

# Predictability in Commodity Markets: Evidence from more than a Century\*

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## Abstract

Using more than 140 years of data, we comprehensively analyze the predictive power of a broad set of macroeconomic variables for commodity prices and volatilities. We find some evidence for short-term predictability, while the predictability is much stronger in the long-term, at least for return predictability. The level of volatility and the degree of predictability are affected by the introduction of derivatives trading. A business cycle analysis shows that the degree of return predictability is independent of being in a recession or expansion. Volatility predictability is more pronounced in recessions.

**JEL classification:** G10, G11, G17

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## ***I.* Introduction**

A growing literature has analyzed the predictability of commodity spot returns and/or volatilities, mostly using variables that are known to predict equity returns (e.g., [Gorton & Rouwenhorst, 2006](#); [Gargano & Timmermann, 2014](#)). The growing number of predictive variables raises several questions: Which variables known to predict stock returns can also predict commodity returns? Do the variables that predict commodity returns also forecast commodity return volatilities? Does predictability vary over the business cycle? Had the introduction of derivatives trading influence on the degree of predictability? These are some of the questions we want to answer.

The interest in commodity markets has grown rapidly over recent decades. Although commodities have been traded on exchanges for more than 100 years in the U.S., commodities as an asset class are still relatively unexplored. Due to the poor performance of stocks and bonds, investors have turned to commodities as a new investment class (e.g., [Bessembinder & Chan, 1992](#); [Gorton & Rouwenhorst, 2006](#); [Kogan et al., 2009](#)). [Erb & Harvey \(2006\)](#) show that commodities and equities have similar average returns. Due to the low correlation with stocks and bonds, commodities are useful to achieve a high degree of portfolio diversification and serve as a good hedge against inflation (e.g., [Sadorsky, 2002](#); [Gorton & Rouwenhorst, 2006](#); [Lien & Yang, 2008](#); [Symeonidis et al., 2012](#)).

Commodities also attract attention by being predictable, with financial and macroeconomic variables that are known to possess predictive power for stocks and bonds (e.g., [Bessembinder & Chan, 1992](#); [Bailey & Chan, 1993](#); [Chen et al., 2010](#); [Pierdzioch et al., 2016](#)). Capital constraints and limitations for hedging also affect commodity prices and thus the predictability of commodity returns ([De Roon et al., 2000](#); [Hong & Yogo, 2012](#); [Acharya et al., 2013](#)). Last but not least, being able to

predict the prices (or returns) of commodities is naturally very important for the real industry. In many sectors, commodities are one of the most important inputs to production. It is thus of great interest to be able to accurately model the expected return on commodity prices.

The main goal of this paper is to provide the most comprehensive evidence on the predictive power of macroeconomic variables for commodity excess returns and volatilities to date. In doing so, we make three contributions to the literature.

First, in contrast to the existing literature, we analyze a very long sample period of more than 140 years of data and use a comprehensive set of commodity markets and predictive variables. Indeed, our sample spans the period from January 1871 to December 2015 and covers 30 commodities and 16 predictive variables. A variable is considered to have predictive power if it exhibits significant predictive ability out-of-sample.

Second, we do not only analyze the predictability of excess returns, which is the focus of most existing studies, but also the predictability of volatilities. In doing so, we use the same time periods and techniques as for the returns to ensure a comparable analysis.

Third, in contrast to previous studies, our data allow us to get new insights from analyzing a long sample period as well as the strength of the predictability around economically important events such as the introduction of derivatives trading. Our long sample also enables us to analyze the predictability of both excess returns and volatilities for different states of the economy. Following [Cujean & Hasler \(2017\)](#), we examine expansions and recessions separately.

We find that there is evidence for short- and long-term predictability for both commodity excess returns and volatilities. We observe, however, more predictability at longer horizons. These improvements are more pronounced for the predictability of excess returns rather than that of volatilities.

In more detail, we find that the growth of industrial production, the market risk premium, and the default return spread are the most reliable predictive variables in the short-term. At long horizons, we find that interest rate-related variables – specifically, the 3-month Treasury bill rate, the default yield spread, the long-term U.S. government bond yield, and the term spread – are the most reliable predictive variables.

Analyzing the short-term volatility predictability, we detect that the dividend–price ratio, the dividend yield, the inflation rate and the long-term government bond yield are the most important predictive variables. For longer horizons, the earnings–price ratio, the default yield spread, and the term spread contribute to the predictability.

The structural break analysis shows that the introduction of derivatives trading has a substantial effect on the degree of return and volatility predictability. It also provides evidence that volatility has been systematically affected by the introduction of derivatives trading and the beginning of the global financial crisis.

Our study directly relates to the literature on commodity return predictability. [Bessembinder & Chan \(1992\)](#), [Bailey & Chan \(1993\)](#), and [Bjornson & Carter \(1997\)](#) use the dividend yield, the default return spread, Treasury bill rates, and long-term government bond yields to forecast commodity futures returns. [De Roon et al. \(2000\)](#) focus on the forecasting power of hedging pressure. [Hong & Yogo \(2012\)](#) and [Acharya et al. \(2013\)](#) extend that work using open interest and limits to arbitrage proxies, respectively. [Etula \(2013\)](#) shows that lagged effective risk-aversion and the market excess return predict energy returns. We extend these studies by analyzing a broad set of commodities and we examine numerous predictive variables together that have been studied in isolation in the existing literature.

[Chen et al. \(2010\)](#) demonstrate the predictive power of commodity currency exchange rates for country-specific commodity spot indices. [Gargano & Timmer-](#)

[mann \(2014\)](#) use commodity spot indices to examine the predictive ability of several variables over a somewhat longer sample period than typically analyzed in the existing literature. Analyzing different states of the economy, they find stronger evidence for predictability during recessions. We focus on individual commodities rather than an aggregated index and are thus able to analyze commodity-specific and sector-specific effects.

Our study also relates to the interplay between macroeconomic aggregates and commodity volatilities. [Veronesi \(1999\)](#) documents the link between investors' uncertainty about fundamental variables and volatility clustering. [Bansal & Yaron \(2004\)](#) show that there is a strong relationship between fundamentals and time-varying stock market volatility. [Mele \(2007\)](#) points out the effect of stages of the economy on stock market return volatility. [Paye \(2012\)](#) demonstrates that macroeconomic variables have predictive power for stock market volatility, particularly around the beginning of recessions. [Pierdzioch et al. \(2016\)](#) use macroeconomic and financial variables to predict the volatility of gold-price fluctuations, while [Prokopczuk et al. \(2016\)](#) analyze the drivers of commodity variance. We contribute to this literature by analyzing not only return predictability but also volatility predictability. In addition, we extend these studies by analyzing the linkage between return and volatility predictability and business cycle stages.

The remainder of this paper proceeds as follows. Section *II.* introduces the data and describes the variables. Section *III.* presents the main empirical results. Section *IV.* discusses the time-variation analysis. Section *V.* provides the business cycle analysis. Section *VI.* discusses further results. Finally, Section *VII.* concludes.

## II. Data and Methodology

This section introduces the data used for the empirical analysis. It then explains the main variables in detail.

### II.A Data

We obtain our data from three distinct sources. First, we retrieve the monthly time series of spot prices for 30 different commodities from the Global Financial Database (GFD). Our sample period extends from January 1871 to December 2015, covering almost 150 years. We focus on commodities traded in the U.S. and that are denominated in United States Dollar (USD). Table I lists all the commodity markets we analyze. We focus on spot prices rather than on futures prices since we can obtain a much longer history for the former. Using futures prices has the advantage that one can analyze the profitability of a trading strategy from the perspective of a financial investor. Although interesting, this is not our goal. Our objective is to analyze the spot market to identify potential economic linkages between macroeconomic variables and commodity excess returns and volatilities.<sup>1</sup> Second, we consider most of the predictive variables employed by [Goyal & Welch \(2008\)](#), which they use to predict the equity premium.<sup>2</sup> Third, like [Gargano & Timmermann \(2014\)](#), we also consider industrial production, money supply, and the unemployment rate from the Federal Reserve Bank of St. Louis (FRED).

### II.B Variables

**Commodity Excess Return** Since some commodity markets are known to exhibit seasonal patterns, we deseasonalize the commodity returns by running the

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<sup>1</sup>Knowledge about the future price development of physical commodities is important for producers and consumers, e.g., for planning purposes of future purchases and sales.

<sup>2</sup>The extended data set is available at <http://www.hec.unil.ch/agoyal/>.

following regression on the full sample period:

$$R_{t+1} = \sum_{j=1}^{12} \delta_j D_{j,t+1} + \epsilon_{t+1}, \quad (1)$$

where  $R_{t+1} = \left( \frac{P_{t+1} - P_t}{P_t} \right)$  is the simple return on the commodity at the end of month  $t + 1$ .  $P_{t+1}$  and  $P_t$  denote the price at the end of months  $t + 1$  and  $t$ , respectively.  $D_{j,t+1}$  are monthly dummy variables to account for different monthly mean returns, and  $\delta_j$  and  $\epsilon_{t+1}$  are the coefficients associated with the dummy variables  $D_{j,t+1}$ , and the error term, respectively.

We then compute the excess return on a commodity as the difference between the monthly simple return on the commodity and the monthly riskless rate from the corresponding period:

$$ER_{t+1} = R_{t+1}^d - Rf_t, \quad (2)$$

where  $ER_{t+1}$  is the monthly excess return on the specific commodity at the end of month  $t + 1$ .  $R_{t+1}^d$  denotes the deaseasonalized monthly commodity return.  $Rf_t$  refers to the riskless rate observed at the end of month  $t$ .<sup>3</sup> Following [Goyal & Welch \(2008\)](#), we use the 1-month Treasury bill rate to proxy for the riskless rate.<sup>4</sup>

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<sup>3</sup>Throughout this paper, we use the convention that the riskless rate is given the subscript for the time when it is observed. Thus, the riskless rate is observed at time  $t$  even though it is realized at time  $t + 1$ .

<sup>4</sup>We obtain similar results when using commodity excess returns for deaseasonalization rather than commodity returns in Equation (1). The riskless rate does not exhibit a seasonal component and thus does not influence the results.

**Commodity Volatility** To compute a measure of dispersion on the basis of monthly excess return data, we follow [Schwert \(1989\)](#).<sup>5</sup> First, we estimate a 12th-order autoregression for the commodity excess returns, i.e.:

$$ER_t = \sum_{i=1}^{12} \eta_i ER_{t-i} + \epsilon_t, \quad (3)$$

where  $ER_t$  is the monthly deseasonalized commodity excess return,  $\eta_i$  are the regression coefficients, and  $\hat{\epsilon}_t$  are the realized error terms. Second, we use the absolute value of the realized error terms  $|\hat{\epsilon}_t|$  to estimate a 12th-order autoregression, i.e.:

$$|\hat{\epsilon}_t| = \sum_{i=1}^{12} \rho_i |\hat{\epsilon}_{t-i}| + u_t, \quad (4)$$

where  $\rho_i$  are the regression coefficients and  $u_t$  the realized error terms. The absolute value of the fitted values represents the conditional monthly standard deviation, which we denote by  $\sigma_t$ , and serves as measure of dispersion.

**Predictive Variables** To analyze whether macroeconomic variables carry information about future commodity excess returns and volatilities, we follow the literature on stock return predictability and use 16 predictive variables that are usually considered to have predictive power for stock returns. The variables are related to the equity market, to the fixed income market, and to the overall economy.

In particular, we consider the dividend–payout ratio ( $de$ ) computed as the difference between the log of monthly dividends and the log of monthly earnings. The dividends (earnings) are computed as the trailing sum of dividends (earnings) paid on the S&P 500 index over the past year. Further, we use the dividend–price

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<sup>5</sup>In the case of daily excess returns, we would compute the monthly variance as the sum of the squared daily excess returns. Due to our long sample period there are no daily excess returns available. Thus, we compute the monthly volatility on the basis of monthly excess returns, following the procedure suggested by [Schwert \(1989\)](#).



ratio ( $dp$ ) as the difference between the log of monthly dividends and the log of monthly prices on the S&P 500 stock index, the dividend yield ( $dy$ ) as the difference between the log of monthly dividends and the log of lagged monthly prices, the earnings–price ratio ( $ep$ ) as the difference between the log of monthly earnings and the log of monthly prices, the market risk premium ( $erp$ ) as the difference between the change in the monthly log prices of the S&P 500 total return index and the monthly continuously compounded 1-month Treasury bill rate, and the monthly stock variance ( $svar$ ) computed as the sum of squared daily returns on the S&P 500.

As interest rate-related variables, we use the default return spread ( $dfr$ ) computed as the difference between monthly long-term U.S. corporate bond returns on AAA- and BAA-rated bonds and monthly long-term U.S. government bond returns, the default yield spread ( $dfy$ ) as the difference between monthly U.S. BAA- and AAA-rated corporate bond yields, the monthly long-term U.S. government bond returns ( $ltr$ ), the monthly long-term U.S. government bond yields ( $lty$ ), the monthly 3-month Treasury bill rate ( $tbl$ ), and the term spread ( $tms$ ) as the difference between the monthly long-term yield on U.S. government bonds and the monthly 3-month Treasury bill rate.

As variables that are related to the overall economy, we use the growth of industrial production ( $\Delta indpro$ ) computed as the change in the logarithm of the monthly industrial production, the growth of the money stock M1 ( $\Delta M1$ ) as the change in the logarithm of the monthly money stock, the monthly inflation rate ( $infl$ ) calculated as the simple return on the U.S. consumer price index (CPI), and

the monthly unemployment rate (*unrate*).<sup>6</sup>

### **III. Empirical Analysis**

#### **III.A Summary Statistics**

Before turning to our main analysis, it is instructive to look at the summary statistics and correlation matrices of our variables. We classify the commodities into three groups: agricultural, energy, and metal commodities.

