	0.07	0.04	0.01	0.00	0.00	0.00	0.02
WTI_Crude	0.13	0.17	0.19	0.24	0.33	0.46	0.57	0.68
CPI_Headline	0.70	0.79	0.86	0.92	0.95	0.97	0.98	0.99
S&P 500	-0.09	-0.13	-0.12	-0.12	-0.13	-0.15	-0.17	-0.20
BCOM Index	0.06	0.11	0.12	0.14	0.18	0.27	0.35	0.45
Gold	0.03	0.05	0.11	0.16	0.19	0.24	0.29	0.36
Silver	-0.01	-0.03	-0.02	0.02	0.06	0.13	0.20	0.28
Corn	0.00	0.02	0.01	0.01	0.03	0.05	0.07	0.08
Wheat	-0.02	0.00	-0.02	-0.04	-0.02	0.01	0.02	0.01
Soybean	-0.01	-0.02	-0.03	-0.08	-0.12	-0.19	-0.24	-0.32
JPY/USD	-0.01	0.02	0.04	0.03	0.02	0.00	-0.01	-0.01
ZAR/USD	0.03	0.02	0.03	0.02	0.03	0.03	0.04	0.04
5Y_RollingReturn	0.05	0.05	0.06	0.11	0.16	0.24	0.32	0.40
10Y_RollingReturn	-0.02	-0.05	-0.08	-0.08	-0.08	-0.10	-0.12	-0.15
Fama-French: MKT_ER	-0.12	-0.16	-0.17	-0.20	-0.22	-0.28	-0.34	-0.41
Fama-French: SMALL - BIG	-0.06	-0.02	0.07	0.17	0.25	0.38	0.47	0.57
Fama-French: HIGH - LOW	0.05	0.10	0.12	0.14	0.16	0.19	0.22	0.26
Fama-French: ROBUST - WEAK	-0.01	-0.01	-0.03	-0.07	-0.10	-0.16	-0.21	-0.27
Fama-French: CONSERV. – AGRESS.	0.04	0.08	0.11	0.14	0.16	0.19	0.22	0.28
T-bill	0.55	0.64	0.71	0.74	0.75	0.76	0.77	0.80
Willshire_5000	-0.08	-0.09	-0.06	-0.04	0.00	0.03	0.06	0.11
Case_Shiller	0.29	0.36	0.42	0.46	0.47	0.49	0.52	0.57

CPI Energy VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.00	0.09	0.21	0.46	0.49	0.53	0.55	0.57
GSCI_Index	0.22	0.49	0.62	0.71	0.71	0.71	0.70	0.69
WTI_Crude	0.50	0.67	0.78	0.86	0.90	0.93	0.94	0.94
CPI_Headline	0.72	0.72	0.70	0.69	0.73	0.81	0.87	0.91
S&P 500	0.00	0.11	0.13	0.14	0.15	0.15	0.15	0.15
BCOM Index	0.19	0.42	0.54	0.69	0.74	0.77	0.78	0.78
Gold	0.06	0.10	0.16	0.35	0.43	0.49	0.52	0.53
Silver	0.07	0.15	0.24	0.39	0.44	0.48	0.49	0.51
Corn	0.03	0.14	0.27	0.44	0.49	0.52	0.53	0.53
Wheat	-0.02	-0.02	0.02	0.11	0.12	0.13	0.12	0.12
Soybean	0.05	0.11	0.16	0.24	0.24	0.25	0.24	0.25
JPY/USD	0.04	0.10	0.09	0.08	0.08	0.08	0.08	0.09
ZAR/USD	-0.12	-0.21	-0.27	-0.38	-0.43	-0.47	-0.48	-0.48
5Y_RollingReturn	-0.15	-0.22	-0.22	-0.22	-0.22	-0.22	-0.23	-0.22
10Y_RollingReturn	-0.20	-0.28	-0.29	-0.29	-0.30	-0.30	-0.30	-0.29
Fama-French: MKT_ER	0.00	0.08	0.06	0.01	-0.02	-0.04	-0.05	-0.06
Fama-French: SMALL - BIG	0.09	0.13	0.21	0.23	0.24	0.24	0.25	0.25
Fama-French: HIGH - LOW	0.06	0.16	0.18	0.14	0.13	0.12	0.12	0.11
Fama-French: ROBUST - WEAK	-0.10	-0.09	-0.14	-0.24	-0.31	-0.37	-0.38	-0.39
Fama-French: CONSERV. – AGRESS.	0.01	0.04	0.06	0.06	0.06	0.06	0.06	0.06
T-bill	0.08	0.11	0.14	0.22	0.28	0.40	0.48	0.58
Willshire_5000	0.02	0.10	0.13	0.14	0.15	0.16	0.16	0.14
Case_Shiller	0.32	0.40	0.44	0.45	0.55	0.69	0.78	0.86