Table I reports some (non-annualized) summary statistics of the deseasonalized returns. We observe that the average monthly returns are between 0.24 % for wool and 2.83 % for oranges, 0.28 % for coal and 1.72 % for natural gas, and 0.20 % for aluminium and 0.97 % for palladium in the agricultural, energy, and metal sector, respectively. These numbers are in line with former studies of, e.g., [Gorton et al. \(2012\)](#), although they analyze futures returns.<sup>7</sup> Table II presents some (non-annualized) summary statistics of the volatilities. They range from 2.97 % for milk to 13.60 % for oranges in the agricultural sector, 2.64 % for coal to 10.12 % for natural gas in the energy sector, and 1.67 % for gold to 7.34 % for nickel in the metal sector. The high first-order autoregressive coefficients are noteworthy, indicating a higher persistence and thus a potentially better predictability on the basis of their own current values, compared to commodity returns.

Table A1 of the Online Appendix reports some (non-annualized) summary

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<sup>6</sup>The monthly data of the dividends on the S&P 500 index, earnings on the S&P 500, prices on the S&P 500, U.S. BAA- and AAA-rated corporate bond returns, U.S. BAA- and AAA-rated corporate bond yields, long-term U.S. government bond returns, long-term U.S. government bond yields, 1-month Treasury bill rate, and 3-month Treasury bill rate are obtained from the extended data set provided by [Goyal & Welch \(2008\)](#). The monthly data for industrial production, money supply M1, and unemployment rate with tickers “INDPRO”, “M1”, and “UNRATE” are obtained from FRED. The monthly U.S. consumer price index (ticker: “CPUSAM”) and the monthly prices of the S&P 500 total return index (ticker: “\_SPXTRD”) are retrieved from the GFD.

<sup>7</sup>The high average monthly return of oranges is explained through sharp changes in the monthly price level over time.

statistics for the predictor variables. In particular, the classical predictors  $de$ ,  $dp$ ,  $dy$ , and  $ep$  are characterized by high monthly standard deviations between 31.58 % and 43.11 %, respectively. Most predictors also exhibit high first-order autoregressive coefficients, indicating that they might be predictable themselves.

Tables A2 to A4 of the Online Appendix report the correlation matrices of the commodity returns and volatilities, and the predictive variables. In Table A2, we see that in the agricultural sector, the related commodities soybeans, soybean oil, and soybean meal exhibit high correlations between 0.43 and 0.82, indicating a similar information content. Further, we notice that wheat, yellow corn, and soybean commodities show notable correlations between 0.35 and 0.60, which might be due to the fact that they serve as substitutes. Within the energy sector, we observe co-movements across heating oil, unleaded regular gas, and WTI oil, indicated by high correlations between 0.63 and 0.74.<sup>8</sup> In the metal sector all commodities exhibit moderate correlations. However, there is a high degree of correlation between silver and gold (0.74), which is also consistent with former studies.

In Table A3 of the Online Appendix, we observe similar patterns for volatilities within the sectors. There are additional notable correlations between tin and zinc volatility of 0.46, nickel and high grade copper of 0.47, and soybean oil and corn oil of 0.48. In Table A4 of the Online Appendix, we see high correlations between the interest rate-related variables, namely,  $ltr$  and  $dfr$  of  $-0.46$ ,  $lty$  and  $dfy$  of  $0.51$ , and  $tbl$  and  $lty$  of  $0.89$ ; also between  $unrate$  and  $tms$  of  $0.56$ , and  $unrate$  and  $dfy$  of  $0.64$ . We also observe similar information content between the related variables  $ep$  and  $dp$ , and  $dy$ , respectively, indicated by a correlation of  $0.78$ . Finally,  $dp$  and  $dy$  exhibit a correlation of  $0.99$ .

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<sup>8</sup>Which is not surprising, because heating oil is derived from crude oil.

### III.B Return Predictability

**In-Sample Analysis** To assess the in-sample predictability for commodity excess returns, we follow the methodology of [Rapach & Wohar \(2006\)](#). We estimate the following regression model of the  $k$ -month(s) ahead excess return on a constant and the predictive variable:

$$ER_{t,t+k} = \alpha_k + \beta_k X_t + \epsilon_{t,t+k}, \quad (5)$$

where  $ER_{t,t+k}$  is the commodity excess return from month  $t$  to  $t+k$ ,  $\alpha_k$  and  $\beta_k$  are the intercept and slope parameters of the respective forecast horizon, respectively, and  $\epsilon_{t,t+k}$  represents the regression error term over the  $k$  month(s).  $X_t$  is the predictive variable observed at the end of month  $t$ .

Table III summarizes the results for each predictive variable, predicting the next month's and the next year's excess return. Panel (A) reports the results for the short-term predictability, whereas Panel (B) focuses on the long-term predictability. Tables IV and V provide more detailed regression results. Based on the regression model, we examine whether the expected commodity excess return is time-varying or constant. Under the null hypothesis that the future commodity excess return cannot be predicted using  $X_t$ , we would expect that the slope would not be significantly different from zero, i.e.,  $\beta_k = 0$ . Thus, the expected commodity excess return would simply be constant, and we would conclude that the best estimate of the future expected excess return is simply its recursive mean. Under the alternative hypothesis, we would expect to see that the slope loading is statistically significant, indicating evidence of predictability. We use the bootstrapped distribution proposed by [Rapach & Wohar \(2006\)](#) to obtain reliable statistical inferences. Thus, we avoid a small-sample bias ([Stambaugh, 1999](#)) and serial correlation in the error terms

(Richardson & Stock, 1989).<sup>9</sup>

Analyzing the short-term predictability, Panel (A) of Table III reports the percentage of commodities for which the variable under consideration has predictive power. We find that  $\Delta indpro$  and  $dfr$  are the most frequent statistically significant variables in the univariate regressions in-sample. This is also supported by their  $t$ -statistics shown in Table IV. Other frequently significant predictors are  $erp$ ,  $infl$ ,  $ltr$ ,  $tbl$ , and  $tms$ , confirming the previous results of, e.g., Bessembinder & Chan (1992) and Sadorsky (2002). It is also worth analyzing the predictive power of each individual variable. The in-sample  $R^2$ s, presented in Table IV, reveal that  $\Delta indpro$  in the case of wool has the highest predictive power for future excess returns ( $R^2 = 3.04\%$ ).

The results analyzing the long-term predictability of excess returns are shown in Panel (B) of Table III. We ascertain that  $tbl$  and  $lty$  are the most frequent statistically significant variables in the univariate regressions, documented by their large  $t$ -statistics, shown in Table V, among others, of  $-11.15$  and  $-8.24$  for, e.g., live cattle. The degree of predictability for  $ep$ ,  $tms$ , and  $\Delta indpro$  is also noteworthy. We note that  $tbl$  has the highest predictive power in the univariate regressions in the case of live cattle ( $R^2 = 9.86\%$ ).

Overall, our findings are consistent with the literature. Fama & French (1989) show that  $tms$  is related to shorter-term business cycles, whereas  $dfr$  and  $dy$  more to long-term cycles. Chen (1991) documents that  $\Delta indpro$  and short-term interest yields are positively correlated to expected returns.<sup>10</sup> The relative high correlation between  $lty$  and  $tbl$  support the findings and indicate a similar variation. The

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<sup>9</sup>Under the null hypothesis of no predictability, we generate a pseudo sample and compute the respective in- and out-of-sample statistics. For details, we refer to Rapach & Wohar (2006). For the multiple variable regression case, we adjust the procedure accordingly.

<sup>10</sup>In detail, Chen (1991) shows that lagged industrial production, the default yield spread, the term spread, short-term interest yields, and the dividend yield are related to future economic growth. Simultaneously, he shows that the market excess return is positively correlated with future economic conditions.

results also suggest that bond returns, specifically *dfr* and *ltr*, are less suitable for predicting commodity excess returns.

To summarize, in the long-term we find a substantial increase in the frequency of significant predictions by the individual variables. Some variables predict (in-sample) excess returns better in the short-term (*Δindpro*), and others better in the long-term (*lty*). Further, there are variables that predict excess returns well in the short- and in the long-term (*tbl*).

**Out-of-Sample Results** We analyze the out-of-sample results in the spirit of [Goyal & Welch \(2008\)](#). To obtain the first out-of-sample forecast, we estimate the forecasting model presented in Equation (5) using an initial estimation window of 10 years. We then generate the first excess return forecast by using the parameter estimates and the most recent observation of the predictive variable in the estimation period. For the following month, we roll the estimation period by one observation month and re-estimate the forecasting model. With the new parameter estimates, we forecast the commodity excess return for the next month. The out-of-sample analysis is based on a rolling window to capture the potential time-varying relationship. To address the average length of a common business cycle, we follow [Çakmaklı & van Dijk \(2016\)](#) and use a 10-year rolling window.<sup>11</sup>

To be able to compare the out-of-sample performance of different models, we use the out-of-sample  $R^2$  ( $R_{oos}^2$ ), proposed by [Campbell & Thompson \(2008\)](#), which is given as follows:

$$R_{oos}^2 = 1 - \frac{MSE_u}{MSE_r}, \quad (6)$$

where  $MSE_u$  and  $MSE_r$  are the mean squared errors of the unrestricted and restricted model, respectively. The unrestricted model is presented in Equation

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<sup>11</sup>We analyze the time series for structural breaks and our findings suggest the use of a rolling window.

(5), whereas in the restricted model we assume that  $\beta_k = 0$  by imposing the null hypothesis that excess returns are unpredictable. Thus, based on the  $R_{oos}^2$  we answer the question: How large is the additional predictive power using the variable  $X_t$  in excess of the predictive power by using the historical mean? An increasing predictive power is associated with a positive  $R_{oos}^2$ . A variable is considered to have predictive power if it exhibits a positive and significant  $R_{oos}^2$ , thus, displaying an overall superior performance of the predictive variable.

To be able to make a statement whether the improvement is statistically significant, we compute the  $MSE - F$  statistic of [McCracken \(2007\)](#):

$$MSE - F = (N - k + 1) \times \left( \frac{MSE_r - MSE_u}{MSE_u} \right), \quad (7)$$

where  $N$  denotes the number of out-of-sample forecasts, and  $k$  the degree of overlapping observations.<sup>12</sup> All other variables are as previously defined. The null hypothesis is that the restricted model performs at most as well as the unrestricted model, i.e.,  $MSE_r \leq MSE_u$ . Thus, the alternative is that the unrestricted model provides smaller forecast errors than the restricted model.

We first analyze the short-term predictability. The results are summarized in Panel (A) of Table III. We observe that the variables performing best in-sample also perform best out-of-sample. In particular,  $\Delta indpro$  is the best performing variable, being significant for 23.33 % of the cases and showing the highest predictive power in the case of natural gas ( $R_{oos}^2 = 2.34$  %), documented in Table IV.

We now analyze the long-term predictability, given in Panel (B) of Table III. We observe similar patterns as in-sample. Interest rate-related variables, especially  $tbl$ ,  $dfy$ ,  $lty$ , and  $tms$  are the most frequently significant predictive variables with a frequency up to 70 %.  $dfy$  exhibits the highest predictive power in the univariate

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<sup>12</sup>Analogously to Equation (5),  $k$  equals 1 (12) in the case of predicting the next month's (next year's) excess return.

regressions in the case of gold ( $R_{oos}^2 = 13.98\%$ ), shown in Table V.

Overall, similar to the in-sample analysis, in the long-term we find a substantial increase in the frequency of significant predictions by the variables.  $\Delta indpro$ ,  $dfr$ , and  $erp$  perform best in the short-term, whereas interest rate-related variables, specifically,  $tbl$ ,  $dfy$ ,  $lty$ , and  $tms$ , do best in the long-term. In total, our results are consistent with the literature. We detect a moderate short-term predictability, while the degree of predictability is stronger for longer horizons.

### III.C Volatility Predictability

We now turn our attention to the predictability of the commodity volatility. In particular, we ask the question: Can any of the forecasting variables considered for returns be used to predict the next month's and the next year's volatilities, respectively?

**In-Sample Analysis** Using all the sample information, we estimate the following regression model:

$$\sigma_{t,t+k} = \xi_k + \gamma_k X_t + \delta_k \sigma_t + u_{t,t+k}, \quad (8)$$

where  $\sigma_{t,t+k}$  is the monthly (average) volatility from month  $t$  to  $t+k$ .  $\xi_k$ ,  $\gamma_k$ , and  $\delta_k$  are the intercept and slope parameters, respectively.  $X_t$  represents the forecasting variable observed at the end of month  $t$ . Finally,  $u_{t,t+k}$  is the regression error term over the  $k$  month(s). To account for the persistence in volatility, we include the lagged volatility,  $\sigma_t$ , as an additional predictive variable. Accordingly, we use a fitted AR(1) process as naive benchmark to address this property.<sup>13</sup>

Table III summarizes the results for each predictive variable, predicting the next

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<sup>13</sup>The strong persistence of commodity volatilities is indicated by their high AR(1) coefficients, shown in Table II, in comparison to commodity returns that show substantial lower AR(1) coefficients (see Table I). Thus, the best predictor for future volatility is mainly its current value. Accordingly, a fitted AR(1) process represents the natural naive benchmark rather than the historical volatility.



month's and the next year's volatility. Tables VI and VII provide more detailed regression results. In doing so, we now present the in-sample  $R^2$  improvement ( $\Delta R^2$ ) of the unrestricted model rather than the individual  $R^2$ .<sup>14</sup> We start again by analyzing the short-term predictability, shown in Panel (C) of Table III. The results reveal that all variables have predictive power for future volatility. In particular,  $dp$ ,  $dy$ , and  $svar$  provide evidence for predictability in the univariate regressions by their statistically significant  $t$ -statistics of 6.24 and 5.09 in the case of live cattle, and 4.29 for the commodity tin, respectively, shown in Table VI. Other frequently significant predictive variables are  $dfy$ ,  $unrate$ ,  $ep$ , and  $lty$ .

Next, we analyze the long-term predictability of volatilities; here, the results are presented in Panel (D) of Table III. We observe that all variables exhibit predictive power for future volatilities, except  $lty$ . Especially, frequent statistically significant variables are  $\Delta indpro$  and  $dfy$ , indicated by  $t$ -statistics of  $-3.78$  for lean hog and  $-5.17$  for unleaded regular gas, respectively, and are associated with  $\Delta R^2$ s of 0.03 % and 0.15 %, documented in Table VII. Other frequently significant variables are  $unrate$ ,  $de$ , and  $dp$ .

Overall, we find similar patterns for the predictive variables in both the short- and the long-term. However, we do not find an increase in the frequency of significant predictions by the variables in the long-term. These results are interesting for several reasons. First and possibly most surprising, they indicate that there is predictability of volatilities beyond its own lag, although volatility is known to be strongly persistent. Second, the findings reveal that many variables that predict commodity returns also predict commodity volatilities. These are, among others,  $\Delta indpro$ ,  $svar$ ,  $dfy$ , and  $tms$ . These results have an important implication for investigating the predictive power of variables. It is advisable to examine whether

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<sup>14</sup>In more detail, we compute  $\Delta R^2$  as the difference between the partial in-sample  $R^2$ s, i.e., as the difference between the adjusted  $R^2$  of the unrestricted and restricted model. Using the corresponding sum of squared residuals, we compute an  $F$ -test to determine the significance based on a bootstrapped distribution.

variables predict not only excess returns but also volatilities.

**Out-of-Sample Results** We perform our out-of-sample volatility prediction analysis in a similar way as for returns. In doing so, first, we use the first 10 years of observations to initially estimate the model parameters (see Equation (8)). We then predict the next month. We roll the training window by one observation month and repeat all steps. Also here, we account for the possibility of structural breaks and use a 10-year rolling window. This procedure is analog to the return predictability analysis, however, we forecast volatility rather than the excess return.

Analyzing the short-term predictability, Panel (C) of Table III shows that variables performing best in-sample also perform best out-of-sample. Specifically,  $dp$ ,  $dy$ ,  $infl$ ,  $lty$ , and  $dfy$  perform best with a frequency up to 40.00 %. Further,  $lty$  has the highest predictive power in the univariate regressions in the case of gold ( $R_{oos}^2 = 6.16$  %), shown in Table VI.

Analyzing the long-term predictability, Panel (D) of Table III documents similar results as in-sample. In particular  $ep$ ,  $dfy$ ,  $tms$ ,  $dy$ , and  $unrate$  are the most frequently statistically significant variables predicting future volatilities with a frequency up to 23.33 %. Further,  $tms$  has the highest predictive power in the univariate regressions in the case of natural gas ( $R_{oos}^2 = 5.56$  %), documented in Table VII.

Overall, we find a similar fraction of significant predictions by variables in both the short- and long-term. It seems that, despite the high degree of persistence, commodity volatilities are, to some extent, significantly predictable out-of-sample.

## IV. Time-Variation in Predictability

To further analyze the effects of important changes in commodity markets on the predictability of commodity excess returns and volatilities, we examine the variation

of predictability around specific events on the basis of a kitchen sink approach.<sup>15</sup> In particular, we ask the question: Does the introduction of derivatives trading systematically affect the predictability of commodity returns and volatilities?

We use data from the Commodity Research Bureau (CRB) to determine the time points of introduction of commodity futures and options, respectively. Moreover, we follow [Guidolin & Tam \(2013\)](#) and additionally use the beginning of the global financial crisis in 2007 as a further break point. Following the definition of U.S. business cycle stages from the National Bureau of Economic Research (NBER), we use December 2007 as starting point for the global financial crisis.

Tables VIII to XI report the (in-sample) adjusted  $R^2s$  and  $\Delta R^2s$ , respectively, for different horizons computed on the basis of 10 years of observations before and after the break point. To be able to compare the adjusted  $R^2s$  ( $\Delta R^2s$ ), we compute them using 10 years of data (120 observations) before and after the respective event. In the case of the global financial crisis, we use 97 observations due to limited data availability after the event.<sup>16</sup> Panel (A) shows the results with respect to the introduction of derivatives trading, whereas Panel (B) shows them with respect to the beginning of the global financial crisis. [Lettau & Van Nieuwerburgh \(2008\)](#) and [Pettenuzzo & Timmermann \(2011\)](#) analyze the relationship between break points and predictability, and argue that break points are associated with an increase in investment risk due to model instability. Thus, we expect a decrease in the return and volatility predictability after the break points.

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<sup>15</sup>We run a multiple regression in which we include all predictive variables. *dy*, *ep*, and *tbl* have been excluded due to high correlations and multicollinearity. In the case of volatility predictability, we again include lagged volatility as a further predictive variable, and we present the  $\Delta R^2s$ .

<sup>16</sup>In the case of futures and options, we impose the restriction that at least 10 years of observations must be available to compute the adjusted  $R^2s$ . Missing values in the table are due to a lack of data availability.

## IV.A Time-Variation in Return Predictability

We start by assessing the time-variation in return predictability. Prior to and after the introduction of futures and options trading, respectively, only few commodity excess returns are significantly predictable in the short-term, documented in Panel (A) of Table VIII. The highest predictability is observable in the case of WTI oil (adjusted  $R^2 = 19.20\%$ ) and high grade copper (adjusted  $R^2 = 16.80\%$ ) prior to the introduction of futures and options, respectively. However, in Panel (B) we observe that, since the global financial crisis, there is a substantial increase in the predictability, in particular in the case of energy commodities. The adjusted  $R^2$ s range from 10.68 % for nickel to 37.10 % for natural gas.

Panel (A) of Table IX reports the results for the long-term and indicates an extensive significant predictability prior to and after the introduction of futures and options trading, respectively. In accordance with our expectation, we find a higher predictability prior to the break points, indicated by adjusted  $R^2$ s ranging from 11.02 % for platinum to 68.36 % for gold, and 7.31 % for platinum to 68.27 % for gold in the case of futures and options, respectively. In the case of the global financial crisis, documented in Panel (B), all commodities show significant predictability before and after the break point. We detect similar patterns as before, displaying a stronger predictability after the break point, indicated by adjusted  $R^2$ s between 28.23 % for butter and 86.49 % for platinum.

Overall, the results provide evidence in favor of our expectation in the case of futures and options trading, respectively. The introduction of derivatives trading seems to be associated with a reduction in commodity return predictability. The global financial crisis represents an exception by showing stronger predictability after December 2007. Specifically here, energy commodities signal a substantial increase in the predictability.

## **IV.B Time-Variation in Volatility Predictability**

We now turn our focus to the analysis of the time-variation in volatility predictability. In Table X, we find a similar extent of significant short-term volatility predictability, compared to return predictability, prior to and after the break points. Gold exhibits the highest adjusted  $\Delta R^2$ s of 18.17 % prior to the break point in the case of futures, whereas live cattle with 12.29 % prior to the break point in the case of options. We notice that energy commodities show a substantial increase in the predictability since the global financial crisis, indicated by adjusted  $\Delta R^2$ s ranging from 14.78 % for unleaded regular gas to 28.32 % for coal. Table XI documents similar results for the volatility predictability in the long-term, which is consistent with our previous findings.

Overall, the results reflect a significant volatility predictability prior to and after the breaks points, in contrast to our expectation. It seems that the introduction of derivatives trading is associated with a general increase in volatility predictability. Further, the entire results confirm our previous findings. There is short-term predictability, while the degree of predictability is similar even for longer horizons. Moreover, when analyzing the predictability of commodities it is advisable not only to examine the return predictability but also the volatility predictability.

## **V. Predictability and Business Cycle Stages**

In this section, we analyze the return predictability over business cycle stages. We not only consider the return predictability but also the volatility predictability. Following [Cujean & Hasler \(2017\)](#), we examine expansions and recessions, and additionally we differentiate between early and late expansions and recessions, respectively. To determine expansions and recessions, we follow the classification of the NBER for U.S. business cycle stages. To differentiate between early and late

stages, we split up expansions and recessions into two equally large parts.<sup>17</sup>

## V.A Return Predictability

We start by analyzing the return predictability. Table XII summarizes the (in-sample) results of the long-term predictability for expansions and recessions, respectively. Further, Tables A5 to A8 of the Online Appendix report the in-sample and out-of-sample regression results for each business cycle stage, differentiated between early and late expansions and recessions, respectively.<sup>18</sup>

We observe that interest rate-related variables, especially *lty* and *tbl*, are the most frequent significant variables predicting excess returns in expansions, confirming our previous results. Here, *lty* shows the highest predictive power in the univariate regressions for unleaded regular gas ( $R^2 = 15.88\%$ ). Further, equity related predictors, i.e., *de*, *dp*, *dy*, and *ep*, display an extensive degree of significant predictions in expansions and recessions. The findings support the fact that, in particular, *tms*, *dfy*, and *dy* are closely related to business cycle stages (e.g., [Fama & French, 1989](#); [Chen, 1991](#); [Cochrane, 1999](#)). Moreover, *unrate* exhibits a superior performance in expansions.

Overall, in contrast to the literature, our findings provide evidence in favor of similar return predictability in expansions and recessions. In total, the results are consistent with our previous findings.

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<sup>17</sup>To obtain meaningful results, we impose the following conditions: We report the out-of-sample results when there are at least 30 out-of-sample observations available. Further, at least 10 years of in-sample observations must be available.

<sup>18</sup>We report the out-of-sample results in analogy to our main results, although we know that this is not a "real" out-of-sample analysis, because the business cycle stages have been determined ex post.

## **V.B Volatility Predictability**

We now turn our attention to the volatility predictability over business cycle stages. Analogously, Table XIII summarizes the (in-sample) results for expansions and recessions, respectively. Tables A9 to A12 of the Online Appendix report the more detailed in-sample and out-of-sample regression results.

The results reveal a weaker degree of predictability across business cycle stages compared to the return predictability. However, the findings clearly show that  $\Delta indpro$ ,  $dp$ ,  $dy$ ,  $ep$ , and  $ltr$  are the most frequent significant variables predicting commodity volatilities in recessions. In contrast,  $tms$  exhibits a superior performance in expansions.

Overall, the results are consistent with our previous findings. First, they verify that there is predictability of volatilities across business cycle stages, despite the high degree of persistence. Second, they provide evidence that most variables predict not only excess returns but also volatilities.

## **VI. Further Analyses**

### **VI.A Restricted Predictability**

[Campbell & Thompson \(2008\)](#) suggest imposing two economically motivated sign restrictions to improve the out-of-sample predictability of the equity premium. Following them, whenever the sign of the slope estimate in the out-of-sample analysis differs from that of the in-sample analysis, we set the estimate equal to zero.<sup>19</sup> Before discussing our findings, it is worthwhile to accentuate that the constraint

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<sup>19</sup>We do not implement the second restriction, because in commodity markets it is not obvious why an investor should exclude negative forecasts of the commodity excess return and commodity volatility, respectively. We analyze individual assets rather than the entire market, thus, it is obvious that commodity excess returns and volatilities do not represent the long-run average of the market.

is not implementable in real-time due to a look-ahead bias. To implement that strategy would require that an investor has information about future risk premia and volatilities, respectively, thus, knowing the in-sample slope estimate.

Panel (A) of Table XIV summarizes the results for each variable predicting the next month's and the next year's excess return.<sup>20</sup> In the short-term, we observe a slight increase in the frequency of significant predictions across the commodities, especially for  $\Delta indpro$ ,  $dfr$ ,  $erp$ ,  $svar$ , and  $tbl$ . In the case of the long-term predictability, there is a substantial increase in the frequency, e.g., in the case of  $\Delta indpro$  from 16.67 % to 40.00 %. Further predictors are  $ltr$ ,  $dfr$ , and  $svar$ . Moreover, the improved performance is also associated with an increase in the predictive power, shown in Table A13 of the Online Appendix. However, we detect that other variables show an inferior performance by imposing the restriction, indicated by extreme negative  $R_{oos}^2$ s.

Panel (B) of Table XIV documents the results for each variable predicting the next month's and the next year's volatility.<sup>21</sup> We observe similar results as before.  $\Delta M1$ ,  $erp$ ,  $\Delta indpro$ ,  $svar$ ,  $ltr$ ,  $dfr$ , and  $tms$  display an increase in the frequency of significant predictions in the short-term, whereas  $\Delta M1$ ,  $\Delta indpro$ ,  $ltr$ ,  $infl$ , and  $dfr$  do so in the long-term.

Overall, the results provide evidence in favor for an improvement of the out-of-sample predictability for several variables. In particular,  $\Delta indpro$ ,  $dfr$ , and  $svar$  benefit from imposing the sign restriction in the case of return predictability, whereas  $\Delta M1$ ,  $\Delta indpro$ , and  $ltr$  do so in the case of volatility predictability. The findings also document a substantial worsening for some variables by imposing the restriction. Thus, we conclude it is necessary to differentiate between variables as to whether the imposition of the restriction is worthwhile.

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<sup>20</sup>Table A13 of the Online Appendix provides more detailed regression results.

<sup>21</sup>Table A14 of the Online Appendix provides more detailed regression results.