CPI Durables VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.08	0.09	0.10	0.12	0.16	0.23	0.28	0.34
GSCI_Index	0.08	0.09	0.10	0.10	0.12	0.15	0.18	0.22
WTI_Crude	0.12	0.14	0.19	0.26	0.33	0.43	0.49	0.53
CPI_Headline	0.49	0.60	0.71	0.79	0.83	0.87	0.90	0.91
S&P 500	-0.01	0.00	0.03	0.05	0.07	0.11	0.14	0.16
BCOM Index	0.13	0.19	0.21	0.24	0.31	0.41	0.48	0.54
Gold	0.00	0.03	0.06	0.08	0.10	0.15	0.18	0.21
Silver	0.02	0.04	0.06	0.10	0.20	0.34	0.42	0.49
Corn	0.09	0.09	0.10	0.15	0.20	0.30	0.36	0.42
Wheat	0.06	0.05	0.03	0.04	0.08	0.14	0.18	0.21
Soybean	0.05	0.06	0.03	0.02	0.02	0.02	0.02	0.02
JPY/USD	0.04	0.07	0.07	0.06	0.08	0.10	0.12	0.17
ZAR/USD	0.01	0.01	0.01	0.03	0.05	0.09	0.12	0.15
5Y_RollingReturn	-0.07	-0.05	0.00	0.04	0.09	0.17	0.22	0.26
10Y_RollingReturn	-0.09	-0.10	-0.11	-0.11	-0.14	-0.18	-0.21	-0.23
Fama-French: MKT_ER	-0.03	-0.03	-0.02	-0.03	-0.02	-0.03	-0.03	-0.03
Fama-French: SMALL - BIG	0.00	0.03	0.12	0.23	0.34	0.48	0.57	0.63
Fama-French: HIGH - LOW	0.02	0.06	0.12	0.18	0.23	0.30	0.36	0.42
Fama-French: ROBUST - WEAK	0.03	0.05	0.05	0.00	-0.06	-0.12	-0.17	-0.21
Fama-French: CONSERV. – AGRESS.	0.00	0.03	0.10	0.15	0.20	0.26	0.30	0.34
T-bill	0.37	0.42	0.46	0.50	0.53	0.60	0.68	0.78
Willshire_5000	0.01	0.04	0.09	0.14	0.20	0.30	0.37	0.44
Case_Shiller	0.42	0.47	0.55	0.61	0.63	0.65	0.69	0.74