## VI.B Time-Variation in Volatility

To further exploit the information content of our long sample, we analyze the volatility variation before and after the introduction of derivatives trading and the beginning of the global financial crisis, respectively.<sup>22</sup> In particular, we ask the question: Does the introduction of derivatives trading systematically affect the volatility of commodity returns?

Since the introduction of commodity derivatives trading, these markets have exhibited a steadily increasing trading volume (Gorton & Rouwenhorst, 2006; Gorton et al., 2012). The increase in trading volume reflects the rise in the hedging demand at the futures market.<sup>23</sup> Following Acharya et al. (2013), speculators face restrictions by investing their capital in the futures market. On the other hand, due to these capital constraints the hedging demand of commodity producers cannot be satisfied. Consequently, both the capital constraints and the limitations to hedging affect the spot prices. Thus, we expect an increase in the volatility after these break points. Further, since the global financial crisis represents a shock to the economy, we also expect an increase in the volatility after that break point.

Table XV reports the results for the different events.<sup>24</sup> Panel (A) summarizes the results with respect to the introduction of derivatives trading, whereas Panel (B) does so with respect to the beginning of the global financial crisis. Following Snedecor & Cochran (1989), we use an  $F$ -test to examine whether there are significant differences in the volatilities.<sup>25</sup>

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<sup>22</sup>Note that we focus here on the level of volatility and not on the predictability of volatility, as in Section V.B.

<sup>23</sup>In detail, assume that a specific fraction of trading volume reflects the hedging demand of a given number of investors. Accordingly, an increase in trading volume is associated with a rise in the number of investors who look for hedging possibilities. Thus, the hedging demand increases.

<sup>24</sup>In analogy to Section IV., we use 120 observations, and 97 observations in the case of the global financial crisis due to limited data availability. Further, we impose the restriction that in the case of futures and options, respectively, at least 10 years of observations must be available to compute the volatilities.

<sup>25</sup>We examine the null hypothesis that the volatility prior to and the volatility after the break point are equal.

We start by analyzing the effect of derivatives trading on the return volatility, shown in Panel (A) of Table XV. With the introduction of futures trading, we observe a general increase in the volatility, in particular in the case of energy commodities. The  $F$ -test confirms that there are significant differences in the volatilities. We detect the strongest increase from 4.97 % to 13.90 % for natural gas. Other commodities showing notable rises are lean hog, sugar, and silver. Striking exceptions displaying a sharp drop in the volatility are butter, unleaded regular gas, and high grade copper. In general, the results confirm our expectation of an increasing hedging pressure at the spot market.

With the introduction of commodity options, we find a general increase in the volatility in the case of energy commodities, also confirming our expectation. Specifically, natural gas exhibits a rise from 6.21 % to 19.97 %. Unleaded regular gas represents an exception. As opposed to energy, a general downward trend for metal and agricultural commodities is identifiable, in contrast to our expectation. It seems that the introduction of options is associated with a decrease in the volatility for metals and agriculturals. An exception are oranges, showing an increase from 16.91 % to 27.87 %.

Overall, the results provide evidence in favor of a systematic effect of derivatives trading on commodity volatility, indicated by significant differences in volatilities. In particular, an upward trend in energy commodities is perceivable. Natural gas exhibits the strongest increase, whereas unleaded regular gas always shows a sharp reduction in the volatility. Oranges also display a similar pattern.

Analyzing the time periods around the global financial crisis, documented in Panel (B) of Table XV, there is an ambiguous pattern in volatility. Wheat exhibits the strongest increase from 8.18 % to 12.59 %, and, similarly, in the case of soybean meal, coal, platinum, and silver, whereas oranges show the strongest decrease from 52.23 % to 17.44 %; butter, natural gas, and unleaded regular gas also show a similar

pattern. The results only partly confirm our expectation, indicating the presence of further effects.

## VI.C Model Selection Approach

To gain insights about the predictability of excess returns (volatilities) based on multiple regressions, we perform a model selection approach.<sup>26</sup> An investor would use all information available up to the time point  $t$  and would select the best performing model to predict the next month’s excess return (volatility).<sup>27</sup> In doing so, we proceed as follows: For all possible predictor combinations, we compute the MSEs on the basis of the first 10 years of out-of-sample observations.<sup>28</sup> Selecting the best performing model, we predict the next month’s excess return (volatility). Afterwards, using all information up to the next time point  $t + 1$ , we compute the MSEs again and predict the next month’s excess return (volatility) out-of-sample using the model with the lowest MSE. For all other months, we repeat this procedure analogously. To make inferences about the significance of the  $R_{oos}^2$ s, we use the MSFE-adjusted statistic of [Clark & West \(2007\)](#), a modified version of the [Diebold & Mariano \(1995\)](#) and [West \(1996\)](#) statistic, for nested models.<sup>29</sup>

Tables IV to V and Tables VI to VII show the adjusted  $R_{oos}^2$ s for the (next month’s and next year’s) return and the (next month’s and next year’s) volatility predictability, respectively.

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<sup>26</sup>We conducted two further alternative approaches to utilize the information of the given set of variables. Both approaches led to similar results as the model selection approach. First, we used a kitchen sink approach, in which we included all available variables. Second, we followed [Rapach et al. \(2013\)](#) and used an adaptive elastic net estimation procedure that shrinks and select parameters based on two penalty terms (lasso and ridge regressions).

<sup>27</sup>We start in January 1948 to ensure that all predictive variables are available. Further, *dy*, *ep*, and *tbl* have been excluded due to high correlations and multicollinearity.

<sup>28</sup>We start by running individual regressions, performing multiple regressions, and we end up with a regression containing all predictors (kitchen sink). Also the historical mean (fitted AR(1) process) serves as potential model. If all models fail, an investor would rely on the historical mean (fitted AR(1) process) as best prediction.

<sup>29</sup>Since we use multiple regressions equipped with a different number of variables, the bootstrap algorithm, described in Section *III.B*, in determining an empirical distribution is not applicable.

In Table IV, we observe no joint predictive power in the short-term return predictability, indicated by negative adjusted  $R_{oos}^2$ s. For the long-term return predictability, the results in Table V indicate that some commodities are predictable, in particular cocoa ( $R_{oos}^2 = 10.88\%$ ), live cattle ( $R_{oos}^2 = 0.27\%$ ), heating oil ( $R_{oos}^2 = 0.35\%$ ), and gold ( $R_{oos}^2 = 15.16\%$ ). Overall, the findings suggest a poor out-of-sample return predictability based on a model selection approach. Only few long-term commodity excess returns are well predictable.<sup>30</sup>

We now turn our focus on the analysis of the volatility predictability. Tables VI and VII reveal no predictability of commodity volatilities based on a model selection approach. The strong persistence of commodity volatility prevents any predictability of the employed predictive variables, although an optimized approach is used.

## VI.D Mean Forecast Combination Approach

Another approach to improve the out-of-sample predictability is forecast combinations as suggested, e.g., by [Rapach et al. \(2010\)](#). In doing so, we first run a kitchen sink regression and select all predictive variables that are significant at at least the 10% significance level. Afterwards, we run univariate regressions to obtain the individual out-of-sample forecasts. Finally, we use the average of all available forecasts to obtain the mean out-of-sample forecast.<sup>31</sup>

Tables IV to V and Tables VI to VII show the  $R_{oos}^2$ s for the (next month's and next year's) return and the (next month's and next year's) volatility predictability, respectively.

In Table IV, we observe that four commodity excess returns are significantly

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<sup>30</sup>The results are not entirely surprising given the large fluctuations among the predictive variables. Despite the fluctuations, the optimized approach shows that few commodity returns are well predictable, particularly in the long-term, indicating a robust predictability over time.

<sup>31</sup>[Rapach et al. \(2010\)](#) argue that forecast combinations reduce the model instability, thus, leading to a superior performance compared to individual forecasts. Further, they show that mean forecast combinations represent robust techniques compared to median and truncated mean forecast combinations.

predictable in the short-term, indicated by  $R_{oos}^2$ s between 0.35 % for wool and 1.33 % for gold. In contrast, the results in the long-term analysis reveal that almost all commodity returns are significantly predictable, indicated by  $R_{oos}^2$ s up to 13.49 % for gold. Overall, the findings confirm the stability of the mean forecast combination approach in predicting commodity excess returns, particularly in the long-term. To get an overview about the out-of-sample performance based on the mean forecast combination approach, the plots (a), (b), (c), and (d), (e), (f) in Figure I show the cumulative differences in squared forecast errors (CDSFE) of coffee arabica, WTI oil, gold, and cocoa, heating oil and gold, for both the short- and long-term.<sup>32</sup> In all cases, we observe an increasing out-of-sample performance, indicating a superior performance of the mean forecast combination approach.

Predicting commodity volatilities in the short-term, shown in Table VI, we observe that only two commodity volatilities are significantly predictable, indicated by  $R_{oos}^2$ s of 0.33 % for unleaded regular gas, and 4.34 % for nickel. In the long-term analysis (Table VII), the results reveal no predictability on the basis of the mean forecast combination approach. Overall, the strong persistence of commodity volatility prevents any predictability, although a robust approach is used.<sup>33</sup>

## VI.E Sub-Sample Analysis

To further examine the robustness of our results, we analyze the sample period from January 1950 to December 2015. Following [Engsted & Pedersen \(2010\)](#), there might be differences in the predictability during the pre- and post-World War II

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<sup>32</sup>The out-of-sample performance is the difference between the cumulative squared forecast error from the restricted model and the cumulative squared forecast error from the unrestricted model.

<sup>33</sup>The large negative  $R_{oos}^2$ s are consistent with our previous findings. Using any predictor in addition to lagged volatility leads to an increase in the deviation between the actual commodity volatility and the predicted one (in comparison to the prediction using lagged volatility only), resulting in a massive underperformance relative to the naive benchmark. This effect is strengthened even in the long-term. Since there is no notable predictability of commodity volatilities, we omit the corresponding CDSFE plots.

period, so we are able to avoid incisive events. Table A15 of the Online Appendix summarizes the return and volatility predictability results for different horizons, and Tables A16 to A19 of the Online Appendix provide more detailed information. Overall, the results confirm our main findings.

## ***VII.* Conclusion**

This paper provides comprehensive evidence on the predictive power of a broad set of 16 macroeconomic variables for the returns and volatilities of 30 commodities. Using more than 140 years of data, our long sample enables us to analyze the time-variation in return volatility and in the predictability of commodity return and volatility related to specific break points. A variable is considered to have predictive power if it exhibits significant predictive ability out-of-sample.

We observe short- and long-term predictability in both excess returns and volatilities. Further, there are substantial improvements in the predictive power of variables both in individual predictions and in predictions based on multiple regressions, and in the frequency of significant predictions in the long-term. These effects are more pronounced in return rather than volatility predictability. The break point analysis provides evidence that return volatility, and the return and volatility predictability are systematically affected by the introduction of derivatives trading and the beginning of the global financial crisis.

Finally, our long sample study enables us to analyze the predictability over multiple business cycle stages. Here, we do not only examine expansions and recessions, but also early and late business cycle stages. We find that returns are predictable in both expansions and recessions, whereas volatilities are better predictable in recessions. Several variables exhibit an enhanced predictive performance, when differentiating between business cycle stages.

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Figure I: Return Predictability (Mean Forecast Combination)

This figure plots the out-of-sample performances based on a mean forecast combination approach. Plots (a)–(c) show the performances of predicting the next month's excess return. Plots (d)–(f) show the performances of predicting the next year's excess return. On the ordinate, there are the cumulative differences in squared forecast errors (CDSFE). The out-of-sample performance is the difference between the cumulative squared forecast error from the restricted model and the cumulative squared forecast error from the unrestricted model. The grey bars indicate the U.S. recessions, published by the NBER. All data are sampled at the monthly frequency.

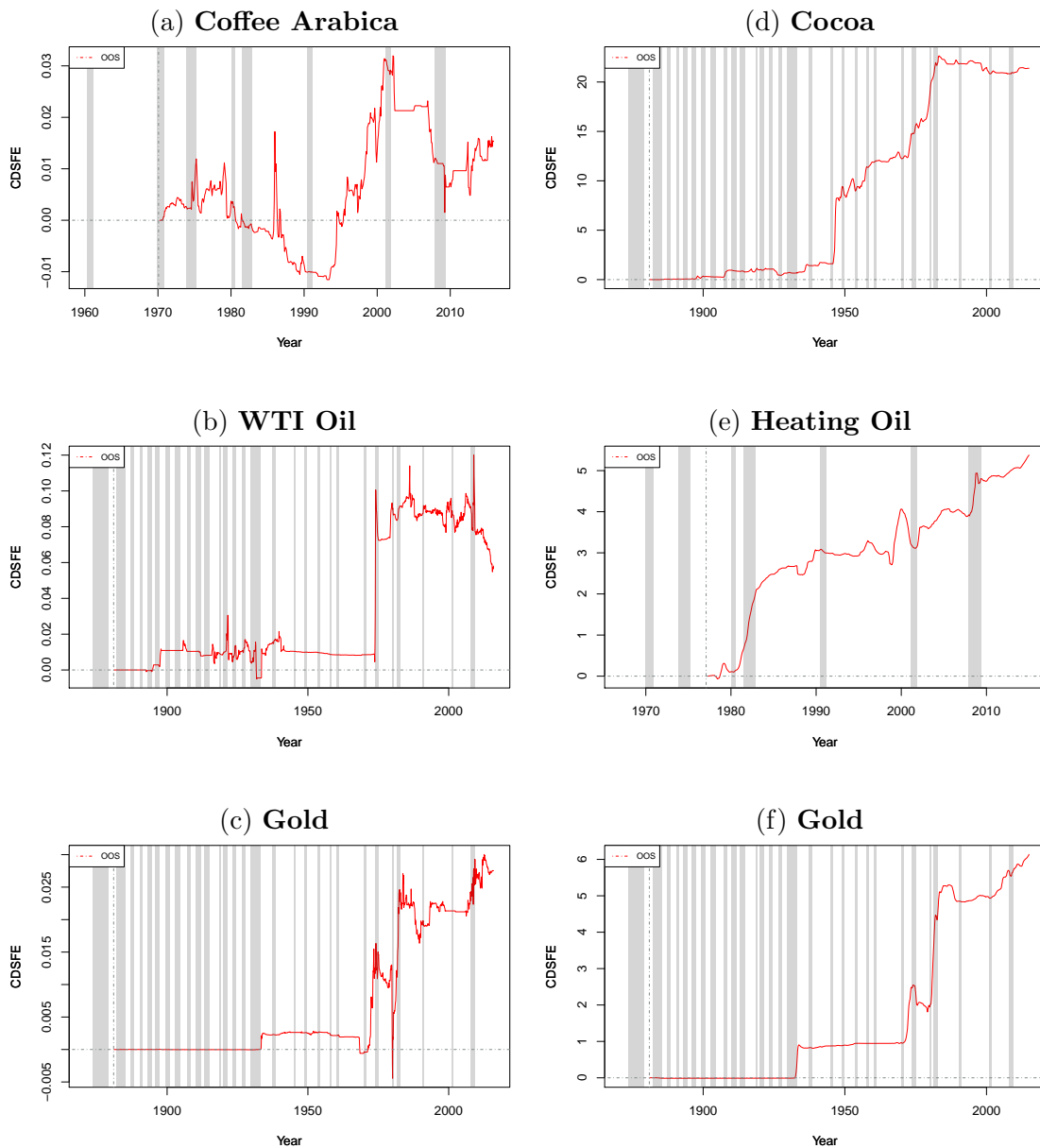


Table I: Summary Statistics Commodity Returns

This table summarizes (non-annualized) key statistics for commodity returns. “Mean”, “Std Dev”, “Skew”, and “Kurt” denote the mean, standard deviation, skewness, and kurtosis, respectively. The next three columns show the first-order autoregressive coefficient and the p-value of the Jarque-Bera and Augmented Dicky Fuller test, respectively. “First Obs.” and “Nobs” denote the first observation of the time series and the number of observations. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Sector	Commodity	Mean	Std Dev	Skew	Kurt	AR(1)	JB p-value	ADF p-value	First Obs.	Nobs
Agriculturals	Butter	0.0047	0.0769	0.3462	10.8597	0.0825	<0.01	<0.01	01.1890	1512
	Cocoa	0.0042	0.0779	1.3929	13.3732	0.0578	<0.01	<0.01	01.1871	1740
	Coffee Arabica	0.0043	0.0712	1.4251	10.2132	0.2879	<0.01	<0.01	02.1960	671
	Corn Oil	0.0048	0.0850	0.9109	9.6072	0.2050	<0.01	<0.01	08.1924	1097
	Cotton	0.0028	0.0617	0.3051	14.8481	0.1524	<0.01	<0.01	01.1871	1740
	Live Cattle	0.0034	0.0525	1.0037	13.7484	0.1948	<0.01	<0.01	01.1871	1740
	Lean Hog	0.0056	0.0927	1.8014	14.5589	-0.0043	<0.01	<0.01	01.1871	1740
	Milk	0.0036	0.0528	0.7454	9.6180	0.2198	<0.01	<0.01	02.1890	1511
	Oranges	0.0283	0.2245	5.1073	79.8298	0.0111	<0.01	<0.01	02.1914	1223
	Soybean Oil	0.0046	0.0842	1.0609	8.8736	0.0763	<0.01	<0.01	02.1911	1259
	Soybeans	0.0044	0.0775	0.9309	10.9084	0.0881	<0.01	<0.01	12.1913	1225
	Soybean Meal	0.0064	0.1006	1.5570	17.1419	-0.1225	<0.01	<0.01	11.1929	1034
	Sugar	0.0040	0.0915	1.9721	14.9091	0.1623	<0.01	<0.01	01.1871	1740
	Wheat	0.0043	0.0828	0.5997	8.5674	-0.0476	<0.01	<0.01	01.1871	1740
	Wool	0.0024	0.0512	0.7640	16.7863	0.3243	<0.01	<0.01	01.1890	1512
Yellow Corn	0.0049	0.0851	0.7701	9.8353	-0.0406	<0.01	<0.01	01.1871	1740	
Energies	Coal	0.0028	0.0507	2.1719	34.2273	0.1318	<0.01	<0.01	01.1932	1008
	Heating Oil	0.0080	0.0923	0.8861	11.1544	0.0248	<0.01	<0.01	02.1967	587
	Natural Gas	0.0172	0.1641	1.7593	14.5080	-0.1702	<0.01	<0.01	01.1976	452
	Unleaded Regular Gas	0.0084	0.1118	1.6087	13.6043	-0.0541	<0.01	<0.01	11.1973	506
	WTI Oil	0.0047	0.0832	1.6486	14.9942	0.1757	<0.01	<0.01	01.1871	1740
Metals	Aluminium	0.0020	0.0470	1.2388	19.5472	0.0234	<0.01	<0.01	01.1910	1272
	Gold	0.0028	0.0345	1.8444	19.8144	0.0862	<0.01	<0.01	01.1871	1740
	High Grade Copper	0.0034	0.0691	2.0898	32.4764	0.0033	<0.01	<0.01	01.1871	1740
	Nickel	0.0064	0.1125	3.3572	30.8451	0.2174	<0.01	<0.01	01.1980	432
	Palladium	0.0097	0.1007	1.1296	10.8833	-0.0661	<0.01	<0.01	01.1968	576
	Platinum	0.0046	0.0633	1.7233	18.3757	0.1257	<0.01	<0.01	02.1910	1271
	Silver	0.0031	0.0601	1.0823	20.7601	0.0752	<0.01	<0.01	01.1871	1740
	Tin	0.0033	0.0570	0.7731	12.4076	0.2142	<0.01	<0.01	01.1871	1740
Zinc	0.0031	0.0614	1.3287	15.4648	0.1567	<0.01	<0.01	01.1871	1740	

Table II: Summary Statistics Commodity Volatilities

This table summarizes (non-annualized) key statistics for commodity volatilities. “Mean”, “Std Dev”, “Skew”, and “Kurt” denote the mean, standard deviation, skewness, and kurtosis, respectively. The next three columns show the first-order autoregressive coefficient and the p-value of the Jarque-Bera and Augmented Dicky Fuller test, respectively. “First Obs.” and “Nobs” denote the first observation of the time series and the number of observations. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Sector	Commodity	Mean	Std Dev	Skew	Kurt	AR(1)	JB p-value	ADF p-value	First Obs.	Nobs
Agriculturals	Butter	0.0476	0.0257	1.5002	6.8745	0.8131	<0.01	<0.01	01.1892	1488
	Cocoa	0.0472	0.0238	0.8376	3.8873	0.6544	<0.01	<0.01	01.1873	1716
	Coffee Arabica	0.0481	0.0168	1.1906	6.8446	0.6684	<0.01	<0.01	02.1962	647
	Corn Oil	0.0563	0.0255	1.6649	8.3588	0.6606	<0.01	<0.01	08.1926	1073
	Cotton	0.0394	0.0176	2.2277	14.5611	0.6599	<0.01	<0.01	01.1873	1716
	Live Cattle	0.0348	0.0104	1.6270	9.5387	0.4651	<0.01	<0.01	01.1873	1716
	Lean Hog	0.0637	0.0143	1.8366	10.2461	0.5721	<0.01	<0.01	01.1873	1716
	Milk	0.0297	0.0179	1.5367	6.7992	0.7723	<0.01	<0.01	02.1892	1487
	Oranges	0.1360	0.0610	3.7660	38.1728	0.6972	<0.01	<0.01	02.1916	1199
	Soybean Oil	0.0571	0.0273	1.3680	5.9171	0.7275	<0.01	<0.01	02.1913	1235
	Soybeans	0.0518	0.0233	2.0257	10.7609	0.6684	<0.01	<0.01	12.1915	1201
	Soybean Meal	0.0687	0.0274	1.3406	6.5212	0.6474	<0.01	<0.01	11.1931	1010
	Sugar	0.0563	0.0293	1.1128	3.8258	0.9089	<0.01	<0.01	01.1873	1716
	Wheat	0.0567	0.0205	0.8654	4.6742	0.7625	<0.01	<0.01	01.1873	1716
Wool	0.0284	0.0160	2.3342	13.2643	0.5975	<0.01	<0.01	01.1892	1488	
Yellow Corn	0.0594	0.0207	1.1023	5.3220	0.5444	<0.01	<0.01	01.1873	1716	
Energies	Coal	0.0264	0.0194	2.8941	18.2071	0.4091	<0.01	<0.01	01.1934	984
	Heating Oil	0.0631	0.0284	1.1639	5.9624	0.6948	<0.01	<0.01	02.1969	563
	Natural Gas	0.1012	0.0633	1.4952	5.8421	0.7659	<0.01	<0.01	01.1978	428
	Unleaded Regular Gas	0.0752	0.0282	1.0959	5.4098	0.3854	<0.01	<0.01	11.1975	482
	WTI Oil	0.0461	0.0319	1.4269	5.4384	0.8702	<0.01	<0.01	01.1873	1716
Metals	Aluminium	0.0239	0.0218	1.8390	7.7716	0.8491	<0.01	<0.01	01.1912	1248
	Gold	0.0167	0.0189	1.7882	6.4849	0.8922	<0.01	<0.01	01.1873	1716
	High Grade Copper	0.0374	0.0207	2.2678	11.8227	0.7846	<0.01	<0.01	01.1873	1716
	Nickel	0.0734	0.0336	3.2820	25.4281	0.3805	<0.01	<0.01	01.1982	408
	Palladium	0.0640	0.0160	0.8444	4.1945	0.3538	<0.01	<0.01	01.1970	552
	Platinum	0.0354	0.0203	1.7032	7.4293	0.7473	<0.01	<0.01	02.1912	1247
	Silver	0.0339	0.0258	2.1273	10.6922	0.8046	<0.01	<0.01	01.1873	1716
	Tin	0.0363	0.0129	1.0356	4.5111	0.7611	<0.01	<0.01	01.1873	1716
Zinc	0.0358	0.0202	2.2554	13.7324	0.7831	<0.01	<0.01	01.1873	1716	

Table III: Summary Return and Volatility Predictability

This table reports a summary of the regression results of monthly excess returns on a constant and the lagged predictive variable (Panel (A) and (B)), and the regression results of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable (Panel (C) and (D)). In Panel (A) and (B), we report the percentage of significant in-sample and out-of-sample  $R^2$ s across the variables of predicting the next month's and next year's excess return. In Panel (C) and (D), we report the percentage of significant in-sample  $F$ -statistics of the difference between the adjusted  $R^2$ s of the unrestricted and restricted model, and out-of-sample  $R^2$ s across the variables of predicting the next month's and next year's volatility. "de" denotes the dividend-payout ratio, " $\Delta indpro$ " the growth of industrial production, and " $\Delta M1$ " the growth of money supply  $M1$ . "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. All data are sampled at the monthly frequency.

Panel (A): Return Predictability (1 Month)				Panel (B): Return Predictability (12 Months)			
In-Sample		Out-of-Sample		In-Sample		Out-of-Sample	
$\Delta indpro$	63.33	$\Delta indpro$	23.33	$tbl$	90.00	$tbl$	70.00
$dfr$	46.67	$erp$	20.00	$lty$	86.67	$dfy$	56.67
$erp$	43.33	$dfr$	16.67	$ep$	83.33	$lty$	53.33
$infl$	43.33	$\Delta M1$	10.00	$tms$	80.00	$tms$	43.33
$ltr$	30.00	$infl$	10.00	$\Delta indpro$	60.00	$de$	33.33
$tbl$	30.00	$ltr$	6.67	$dy$	56.67	$dy$	33.33
$tms$	30.00	$tms$	3.33	$svar$	56.67	$dp$	26.67
$\Delta M1$	26.67	$de$	0.00	$unrate$	56.67	$infl$	26.67
$svar$	20.00	$dfy$	0.00	$dfy$	53.33	$\Delta M1$	23.33
$lty$	16.67	$dp$	0.00	$dp$	50.00	$ep$	23.33
$dp$	13.33	$dy$	0.00	$infl$	46.67	$unrate$	23.33
$ep$	10.00	$ep$	0.00	$de$	40.00	$erp$	20.00
$dfy$	6.67	$lty$	0.00	$erp$	40.00	$\Delta indpro$	16.67
$dy$	6.67	$svar$	0.00	$dfr$	33.33	$dfr$	3.33
$de$	3.33	$tbl$	0.00	$\Delta M1$	26.67	$svar$	3.33
$unrate$	0.00	$unrate$	0.00	$ltr$	16.67	$ltr$	0.00