CPI Services VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.04	-0.02	0.01	0.03	0.05	0.08	0.10	0.13
GSCI_Index	-0.04	0.01	0.04	0.05	0.06	0.08	0.08	0.09
WTI_Crude	0.11	0.15	0.20	0.25	0.33	0.43	0.48	0.52
CPI_Headline	0.63	0.73	0.83	0.92	0.94	0.97	0.98	0.98
S&P 500	-0.05	-0.12	-0.16	-0.17	-0.17	-0.17	-0.18	-0.19
BCOM Index	-0.02	0.04	0.10	0.14	0.19	0.26	0.32	0.37
Gold	0.04	0.06	0.13	0.18	0.22	0.28	0.33	0.36
Silver	-0.04	-0.06	-0.02	0.05	0.10	0.16	0.19	0.23
Corn	-0.06	-0.03	-0.01	0.01	0.04	0.06	0.07	0.07
Wheat	-0.05	-0.04	-0.03	-0.02	0.00	0.04	0.06	0.06
Soybean	-0.07	-0.09	-0.09	-0.08	-0.09	-0.11	-0.13	-0.14
JPY/USD	0.01	0.02	0.02	0.01	0.00	-0.02	-0.04	-0.06
ZAR/USD	0.03	0.02	0.04	0.03	0.03	0.03	0.03	0.04
5Y_RollingReturn	0.08	0.09	0.06	0.09	0.12	0.17	0.20	0.24
10Y_RollingReturn	0.02	-0.02	-0.09	-0.12	-0.15	-0.20	-0.22	-0.25
Fama-French: MKT_ER	-0.07	-0.15	-0.21	-0.24	-0.26	-0.29	-0.32	-0.34
Fama-French: SMALL - BIG	0.02	0.06	0.13	0.21	0.30	0.40	0.45	0.49
Fama-French: HIGH - LOW	0.05	0.10	0.11	0.10	0.09	0.08	0.08	0.09
Fama-French: ROBUST - WEAK	-0.07	-0.07	-0.09	-0.11	-0.14	-0.18	-0.20	-0.23
Fama-French: CONSERV. – AGRESS.	0.03	0.10	0.14	0.13	0.10	0.06	0.04	0.01
T-bill	0.65	0.72	0.74	0.76	0.78	0.81	0.84	0.89
Willshire_5000	-0.03	-0.08	-0.10	-0.09	-0.05	0.00	0.03	0.06
Case_Shiller	0.34	0.38	0.43	0.47	0.49	0.55	0.61	0.71

CPI Nondurables VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.02	0.19	0.34	0.47	0.48	0.48	0.47	0.49
GSCI_Index	0.22	0.50	0.61	0.62	0.57	0.51	0.49	0.47
WTI_Crude	0.47	0.63	0.71	0.74	0.75	0.77	0.78	0.79
CPI_Headline	0.76	0.79	0.83	0.88	0.92	0.96	0.97	0.99
S&P 500	-0.04	0.06	0.10	0.12	0.13	0.13	0.13	0.13
BCOM Index	0.20	0.48	0.61	0.66	0.64	0.62	0.61	0.60
Gold	0.08	0.19	0.29	0.45	0.53	0.59	0.61	0.62
Silver	0.07	0.16	0.21	0.22	0.24	0.24	0.24	0.25
Corn	0.01	0.12	0.26	0.33	0.37	0.39	0.40	0.42
Wheat	0.02	0.08	0.18	0.32	0.38	0.42	0.43	0.45
Soybean	0.00	0.08	0.15	0.20	0.18	0.17	0.16	0.17
JPY/USD	0.01	0.07	0.09	0.09	0.09	0.10	0.09	0.09
ZAR/USD	-0.14	-0.23	-0.28	-0.32	-0.30	-0.27	-0.25	-0.25
5Y_RollingReturn	-0.13	-0.21	-0.22	-0.22	-0.23	-0.23	-0.23	-0.24
10Y_RollingReturn	-0.21	-0.30	-0.32	-0.33	-0.34	-0.34	-0.35	-0.35
Fama-French: MKT_ER	-0.05	0.06	0.09	0.11	0.12	0.13	0.14	0.14
Fama-French: SMALL - BIG	0.03	0.12	0.14	0.15	0.15	0.15	0.16	0.16
Fama-French: HIGH - LOW	0.07	0.14	0.15	0.12	0.10	0.08	0.08	0.09
Fama-French: ROBUST - WEAK	-0.10	-0.15	-0.15	-0.15	-0.15	-0.16	-0.16	-0.14
Fama-French: CONSERV. – AGRESS.	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.04
T-bill	0.21	0.29	0.38	0.49	0.60	0.74	0.82	0.87
Willshire_5000	-0.04	0.07	0.12	0.14	0.15	0.15	0.16	0.15
Case_Shiller	0.21	0.29	0.36	0.40	0.44	0.54	0.62	0.72

Headline PCE VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.03	0.13	0.21	0.26	0.26	0.27	0.29	0.32
GSCI_Index	0.14	0.28	0.31	0.29	0.25	0.23	0.23	0.25
WTI_Crude	0.35	0.43	0.45	0.48	0.55	0.63	0.68	0.71
CPI_Headline	0.84	0.89	0.94	0.98	0.99	0.99	0.99	1.00
S&P 500	-0.06	-0.04	-0.06	-0.13	-0.20	-0.29	-0.35	-0.39
BCOM Index	0.17	0.35	0.40	0.42	0.43	0.49	0.55	0.62
Gold	0.10	0.20	0.26	0.33	0.37	0.45	0.50	0.54
Silver	0.05	0.11	0.15	0.20	0.26	0.35	0.41	0.46
Corn	0.02	0.10	0.17	0.22	0.23	0.24	0.27	0.28
Wheat	0.02	0.06	0.10	0.16	0.20	0.27	0.31	0.35
Soybean	0.02	0.06	0.07	0.07	0.07	0.08	0.09	0.12
JPY/USD	0.02	0.04	0.03	0.02	0.02	0.03	0.03	0.03
ZAR/USD	-0.10	-0.15	-0.15	-0.15	-0.13	-0.11	-0.11	-0.10
5Y_RollingReturn	-0.07	-0.09	-0.05	0.00	0.07	0.19	0.27	0.32
10Y_RollingReturn	-0.15	-0.19	-0.17	-0.18	-0.19	-0.22	-0.24	-0.24
Fama-French: MKT_ER	-0.08	-0.07	-0.11	-0.19	-0.28	-0.40	-0.46	-0.51
Fama-French: SMALL - BIG	0.04	0.10	0.15	0.20	0.26	0.34	0.39	0.42
Fama-French: HIGH - LOW	0.08	0.15	0.16	0.17	0.18	0.21	0.23	0.25
Fama-French: ROBUST - WEAK	-0.09	-0.11	-0.12	-0.16	-0.23	-0.32	-0.38	-0.42
Fama-French: CONSERV. – AGRESS.	0.05	0.11	0.15	0.18	0.22	0.26	0.28	0.28
T-bill	0.47	0.54	0.59	0.62	0.66	0.72	0.78	0.84
Willshire_5000	-0.04	0.00	0.00	-0.04	-0.08	-0.12	-0.15	-0.15
Case_Shiller	0.39	0.44	0.48	0.52	0.53	0.57	0.61	0.67

CORE PCE VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.01	0.05	0.06	0.07	0.09	0.11	0.13	0.16
GSCI_Index	0.03	0.06	0.08	0.07	0.06	0.05	0.04	0.04
WTI_Crude	0.14	0.17	0.21	0.28	0.37	0.49	0.57	0.63
CPI_Headline	0.60	0.73	0.83	0.91	0.95	0.97	0.98	0.99
S&P 500	-0.05	-0.06	-0.07	-0.11	-0.15	-0.21	-0.26	-0.30
BCOM Index	0.09	0.17	0.20	0.22	0.26	0.34	0.39	0.45
Gold	0.05	0.10	0.15	0.18	0.20	0.24	0.28	0.33
Silver	0.01	0.03	0.04	0.07	0.10	0.16	0.21	0.26
Corn	0.03	0.06	0.06	0.07	0.08	0.11	0.13	0.16
Wheat	0.01	0.01	0.01	0.00	0.00	-0.01	-0.01	-0.02
Soybean	0.01	0.02	0.00	-0.03	-0.05	-0.09	-0.12	-0.14
JPY/USD	0.02	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.01
ZAR/USD	-0.02	-0.05	-0.04	-0.03	-0.02	-0.01	-0.01	0.01
5Y_RollingReturn	0.00	0.02	0.08	0.14	0.20	0.29	0.36	0.41
10Y_RollingReturn	-0.05	-0.07	-0.05	-0.04	-0.04	-0.05	-0.06	-0.08
Fama-French: MKT_ER	-0.07	-0.09	-0.12	-0.17	-0.24	-0.33	-0.39	-0.46
Fama-French: SMALL - BIG	0.05	0.11	0.17	0.25	0.34	0.47	0.54	0.61
Fama-French: HIGH - LOW	0.06	0.12	0.15	0.19	0.24	0.33	0.39	0.46
Fama-French: ROBUST - WEAK	-0.04	-0.06	-0.08	-0.13	-0.19	-0.28	-0.33	-0.39
Fama-French: CONSERV. – AGRESS.	0.04	0.11	0.15	0.18	0.19	0.21	0.23	0.26
T-bill	0.60	0.67	0.69	0.71	0.73	0.78	0.83	0.88
Willshire_5000	-0.03	-0.02	-0.02	-0.02	-0.03	-0.04	-0.05	-0.05
Case_Shiller	0.37	0.42	0.46	0.50	0.51	0.52	0.55	0.60