Panel (C): Volatility Predictability (1 Month)				Panel (D): Volatility Predictability (12 Months)			
In-Sample		Out-of-Sample		In-Sample		Out-of-Sample	
$dp$	60.00	$dp$	40.00	$\Delta indpro$	46.67	$ep$	23.33
$dy$	56.67	$dy$	40.00	$dfy$	43.33	$dfy$	20.00
$svar$	56.67	$infl$	36.67	$unrate$	36.67	$tms$	20.00
$dfy$	50.00	$lty$	36.67	$de$	33.33	$dy$	13.33
$unrate$	50.00	$dfy$	30.00	$dp$	33.33	$unrate$	13.33
$ep$	46.67	$ep$	30.00	$dy$	33.33	$\Delta indpro$	10.00
$lty$	43.33	$unrate$	30.00	$ep$	33.33	$dp$	10.00
$infl$	40.00	$de$	20.00	$svar$	33.33	$ltr$	10.00
$de$	36.67	$\Delta indpro$	16.67	$tms$	33.33	$tbl$	10.00
$tbl$	36.67	$erp$	16.67	$tbl$	3.33	$de$	6.67
$tms$	33.33	$tbl$	13.33	$\Delta M1$	16.67	$\Delta M1$	6.67
$erp$	23.33	$\Delta M1$	6.67	$dfr$	13.33	$svar$	6.67
$\Delta M1$	20.00	$dfr$	3.33	$erp$	13.33	$erp$	3.33
$\Delta indpro$	16.67	$ltr$	3.33	$ltr$	13.33	$infl$	3.33
$dfr$	10.00	$svar$	3.33	$infl$	10.00	$dfr$	0.00
$ltr$	10.00	$tms$	3.33	$lty$	0.00	$lty$	0.00

Table IV: Return Predictability (1 Month)

This table reports the regression results of monthly excess returns on a constant and the lagged predictive variable(s). We predict the next month's excess return. Statistical inferences are based on a bootstrapped distribution. “de” denotes the dividend-payout ratio, “ $\Delta\text{indpro}$ ” the growth of industrial production, and “ $\Delta M1$ ” the growth of money supply M1. “dfr” is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. “dfy” is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. “dp” is the dividend-price ratio, “dy” the dividend yield, “ep” the earnings-price ratio, “erp” the market risk premium, “infl” the inflation rate, “ltr” the long-term U.S. government bond returns, “lty” the long-term U.S. government bond yields, “swar” the stock variance, and “tbl” the 3-month Treasury bill rate. “unrate” is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. “unrate” is the unemployment rate. “MSA” and “MFC” denote the model selection approach and mean forecast combination.  $R^2$  and  $R^2_{\text{cos}}$  are the in-sample and out-of-sample  $R^2$ , respectively. We report the t-statistics in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10%, 5%, and 1% significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Statistic	de	$\Delta\text{indpro}$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	swar	tbl	tms	unrate	MSA	MFC	
Butter	$R^2$	0.10	<b>0.33**</b>	<b>1.28***</b>	0.00	0.11	0.19	0.12	0.05	<b>0.67***</b>	0.04	0.00	0.11	0.20	0.20	0.11	0.00	-16.65	-0.51	
	$R^2_{\text{cos}}$	-1.43	-0.68	<b>0.52***</b>	-0.67	-1.52	-2.01	-1.99	-1.73	-0.55	-0.53	-1.87	-2.18	-0.93	-1.81	-1.17	-1.62			
	t - stat	(-1.24)	(1.96)	(-3.27)	(0.08)	(-1.13)	(-1.68)	(-1.33)	(-0.85)	(3.19)	(0.78)	(-0.00)	(-1.13)	(-1.75)	(-1.51)	(1.13)	(0.09)			
Cocoa	$R^2$	0.01	<b>0.85***</b>	0.09	0.00	0.11	0.04	0.02	0.10	<b>0.22**</b>	0.08	0.05	<b>0.31*</b>	0.01	<b>0.57***</b>	<b>0.32*</b>	0.00	-18.09	-7.24*	
	$R^2_{\text{cos}}$	-1.89	-0.65	-1.47	-0.27*	-1.93	-1.74	-1.80	-2.58	-1.00	-1.23	-0.85	-1.37	-1.06	-1.39	-1.02	-1.50			
	t - stat	(0.46)	(3.20)	(-0.87)	(-0.02)	(-1.11)	(-0.83)	(-0.65)	(-1.97)	(1.15)	(1.15)	(0.76)	(-1.89)	(-1.45)	(-2.56)	(1.93)	(0.11)			
Coffee Arabica	$R^2$	0.07	<b>0.56**</b>	0.01	0.34	0.00	0.00	0.00	0.05	0.00	0.12	0.13	0.01	0.00	0.43	<b>1.52***</b>	0.38	-14.14**	<b>0.46*</b>	
	$R^2_{\text{cos}}$	-1.77	-0.60	-2.20	-0.30	-1.65	-2.32	-2.43	-2.75	-0.81	-1.23	-1.05	-1.76	-0.67	-0.87	-1.09	<b>0.85***</b>	-0.76*		
	t - stat	(0.68)	(1.94)	(0.23)	(1.51)	(0.00)	(-0.09)	(-0.11)	(-0.58)	(-0.02)	(0.88)	(-0.93)	(-0.25)	(0.05)	(-1.71)	(3.21)	(1.59)			
Corn	$R^2$	0.09	<b>0.68***</b>	0.00	<b>0.30*</b>	0.00	0.00	0.03	0.06	<b>2.09***</b>	0.09	0.24	0.11	0.00	0.14	0.03	0.02	-17.48	-1.98	
	$R^2_{\text{cos}}$	-3.04	-1.34	-0.82	-0.24**	-2.29	-1.69	-1.42	-2.46	-2.37	-0.42*	-1.47	-2.23	-0.35	-3.17	-3.18	-2.78			
	t - stat	(0.99)	(2.73)	(-0.00)	(1.80)	(0.34)	(-0.02)	(-0.54)	(-0.80)	(4.83)	(1.01)	(-1.61)	(-1.10)	(0.10)	(-1.23)	(0.56)	(0.41)			
Cotton	$R^2$	0.00	<b>0.48**</b>	0.18	0.02	0.23	0.00	0.01	0.00	<b>1.58***</b>	<b>0.70***</b>	0.05	0.19	0.01	<b>0.47**</b>	<b>0.47**</b>	0.16	-17.81	-0.63**	
	$R^2_{\text{cos}}$	-2.57	-0.97	-1.26	-2.08	-1.79	-2.00	-1.75	-2.68	-0.40**	-0.58	-0.74**	-2.42	-1.23	-1.58	-1.13	-1.38			
	t - stat	(-0.15)	(2.35)	(-1.21)	(-0.48)	(1.63)	(-0.10)	(0.42)	(0.01)	(5.28)	(3.46)	(0.73)	(-1.48)	(0.35)	(-2.33)	(2.32)	(1.13)			
Live Cattle	$R^2$	0.02	<b>1.86***</b>	0.06	<b>0.32*</b>	0.06	0.01	0.00	0.00	<b>0.39***</b>	<b>0.29**</b>	0.14	<b>0.37**</b>	0.07	<b>0.74***</b>	<b>0.51**</b>	0.18	-16.21	-0.39**	
	$R^2_{\text{cos}}$	-2.05	-0.08**	-0.74	-0.25*	-1.91	-1.87	-2.01	-2.43	-0.59	-0.32**	-1.39	-1.89	-1.68	-2.39	-1.62	-1.47			
	t - stat	(-0.53)	(4.69)	(0.70)	(1.86)	(-0.84)	(-0.43)	(-0.19)	(-0.05)	(2.62)	(2.21)	(-2.21)	(-2.06)	(-1.04)	(-2.93)	(2.41)	(1.22)			
Lean Hog	$R^2$	0.07	0.01	0.00	0.02	0.01	0.05	0.04	0.00	0.03	0.05	0.03	0.06	0.01	0.17	0.17	0.04	-16.40	-1.97	
	$R^2_{\text{cos}}$	-1.51	-1.01	-1.05	-0.56	-2.58	-1.99	-1.79	-2.36	-1.52	-0.15***	-0.69	-2.99	-1.94	-1.80	-1.38	-1.26			
	t - stat	(-1.11)	(-0.31)	(-0.06)	(0.51)	(-3.36)	(-0.90)	(-0.83)	(-0.10)	(0.76)	(0.93)	(-0.54)	(-0.86)	(-0.44)	(-1.39)	(1.39)	(-0.57)			
Milk	$R^2$	0.11	<b>1.16***</b>	<b>1.11***</b>	<b>0.34**</b>	<b>0.38**</b>	0.00	0.00	0.06	0.13	<b>1.32***</b>	<b>0.71***</b>	0.23	<b>0.34**</b>	0.19	0.00	0.01	-9.86**	-1.02**	
	$R^2_{\text{cos}}$	-1.19	<b>0.88***</b>	<b>0.19**</b>	-0.81	-0.52**	-1.60	-1.97	-1.98	-0.82	<b>1.36***</b>	-0.11**	-1.60	-5.65	-1.93	-1.81	-1.45			
	t - stat	(-1.28)	(3.69)	(-3.04)	(-1.92)	(-2.10)	(-0.07)	(0.05)	(0.96)	(1.39)	(4.49)	(-2.78)	(-1.62)	(-2.27)	(-1.46)	(-0.06)	(0.26)			
Oranges	$R^2$	0.04	0.01	0.00	0.01	<b>0.28*</b>	<b>0.31*</b>	<b>0.34**</b>	0.21	0.04	0.02	0.06	0.08	0.15	0.09	0.01	0.09	-12.82	-0.34	
	$R^2_{\text{cos}}$	-2.02	-0.93	-1.02	-1.70	-0.92	-1.66	-2.01	-1.14	-1.69	-1.38	-0.66	-1.68	-2.22	-1.71	-1.44	-1.44			
	t - stat	(-0.72)	(0.37)	(-0.17)	(0.33)	(-1.80)	(-1.95)	(-2.05)	(-1.60)	(-0.70)	(0.51)	(-0.82)	(-0.94)	(-1.37)	(-1.00)	(0.34)	(-0.84)			
Soybean Oil	$R^2$	0.01	<b>2.18***</b>	0.01	0.02	0.03	0.01	0.00	0.03	<b>0.34**</b>	<b>0.64***</b>	0.00	0.08	0.01	0.20	0.21	0.01	-19.16*	-0.20**	
	$R^2_{\text{cos}}$	-3.20	<b>0.59***</b>	-1.57	-1.86	-2.30	-2.05	-1.78	-3.09	-0.22**	-1.15	-0.38	-2.03	-4.81	-1.94	-2.61	-3.06			
	t - stat	(0.25)	(5.08)	(0.34)	(0.46)	(-0.54)	(-0.38)	(-0.18)	(-0.61)	(2.08)	(2.84)	(-0.19)	(-0.94)	(-0.33)	(-1.52)	(1.55)	(0.35)			
Soybeans	$R^2$	0.01	<b>1.57***</b>	0.05	0.00	0.00	0.04	0.01	0.09	<b>0.75***</b>	0.03	0.01	0.17	0.01	<b>0.42**</b>	<b>0.39**</b>	0.06	-16.75	-0.88	
	$R^2_{\text{cos}}$	-3.16	<b>0.21***</b>	-1.02	-1.11	-1.59	-1.21	-1.41	-2.93	<b>0.99***</b>	-1.40	-1.11	-1.40	-2.79	-1.66	-0.84	-1.73			
	t - stat	(0.37)	(4.30)	(0.63)	(-0.00)	(-0.15)	(-0.68)	(-0.37)	(-1.04)	(3.05)	(-0.56)	(-0.34)	(-1.42)	(-1.42)	(-2.19)	(2.12)	(0.72)			
Soybeans Meal	$R^2$	0.02	<b>0.32*</b>	0.22	0.01	0.01	0.04	0.01	0.11	<b>0.48**</b>	0.09	0.01	0.14	0.03	0.26	0.19	0.05	-16.77	-2.41	
	$R^2_{\text{cos}}$	-3.56	-1.32	-0.92	-1.06	-1.12	-1.91	-1.90	-3.79	-0.58	-1.29	-0.85	-1.89	-2.33	-1.40	-0.75	-1.31			
	t - stat	(0.44)	(1.81)	(1.34)	(-0.28)	(0.29)	(-0.63)	(-0.39)	(-1.05)	(2.24)	(-0.97)	(-0.35)	(-1.21)	(0.54)	(-1.64)	(1.38)	(0.66)			
Sugar	$R^2$	0.00	0.10	0.01	0.00	0.02	0.07	0.06	0.09	0.01	<b>0.55***</b>	0.23	0.04	0.05	0.05	0.01	0.03	-16.80*	-1.54	
	$R^2_{\text{cos}}$	-2.38	-1.17	-1.19	-1.46	-1.72	-1.18	-1.24	-1.45	-1.90	<b>0.01***</b>	-1.06	-1.21	-2.82	-1.68	-1.54	-1.54			
	t - stat	(-0.02)	(1.10)	(-0.34)	(0.19)	(-0.44)	(-1.08)	(-1.04)	(-1.23)	(0.49)	(3.06)	(-1.58)	(-0.67)	(0.92)	(-0.75)	(0.36)	(-0.51)			
Wheat	$R^2$	0.02	0.11	0.01	0.01	0.00	0.00	0.01	0.00	0.09	0.09	0.01	0.13	0.02	0.21	0.09	0.01	-16.81	-1.00	
	$R^2_{\text{cos}}$	-2.21	-1.12	-1.45	-2.15	-1.92	-1.36	-1.26	-1.55	-0.83	-1.15	-1.51	-1.85	-4.73	-1.56	-1.36	-2.37			
	t - stat	(-0.59)	(1.13)	(0.28)	(-0.40)	(0.24)	(-0.21)	(-0.39)	(0.25)	(-1.23)	(1.24)	(0.25)	(-1.24)	(0.54)	(-1.56)	(1.04)	(0.30)			



Table IV: Return Predictability (1 Month) (continued)