PPI Final Goods VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	0.12	0.30	0.39	0.47	0.50	0.52	0.53	0.54
GSCI_Index	0.30	0.53	0.58	0.58	0.54	0.52	0.52	0.54
WTI_Crude	0.56	0.63	0.65	0.70	0.76	0.82	0.84	0.85
CPI_Headline	0.67	0.76	0.82	0.88	0.90	0.93	0.95	0.96
S&P 500	-0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03
BCOM Index	0.24	0.53	0.60	0.61	0.61	0.61	0.61	0.61
Gold	0.11	0.24	0.31	0.41	0.48	0.56	0.58	0.60
Silver	0.12	0.18	0.23	0.31	0.41	0.53	0.59	0.62
Corn	0.05	0.19	0.27	0.35	0.38	0.41	0.41	0.42
Wheat	0.00	0.10	0.16	0.27	0.37	0.45	0.48	0.50
Soybean	0.04	0.16	0.17	0.16	0.17	0.18	0.19	0.22
JPY/USD	0.05	0.09	0.06	0.03	0.02	0.01	0.00	-0.03
ZAR/USD	-0.10	-0.25	-0.29	-0.33	-0.32	-0.31	-0.31	-0.30
5Y_RollingReturn	-0.08	-0.15	-0.17	-0.19	-0.21	-0.22	-0.22	-0.20
10Y_RollingReturn	-0.17	-0.26	-0.30	-0.35	-0.38	-0.41	-0.42	-0.44
Fama-French: MKT_ER	0.08	0.13	0.14	0.15	0.16	0.17	0.18	0.19
Fama-French: SMALL - BIG	0.04	0.08	0.12	0.15	0.16	0.17	0.17	0.16
Fama-French: HIGH - LOW	0.06	0.15	0.23	0.27	0.30	0.31	0.32	0.32
Fama-French: ROBUST - WEAK	-0.11	-0.13	-0.17	-0.20	-0.30	-0.38	-0.42	-0.45
Fama-French: CONSERV. – AGRESS.	0.03	0.10	0.13	0.12	0.12	0.14	0.15	0.14
T-bill	0.18	0.26	0.31	0.35	0.41	0.50	0.59	0.69
Willshire_5000	-0.01	0.04	0.05	0.05	0.05	0.05	0.05	0.06
Case_Shiller	0.22	0.30	0.38	0.44	0.47	0.54	0.60	0.68

Hourly Earnings VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.02	0.00	0.04	0.08	0.13	0.21	0.26	0.31
GSCI_Index	-0.02	-0.03	0.03	0.07	0.13	0.21	0.27	0.31
WTI_Crude	-0.15	-0.07	0.08	0.23	0.38	0.54	0.62	0.68
CPI_Headline	0.25	0.49	0.69	0.82	0.88	0.93	0.95	0.97
S&P 500	0.00	-0.16	-0.17	-0.18	-0.18	-0.20	-0.21	-0.21
BCOM Index	0.01	0.06	0.15	0.22	0.30	0.39	0.45	0.49
Gold	0.04	0.05	0.14	0.21	0.27	0.35	0.40	0.45
Silver	-0.01	-0.03	0.05	0.14	0.23	0.33	0.39	0.43
Corn	0.00	0.03	0.07	0.11	0.15	0.21	0.25	0.29
Wheat	0.02	0.03	0.04	0.06	0.12	0.20	0.25	0.30
Soybean	-0.01	0.01	0.04	0.06	0.08	0.11	0.13	0.15
JPY/USD	-0.05	0.01	0.03	0.03	0.04	0.04	0.04	0.05
ZAR/USD	-0.01	0.03	0.00	-0.04	-0.08	-0.12	-0.15	-0.18
5Y_RollingReturn	0.04	0.00	0.00	0.00	0.00	0.02	0.02	0.03
10Y_RollingReturn	0.02	-0.05	-0.09	-0.14	-0.20	-0.26	-0.31	-0.34
Fama-French: MKT_ER	-0.02	-0.19	-0.21	-0.24	-0.28	-0.35	-0.40	-0.45
Fama-French: SMALL - BIG	0.02	0.06	0.12	0.22	0.32	0.45	0.53	0.61
Fama-French: HIGH - LOW	0.01	-0.01	0.02	0.07	0.11	0.18	0.22	0.25
Fama-French: ROBUST - WEAK	0.01	-0.04	-0.06	-0.13	-0.21	-0.32	-0.40	-0.46
Fama-French: CONSERV. – AGRESS.	0.00	0.04	0.07	0.10	0.14	0.19	0.22	0.25
T-bill	0.29	0.46	0.53	0.56	0.59	0.63	0.67	0.74
Willshire_5000	0.00	-0.13	-0.12	-0.10	-0.08	-0.06	-0.04	-0.02
Case_Shiller	0.28	0.40	0.48	0.55	0.58	0.64	0.70	0.79

Case Shiller VS:	1m	3m	6m	1y	2y	5y	10y	30y
Agriculture_Subindex	-0.05	-0.05	-0.02	0.02	0.02	0.01	0.01	0.01
GSCI_Index	0.09	0.17	0.24	0.29	0.38	0.51	0.61	0.73
WTI_Crude	0.14	0.21	0.28	0.32	0.42	0.56	0.67	0.78
CPI_Headline	0.39	0.46	0.50	0.50	0.51	0.55	0.59	0.64
PPI_FG	0.22	0.30	0.38	0.44	0.47	0.54	0.60	0.68
S&P 500	0.07	0.12	0.18	0.24	0.30	0.40	0.49	0.61
BCOM Index	0.11	0.20	0.28	0.36	0.44	0.58	0.68	0.79
Gold	0.00	0.02	0.05	0.10	0.14	0.20	0.27	0.37
Silver	-0.01	0.00	0.04	0.09	0.12	0.17	0.22	0.30
Corn	-0.07	-0.11	-0.12	-0.13	-0.20	-0.31	-0.40	-0.50
Wheat	0.00	0.02	0.03	0.05	0.07	0.09	0.11	0.14
Soybean	-0.02	-0.04	-0.07	-0.12	-0.17	-0.26	-0.35	-0.46
JPY/USD	0.04	0.06	0.10	0.16	0.20	0.28	0.35	0.46
ZAR/USD	-0.04	-0.07	-0.12	-0.17	-0.22	-0.30	-0.38	-0.48
5Y_RollingReturn	-0.10	-0.16	-0.23	-0.32	-0.37	-0.46	-0.55	-0.66
10Y_RollingReturn	-0.11	-0.17	-0.26	-0.37	-0.43	-0.55	-0.65	-0.75
Fama-French: MKT_ER	0.06	0.10	0.16	0.21	0.26	0.35	0.43	0.55
Fama-French: SMALL - BIG	0.09	0.14	0.22	0.30	0.39	0.53	0.62	0.73
Fama-French: HIGH - LOW	0.09	0.14	0.18	0.22	0.27	0.36	0.44	0.55
Fama-French: ROBUST - WEAK	-0.01	-0.03	-0.08	-0.12	-0.15	-0.19	-0.24	-0.31
Fama-French: CONSERV. – AGRESS.	0.03	0.04	0.08	0.12	0.15	0.21	0.26	0.35
T-bill	0.14	0.14	0.15	0.16	0.17	0.20	0.24	0.35
Willshire_5000	0.08	0.14	0.22	0.29	0.37	0.50	0.60	0.72