Commodity	Statistic	de	$\Delta \ln \text{price}$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	lfr	lty	svar	tbl	tms	unrate	MSA	MFC
<i>Wool</i>	$R^2$	0.01	<b>3.04***</b>	<b>0.61**</b>	<b>2.07***</b>	0.00	<b>0.25**</b>	0.11	<b>0.25*</b>	<b>2.12***</b>	<b>0.58***</b>	<b>2.03***</b>	<b>0.28*</b>	0.00	<b>1.06***</b>	<b>1.63***</b>	0.08		
	$R_{\text{voos}}^2$	-6.90	<b>1.48***</b>	-0.42	<b>0.58***</b>	-3.55	-2.26	-2.79	-4.33	<b>1.26***</b>	-0.76	<b>0.68***</b>	-3.34	-6.58	-2.46	-1.70	-3.85	-17.39***	<b>0.35***</b>
	$t - stat$	(-0.29)	(6.03)	(2.25)	(4.77)	(-0.08)	(-1.95)	(-1.31)	(-1.93)	(5.72)	(2.97)	(-4.72)	(-1.81)	(0.25)	(-3.51)	(4.36)	(0.83)		
<i>Yellow Corn</i>	$R^2$	0.02	0.23	0.01	0.06	0.00	0.01	0.01	0.00	0.07	0.00	0.04	<b>0.29*</b>	0.00	<b>0.36**</b>	0.07	0.03		
	$R_{\text{voos}}^2$	-2.08	-0.60	-1.38	-1.41	-1.65	-1.36	-1.47	-2.03	-1.38	(-1.10)	(0.18)	(-1.84)	-1.37	-1.59	-1.64	-2.42		
	$t - stat$	(-0.62)	(1.62)	(0.27)	(-0.80)	(-0.03)	(-0.47)	(-0.36)	(-0.01)	(1.10)	(1.10)	(0.18)	(-1.84)	(0.05)	(-2.04)	(0.88)	(0.50)		
<i>Coal</i>	$R^2$	<b>0.44**</b>	0.00	0.10	<b>0.70**</b>	0.14	0.03	0.26	0.09	0.01	<b>0.97***</b>	<b>0.34*</b>	0.01	0.24	0.00	0.09	0.08		
	$R_{\text{voos}}^2$	-1.99	-3.04	-1.38	-2.64	-1.98	-2.30	-2.63	-2.87	-0.37	<b>0.89***</b>	-0.69	-0.98	-0.81	-1.69	-0.78	-1.13	-19.00	
	$t - stat$	(-2.12)	(0.11)	(-0.93)	(2.67)	(-1.19)	(-0.59)	(-0.55)	(0.97)	(0.38)	(3.14)	(-1.86)	(-0.28)	(-1.55)	(0.13)	(-0.93)	(-0.80)		
<i>Heating Oil</i>	$R^2$	0.04	<b>0.61*</b>	0.21	<b>1.84***</b>	0.24	0.14	0.17	0.04	0.13	0.13	<b>0.46*</b>	0.01	<b>0.67**</b>	0.02	0.21	0.09		
	$R_{\text{voos}}^2$	-1.85	-0.23	-1.52	<b>0.50**</b>	-1.94	-1.93	-1.98	-2.02	-0.64	-2.33	-0.75	-1.12	-0.53	-0.89	-0.69	-0.66*	-25.61	
	$t - stat$	(-0.50)	(1.90)	(-1.10)	(3.31)	(-1.19)	(-0.89)	(-0.99)	(-0.46)	(-0.88)	(0.89)	(-1.64)	(-0.27)	(-1.99)	(0.30)	(-1.12)	(-0.71)		
<i>Natural Gas</i>	$R^2$	0.00	<b>1.96***</b>	0.40	0.01	0.02	0.40	0.50	0.36	0.58	0.10	0.18	0.22	<b>1.04**</b>	0.14	0.00	0.22		
	$R_{\text{voos}}^2$	-2.52	<b>2.34***</b>	-5.16	-2.65	-6.08	-2.37	-1.57	-1.36	-1.36	-3.18	-0.60	-1.26	-17.20	-2.03	-1.20	-1.28	-20.60	
	$t - stat$	(0.10)	(2.99)	(-1.35)	(-0.19)	(-0.33)	(-1.34)	(-1.50)	(-1.28)	(-1.62)	(-0.66)	(-0.90)	(-1.00)	(2.17)	(-0.80)	(-1.00)	(-1.00)		
<i>Unleaded Regular Gas</i>	$R^2$	0.02	0.16	0.03	<b>2.00***</b>	0.01	0.38	0.41	0.44	0.05	0.29	<b>0.61*</b>	0.30	0.48	0.11	0.06	0.14		
	$R_{\text{voos}}^2$	-2.82	-1.91	-2.91	<b>0.39**</b>	-3.21	-2.17	-2.12	-1.92	-1.53	-2.35	-1.13	-2.25	-7.04	-0.73	-0.61	-1.31	-18.56*	
	$t - stat$	(0.32)	(0.91)	(-0.41)	(3.20)	(-0.26)	(-1.38)	(-1.44)	(-1.48)	(-0.49)	(-1.20)	(-1.75)	(-1.22)	(-1.56)	(-0.75)	(-0.55)	(-0.83)		
<i>WTI Oil</i>	$R^2$	0.00	<b>1.07***</b>	<b>0.34*</b>	<b>1.12***</b>	0.06	0.07	0.07	0.08	0.00	<b>0.46***</b>	<b>1.28***</b>	0.00	<b>0.28**</b>	0.00	0.03	0.08		
	$R_{\text{voos}}^2$	-1.98	<b>0.16***</b>	-1.08	-0.53	-2.15	-1.48	-1.62	-2.86	-0.66	-1.11	<b>1.23***</b>	-1.23	-1.48	-1.53	-1.09	-0.98	-21.59***	<b>0.66**</b>
	$t - stat$	(-0.05)	(3.55)	(-1.67)	(3.49)	(-0.85)	(-1.07)	(-1.11)	(-1.19)	(0.09)	(2.80)	(-3.74)	(-0.10)	(-2.10)	(0.17)	(-0.56)	(-0.80)		
<i>Aluminum</i>	$R^2$	0.01	0.21	<b>0.35*</b>	<b>1.18***</b>	0.17	0.05	0.03	0.09	0.08	<b>0.51**</b>	<b>0.86***</b>	0.00	<b>0.29*</b>	0.06	0.18	0.00		
	$R_{\text{voos}}^2$	-1.90	-0.42	-0.68	<b>0.10***</b>	-1.54	-2.00	-1.65	-1.88	-0.79	-1.21	-0.06**	-1.93	-3.63	-1.17	-0.52*	-1.52	-16.91	
	$t - stat$	(0.25)	(1.55)	(-1.70)	(3.59)	(-1.40)	(-0.77)	(-0.65)	(-1.05)	(1.02)	(2.55)	(-3.05)	(-1.92)	(-1.92)	(-0.81)	(-1.45)	(-0.14)		
<i>Gold</i>	$R^2$	0.03	0.00	0.07	<b>0.73***</b>	0.05	<b>0.20*</b>	<b>0.18*</b>	0.13	0.06	0.02	0.03	0.08	<b>0.43***</b>	0.17	0.13	0.02		
	$R_{\text{voos}}^2$	-2.71	-0.10**	-1.23	-0.64	-0.23**	-2.38	-2.87	-2.64	-1.23	-0.40**	-1.26	-0.49**	-30.95	-1.65	-2.20	-1.99	-34.39*	<b>1.33**</b>
	$t - stat$	(-0.72)	(0.19)	(0.78)	(2.81)	(0.77)	(-1.86)	(-1.75)	(-1.53)	(1.03)	(0.57)	(0.58)	(-0.98)	(2.59)	(-1.42)	(1.24)	(0.36)		
<i>High Grade Copper</i>	$R^2$	0.01	<b>1.27***</b>	<b>0.52**</b>	<b>0.32*</b>	0.06	<b>0.21**</b>	0.14	<b>0.38**</b>	<b>0.56***</b>	<b>0.24**</b>	0.04	0.15	0.00	<b>0.28*</b>	0.16	0.02		
	$R_{\text{voos}}^2$	-1.63	-0.62	-1.35	-1.29	-1.67	-1.04*	-1.63	-1.17	-1.85	-0.77	-1.85	-1.66	-5.60	-1.75	-1.34	-1.41	-22.61	
	$t - stat$	(0.45)	(3.87)	(-2.07)	(1.85)	(-0.88)	(-1.89)	(-1.57)	(-2.56)	(3.13)	(2.03)	(-0.67)	(-1.33)	(-0.05)	(-1.80)	(-1.36)	(-0.38)		
<i>Nickel</i>	$R^2$	0.37	<b>0.69*</b>	0.08	0.19	0.00	0.11	0.07	0.63	0.39	0.28	0.05	0.08	0.00	0.31	<b>0.65*</b>	0.01		
	$R_{\text{voos}}^2$	-3.14	-0.11	-0.97	-1.76	-1.96	-2.06	-1.85	-1.63	-1.45	-0.86	-2.30	-1.38	-0.55	-2.46	-1.26	-2.42	-18.14**	
	$t - stat$	(1.25)	(1.73)	(-0.60)	(0.90)	(-0.11)	(-0.68)	(-0.54)	(-1.64)	(1.30)	(-1.10)	(0.45)	(-0.58)	(0.06)	(-1.15)	(1.67)	(-0.20)		
<i>Palladium</i>	$R^2$	0.00	0.12	0.01	0.07	0.37	0.15	0.16	0.13	0.01	0.05	0.12	0.20	0.06	0.14	0.00	0.01		
	$R_{\text{voos}}^2$	-3.21	-1.41	-2.06	-1.87	-4.00	-2.51	-2.64	-1.60	-0.92	-1.02	-1.13	-2.78	-14.80	-2.07	-2.54	-3.17	-12.75	
	$t - stat$	(0.02)	(0.82)	(-0.21)	(0.66)	(-1.46)	(-0.93)	(-0.96)	(-0.87)	(-0.19)	(0.55)	(-0.81)	(-1.06)	(-0.58)	(-0.91)	(0.13)	(0.28)		
<i>Platinum</i>	$R^2$	0.03	<b>0.89***</b>	0.07	<b>0.30*</b>	0.03	0.05	0.04	0.15	0.00	<b>0.35**</b>	0.05	0.04	0.02	0.07	0.03	0.04		
	$R_{\text{voos}}^2$	-2.21	<b>0.03**</b>	-2.08	-0.09**	-1.52	-1.15	-1.20	-0.98*	-1.50	-0.49	-1.38	-1.72	-7.85	-1.56	-1.46	-1.20	-14.84	
	$t - stat$	(0.66)	(3.22)	(-0.74)	(1.81)	(-0.60)	(-0.76)	(-0.75)	(-1.36)	(0.14)	(2.10)	(-0.72)	(-0.70)	(-0.56)	(-0.87)	(0.58)	(-0.59)		
<i>Silver</i>	$R^2$	0.06	0.02	0.01	<b>0.80***</b>	0.00	0.12	0.08	0.04	<b>0.35**</b>	0.08	0.00	0.16	0.00	<b>0.34**</b>	<b>0.26*</b>	0.05		
	$R_{\text{voos}}^2$	-2.01	-0.72	-1.66	<b>0.12***</b>	-1.13	-2.34	-2.26	-2.47	-0.74	-0.78	-1.12	-2.53	-16.24	-1.80	-1.91	-1.61	-17.77	
	$t - stat$	(-1.02)	(-0.53)	(0.35)	(2.94)	(0.10)	(-1.43)	(-1.19)	(-0.79)	(2.45)	(1.14)	(-0.04)	(-1.36)	(0.26)	(-1.97)	(1.73)	(0.63)		
<i>Tin</i>	$R^2$	0.05	<b>0.94***</b>	<b>0.78**</b>	<b>0.35*</b>	0.04	0.12	0.06	0.04	<b>1.07***</b>	<b>0.17*</b>	<b>0.43**</b>	<b>0.49**</b>	0.00	<b>0.85***</b>	<b>0.42**</b>	0.00		
	$R_{\text{voos}}^2$	-1.26	-1.04	<b>0.24**</b>	-0.46	-0.88	-1.80	-1.29	-0.82	<b>0.16***</b>	-1.51	-1.32	-2.69	-3.85	-1.28	-0.90	-0.74*	-21.16	
	$t - stat$	(-0.97)	(3.32)	(-2.55)	(1.94)	(0.66)	(-1.47)	(-1.04)	(-0.87)	(4.34)	(1.69)	(-2.15)	(-2.35)	(-2.19)	(-3.13)	(2.19)	(2.00)		
<i>Zinc</i>	$R^2$	0.12	<b>0.84***</b>	<b>0.41*</b>	0.19	0.01	0.08	0.03	<b>0.37***</b>	<b>0.90***</b>	<b>0.35**</b>	<b>0.43**</b>	0.15	0.01	0.23	0.10	0.10		
	$R_{\text{voos}}^2$	-1.33	-1.16	-0.60	-1.57	-1.78	-1.19	-1.22	-1.62	-0.95	-0.95	-0.62	-2.12	-6.20	-1.62	-1.49	-1.58	-21.59	
	$t - stat$	(1.46)	(3.13)	(-1.83)	(1.42)	(0.37)	(-1.15)	(-0.77)	(-2.55)	(3.98)	(2.43)	(-2.17)	(-1.31)	(-0.37)	(-1.63)	(1.06)	(0.89)		

Table V: Return Predictability (12 Months)