TABLE A5: Correlations of inflation indices with nominal bonds over alternative holding periods, since 1972

Headline CPI

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.02	-0.03	-0.24	-0.16	-0.12		
5y	-0.10	0.07	-0.03	-0.30	-0.34	-0.35	
10y	-0.16	-0.15	0.15	0.30	-0.03	-0.23	0.09

GSCI Index

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.10	-0.10	-0.26	-0.28	-0.31		
5y	-0.11	-0.20	-0.24	-0.32	-0.34	-0.37	
10y	-0.11	-0.25	-0.21	-0.22	-0.32	-0.38	-0.36

Core CPI

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.14	-0.11	-0.12	-0.03	0.01		
5y	0.01	0.21	-0.13	-0.19	-0.24	-0.27	
10y	-0.06	-0.01	0.30	0.44	0.07	-0.20	0.04

CPI Energy

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.09	0.09	-0.24	-0.20	-0.29		
5y	-0.15	-0.11	0.10	-0.24	-0.22	-0.23	
10y	-0.19	-0.21	-0.11	-0.02	-0.23	-0.16	0.16

CPI Durables

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.06	-0.04	-0.24	-0.20	-0.20		
5y	-0.14	0.00	-0.28	-0.30	-0.39	-0.45	
10y	-0.17	-0.17	0.09	0.18	-0.18	-0.45	-0.22

CPI Services

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.20	0.13	-0.05	0.03	0.08		
5y	0.06	0.30	0.24	-0.14	-0.17	-0.15	
10y	0.00	0.07	0.35	0.47	0.20	-0.02	0.39

CPI Nondurables

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.05	0.27	-0.27	-0.19	-0.10		
5y	-0.14	-0.05	0.43	-0.27	-0.22	-0.15	
10y	-0.19	-0.21	0.03	0.18	0.04	0.08	0.58

Headline PCE

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.03	0.12	-0.24	-0.11	-0.08		
5y	-0.10	0.10	0.17	-0.26	-0.29	-0.29	
10y	-0.17	-0.13	0.21	0.33	0.03	-0.14	0.43

Core PCE

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.09	0.17	-0.14	-0.01	0.02		
5y	-0.03	0.20	0.17	-0.16	-0.20	-0.21	
10y	-0.08	-0.04	0.32	0.44	0.11	-0.11	0.31

PPI Final Goods

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.06	0.19	-0.29	-0.22	-0.18		
5y	-0.13	-0.08	0.32	-0.30	-0.29	-0.23	
10y	-0.18	-0.22	-0.03	0.10	-0.07	-0.06	0.45

Hourly Earnings

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	0.08	0.05	-0.13	-0.09	-0.12		
5y	0.03	0.10	0.01	-0.20	-0.30	-0.35	
10y	0.00	-0.06	0.16	0.25	-0.07	-0.30	0.02

Case-Shiller

maturity\horizon	1m	3m	6m	1y	2y	5y	10y
2y	-0.11	-0.37	-0.21	-0.34	-0.44		
5y	-0.14	-0.17	-0.56	-0.32	-0.45	-0.56	
10y	-0.12	-0.23	-0.21	-0.20	-0.51	-0.62	-0.49

TABLE B1: Data Dictionary

Series ID	Name	Info	Source
GSALE	Agriculture Subindex	GSCI Subindex	Haver
GSENE	Energy Subindex	GSCI Subindex	Haver
GSGCE	Gold Subindex	GSCI Subindex	Haver
GSICE	Copper Subindex	GSCI Subindex	Haver
GSNGE	Natural Gas Subindex	GSCI Subindex	Haver
GSIAE	Aluminum Subindex	GSCI Subindex	Haver
GSSIE	Silver Subindex	GSCI Subindex	Haver
GSCIE	GSCI Broad Commodity Index	Goldman Sachs Commodity Index	Haver
PZTEXP	WTI Crude		Haver
PZBRT	Brent Crude		Haver
MPCUN	CPI Headline		Haver
MPCSLFEN	CPI Core		Haver
MPCUSEN	CPI Energy		Haver
MPCUCCD	CPI Durables		Haver
MPCUCS	CPI Services		Haver
MPCUSND	CPI Nondurables		Haver
JCBM	PCE Headline		Haver
JCXFEBM	PCE Core		Haver
SP3000	PPI FG		Haver
SP3500	PPI FG Core		Haver
SPX_INDEX	S&P 500		Haver
SPWI	Wilshire 5000		Haver
S5101AB	S&P Oil and Gas Equipment	S&P Industry Subindex	Haver
S5101BB	S&P Oil and Gas Production	S&P Industry Subindex	Haver
S5452I	S&P Technology Hardware	S&P Industry Subindex	Haver
S5151DI	S&P Metals Mining	S&P Industry Subindex	Haver
S540I	S&P Financials	S&P Industry Subindex	Haver
S5403I	S&P Insurance	S&P Industry Subindex	Haver
S5451I	S&P Softwares	S&P Industry Subindex	Haver
S5453I	S&P Semiconductors	S&P Industry Subindex	Haver
S5501I	S&P Telecom	S&P Industry Subindex	Haver
S560I	S&P Real Estate	S&P Industry Subindex	Haver
BCOM_INDEX	BCOM Broad Commodity Index	Bloomberg Commodity Index	Bloomberg
CL1_COMDTY	WTI_1Month	1 month Future	Bloomberg
CL24_COMDTY	WTI_2Year	2 year future	Bloomberg
CL60_COMDTY	WTI_5Year	5 year future	Bloomberg
CO1_COMDTY	Brent_1Month	1 month future	Bloomberg
CO24_COMDTY	Brent_2Year	2 year future	Bloomberg
CO60_COMDTY	Brent_5year	5 year future	Bloomberg
XAG_CURNCY	Silver		Bloomberg

C_1_COMDTY	Corn		Bloomberg
W_1_COMDTY	Wheat		Bloomberg
S_1_COMDTY	Soybean		Bloomberg
LH1_COMDTY	Hogs		Bloomberg
WILREITT_INDEX	Wilshire REIT		Bloomberg
GI	EM Bonds	EM Bond Total Return Index	Haver
USDJPY_CURNCY	USDJPY		Bloomberg
EURUSD_CURNCY	EURUSD		Bloomberg
USDRUB_CURNCY	USDRUB		Bloomberg
USDBRL_CURNCY	USDBRL		Bloomberg
USDZAR_CURNCY	USDZAR		Bloomberg
Mkt-RF	MKT_ER		Fama/French
SMB	SMALL_MINUS_BIG		Fama/French
HML	HIGH_MINUS_LOW		Fama/French
RMW	ROBUST_MINUS_WEAK		Fama/French
CMA	CONSERVATIVE_MINUS_AGRESSIVE		Fama/French
RF	RISKFREE		Fama/French
AHETPI	Hourly Earnings	US Average Hourly Earnings	FRED
GOLDAMGBD228NLBM	Gold		FRED
WILL5000INDFC	Willshire_5000		FRED
CS_NOM	Case-Shiller		Shiller Website
FTBID1M	1Y_RollingReturn		Haver
FCMID2Y	2Y_RollingReturn		Haver
FCMID5Y	5Y_RollingReturn		Haver
FCMID10	10Y_RollingReturn		Haver
FCMID30	30Y_RollingReturn		Haver
FTIID5Y	5Y_TIPS_Rolling		Haver
FTIID10	10Y_TIPS_Rolling		Haver
FTIID30	30Y_TIPS_Rolling		Haver