This table reports the regression results of monthly excess returns on a constant and the lagged predictive variable(s). We predict the next year's excess return. Statistical inferences are based on a bootstrapped distribution. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "swar" the stock variance, and "tbl" the 3-month Treasury bill rate. "unrate" is the unemployment rate. "MSA" and "MFC" denote the model selection approach and mean forecast combination.  $R^2$  and  $R_{oos}^2$  are the in-sample and out-of-sample  $R^2$ , respectively. We report the t-statistics in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10%, 5%, and 1% significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Statistic	de	Δindpro	ΔM1	dfr	dfy	dp	djy	ep	erp	infl	ltr	lty	swar	tbl	tms	unrate	MSA	MFC
Butter	$R^2$	0.03	<b>0.38**</b>	<b>0.45*</b>	0.02	0.00	0.19	0.11	<b>0.37**</b>	<b>1.07***</b>	0.05	0.04	<b>2.21***</b>	0.00	<b>4.07***</b>	<b>2.36***</b>	<b>0.78**</b>		
	$R_{oos}^2$	<b>1.02***</b>	-0.49	-0.16*	-0.42	-3.16	-3.46	-2.86	-4.97	<b>0.55***</b>	-1.28	-1.18	-2.26	-12.13	-4.64	-1.27	-2.39	-13.96**	<b>4.22***</b>
	t-stat	(0.64)	(2.09)	(-1.92)	(0.42)	(-0.22)	(-1.67)	(-1.26)	(-2.37)	(4.03)	(0.83)	(0.65)	(-5.10)	(-6.95)	(-6.95)	(5.24)	(2.50)		
Cocoa	$R^2$	0.02	<b>1.03***</b>	0.09	0.00	0.13	<b>0.33***</b>	<b>0.33***</b>	<b>0.61***</b>	0.00	<b>0.46***</b>	0.03	<b>2.38***</b>	0.01	<b>3.40***</b>	<b>0.97***</b>	0.00	<b>10.88***</b>	<b>10.61**</b>
	$R_{oos}^2$	-3.56	<b>0.76***</b>	-2.45	-0.56	-3.42	-5.01	-5.18	-3.70	<b>0.13***</b>	<b>3.65***</b>	-1.10	<b>0.31***</b>	-15.52	-0.92*	<b>2.20***</b>	-1.06		
	t-stat	(0.62)	(3.46)	(0.87)	(0.14)	(-1.21)	(-2.38)	(-2.41)	(-3.26)	(0.14)	(2.79)	(0.56)	(-5.30)	(-6.33)	(-6.33)	(3.33)	(0.05)		
Coffee Arabica	$R^2$	<b>1.77***</b>	0.25	0.06	<b>0.52*</b>	<b>1.17***</b>	0.01	0.01	<b>0.80**</b>	0.18	0.24	0.20	0.36	0.00	<b>3.86***</b>	<b>9.33***</b>	<b>4.91***</b>		10.44
	$R_{oos}^2$	-2.28	-0.45	-1.22	-0.49	-1.16	-5.16	-5.30	-6.37	-0.54	-2.62	-0.98	-6.35	-6.90	<b>1.13***</b>	<b>11.13***</b>	<b>2.42***</b>		
	t-stat	(3.44)	(1.29)	(0.62)	(1.85)	(2.79)	(0.22)	(0.31)	(-2.31)	(1.09)	(-1.25)	(-1.15)	(-1.55)	(-0.88)	(-5.14)	(8.22)	(5.83)		
Corn	$R^2$	<b>0.56**</b>	0.19	0.09	0.01	<b>0.48**</b>	0.25	<b>1.31***</b>	0.01	0.02	0.05	<b>1.82***</b>	<b>0.33*</b>	<b>1.76***</b>	<b>0.07</b>	0.07	0.01		
	$R_{oos}^2$	-4.90	-0.67	-0.48	-1.10	-3.98	<b>1.33***</b>	<b>1.70***</b>	-0.93	-1.25	-0.40*	-0.86	-0.22***	-9.76	-2.93	-8.26	-6.50	-6.95***	<b>5.20**</b>
	t-stat	(2.48)	(1.45)	(-0.85)	(0.28)	(2.29)	(-1.66)	(-1.66)	(-3.80)	(0.26)	(-0.47)	(0.71)	(-4.48)	(1.89)	(-4.41)	(0.85)	(0.30)		
Cotton	$R^2$	0.15	<b>0.32*</b>	<b>0.67**</b>	0.00	<b>3.03***</b>	0.15	<b>0.20*</b>	0.01	<b>0.57***</b>	0.06	0.05	<b>1.54***</b>	<b>0.29**</b>	<b>3.56***</b>	<b>2.99***</b>	<b>0.93***</b>		
	$R_{oos}^2$	-6.42	-1.00	-1.14	-0.65	<b>5.44***</b>	-0.09**	<b>0.96***</b>	-4.95	-0.72	-2.64	-0.42	<b>4.97***</b>	-11.43	<b>4.57***</b>	-1.50	-1.55	-7.10**	<b>5.18**</b>
	t-stat	(1.59)	(1.92)	(2.34)	(0.08)	(5.99)	(1.61)	(1.86)	(0.50)	(3.14)	(1.01)	(0.75)	(-4.24)	(2.13)	(-6.48)	(5.92)	(2.74)		
Live Cattle	$R^2$	0.02	<b>1.62***</b>	<b>0.39*</b>	<b>0.28*</b>	0.22	<b>0.56***</b>	<b>0.48***</b>	<b>0.54***</b>	<b>0.37**</b>	<b>0.47***</b>	0.13	<b>5.57***</b>	0.06	<b>9.86***</b>	<b>4.98***</b>	<b>2.34***</b>		
	$R_{oos}^2$	-4.33	<b>1.07***</b>	-2.85	-0.57	-0.55*	-3.63	-3.64	-13.57	-0.46*	<b>0.84***</b>	-0.11**	<b>2.03***</b>	-24.48	<b>1.20***</b>	<b>0.47***</b>	<b>3.79***</b>	<b>0.27***</b>	<b>3.45***</b>
	t-stat	(-0.59)	(4.36)	(-1.79)	(-1.72)	(-1.59)	(-3.10)	(-2.88)	(-3.06)	(2.52)	(2.81)	(-1.20)	(-8.24)	(-0.93)	(-11.15)	(7.72)	(4.38)		
Lean Hog	$R^2$	0.05	0.11	0.07	0.18	<b>0.36**</b>	<b>0.56***</b>	<b>0.51***</b>	<b>0.46***</b>	0.11	<b>0.27**</b>	0.01	<b>1.16***</b>	0.00	<b>1.53***</b>	<b>0.32**</b>	<b>0.68**</b>		
	$R_{oos}^2$	<b>1.82***</b>	-0.86	-1.19	-0.70	-0.18**	-0.19***	<b>0.18***</b>	-2.46	-0.16**	-0.76	-0.96	-7.77	-12.14	-1.80	<b>2.70***</b>	-2.11	-15.94**	<b>4.77***</b>
	t-stat	(0.89)	(1.15)	(-0.74)	(1.38)	(2.05)	(-3.12)	(-2.98)	(-2.82)	(1.40)	(2.13)	(-0.29)	(-3.67)	(-0.23)	(-4.21)	(1.92)	(-2.34)		
Milk	$R^2$	0.00	<b>0.77***</b>	0.17	<b>0.51**</b>	0.07	<b>0.25**</b>	<b>0.21*</b>	<b>1.45***</b>	<b>1.03***</b>	0.00	<b>3.81***</b>	<b>0.19*</b>	<b>4.29***</b>	<b>0.48**</b>	<b>0.92**</b>			
	$R_{oos}^2$	<b>1.40***</b>	-0.39*	-0.99	<b>0.46***</b>	-1.09	-3.52	-2.87	-3.52	<b>0.98***</b>	-0.15***	-0.38	<b>5.41***</b>	-4.83	<b>2.20***</b>	-3.62	<b>2.81***</b>	-17.04**	<b>6.40***</b>
	t-stat	(-0.25)	(2.99)	(-1.18)	(2.34)	(-0.90)	(1.43)	(1.92)	(1.79)	(4.69)	(3.94)	(-0.00)	(-6.75)	(-1.68)	(-7.14)	(2.35)	(2.73)		
Oranges	$R^2$	0.12	0.11	0.01	0.01	0.03	0.03	0.03	0.21	0.00	0.11	0.07	<b>2.24***</b>	0.18	<b>2.57***</b>	<b>0.33**</b>	0.00		
	$R_{oos}^2$	<b>0.92***</b>	-0.08**	-1.78	-1.98	<b>6.06***</b>	<b>1.73***</b>	<b>1.99***</b>	<b>6.65***</b>	-0.87	-1.23	-0.71	<b>2.65***</b>	<b>0.18***</b>	-0.92	<b>5.90***</b>	-3.13	-26.64	<b>6.93*</b>
	t-stat	(1.19)	(-1.11)	(0.35)	(-0.38)	(-3.42)	(-0.60)	(-0.61)	(-1.58)	(0.19)	(1.16)	(-0.86)	(-5.13)	(-1.47)	(-5.47)	(1.95)	(-0.14)		
Soybean Oil	$R^2$	<b>0.81***</b>	<b>1.11***</b>	0.08	0.06	<b>0.98***</b>	0.01	0.02	<b>0.36**</b>	<b>0.32**</b>	<b>0.24*</b>	0.06	<b>1.00***</b>	<b>0.67***</b>	<b>1.99***</b>	<b>1.30***</b>	<b>0.60**</b>		
	$R_{oos}^2$	-6.11	-0.23**	-1.07	-0.74	-2.67	-1.25	-0.14***	<b>0.60***</b>	-1.00	-0.46	-0.80	-2.62	-6.50	<b>2.41***</b>	-4.78	-7.11	-6.35**	<b>6.77***</b>
	t-stat	(3.19)	(3.59)	(0.83)	(0.81)	(3.37)	(0.32)	(0.50)	(-2.12)	(2.00)	(-1.72)	(0.82)	(-3.40)	(2.90)	(-4.80)	(3.87)	(2.21)		
Soybeans	$R^2$	<b>0.40**</b>	<b>1.63***</b>	0.09	0.00	<b>1.94***</b>	0.01	0.00	<b>0.34**</b>	0.04	0.12	<b>1.98***</b>	<b>2.21***</b>	<b>3.85***</b>	<b>2.52***</b>	<b>0.38*</b>			
	$R_{oos}^2$	-3.22	<b>0.17***</b>	-0.44	-0.68	<b>2.90***</b>	-1.57	-1.60	-1.67	<b>0.06**</b>	-0.09**	-0.69	-0.65**	-1.94	<b>0.20***</b>	-0.74*	-3.06	-8.45*	<b>7.16***</b>
	t-stat	(2.20)	(4.36)	(0.84)	(-0.14)	(4.78)	(-0.31)	(-0.05)	(-2.04)	(2.65)	(-0.70)	(1.15)	(-4.82)	(5.23)	(-6.75)	(5.42)	(1.74)		
Soybean Meal	$R^2$	0.04	0.20	0.24	0.06	<b>1.16***</b>	0.07	0.03	0.19	<b>0.56**</b>	<b>0.44**</b>	<b>0.28*</b>	<b>1.38***</b>	<b>0.66**</b>	<b>2.31***</b>	<b>1.32***</b>	0.08		
	$R_{oos}^2$	-2.12	-1.57	-1.69	-0.76	-2.48	-1.28	-1.53	-2.32	<b>0.10***</b>	-0.77	-1.47	-7.95	-6.38	-0.51*	-5.47	-5.47	-13.07	3.96
	t-stat	(0.62)	(1.41)	(1.40)	(-0.77)	(3.46)	(-0.82)	(-0.56)	(-1.40)	(2.40)	(-2.12)	(1.68)	(-3.78)	(2.60)	(-4.91)	(3.69)	(0.82)		
Sugar	$R^2$	0.00	0.21	0.03	0.02	0.18	<b>0.61***</b>	<b>0.65***</b>	<b>0.79***</b>	0.04	<b>0.37**</b>	0.04	0.01	0.10	0.06	0.16	<b>0.33*</b>		
	$R_{oos}^2$	-2.18	-1.73	-1.47	-1.05	-0.58**	-2.05	-1.42	-3.19	-1.51	<b>0.62***</b>	-1.32	<b>3.30***</b>	-13.92	<b>3.14***</b>	-1.84	<b>0.55***</b>	-13.48*	<b>8.28*</b>
	t-stat	(-0.03)	(1.57)	(0.46)	(-0.42)	(-1.43)	(-3.25)	(-3.36)	(-3.71)	(-0.80)	(2.50)	(0.68)	(-0.34)	(1.24)	(-0.82)	(1.34)	(-1.63)		
Wheat	$R^2$	0.10	<b>1.24***</b>	0.00	<b>0.23*</b>	<b>0.45**</b>	0.10	0.09	<b>0.39***</b>	0.06	0.00	0.01	<b>1.59***</b>	<b>0.32**</b>	<b>3.75***</b>	<b>3.32***</b>	0.23		
	$R_{oos}^2$	-1.42	<b>1.72***</b>	<b>0.07**</b>	-0.63	<b>5.38***</b>	-0.14***	-0.13***	-2.10	-0.42*	-1.11	-0.82	-2.85	-7.38	<b>2.12***</b>	<b>0.34***</b>	-4.49	-9.31*	<b>6.74**</b>
	t-stat	(1.31)	(3.79)	(0.08)	(1.58)	(2.28)	(-1.30)	(-1.24)	(-2.60)	(0.98)	(-0.18)	(0.34)	(-4.31)	(2.24)	(-6.66)	(6.25)	(1.37)		

Table V: Return Predictability (12 Months) (continued)

Commodity	Statistic	$\Delta \ln \text{dpro}$	$\Delta M1$	$dfr$	$dfy$	$dp$	$dy$	$ep$	$erp$	$infl$	$ltr$	$lty$	$svar$	$tbl$	$tms$	$unrate$	$MSA$	$MFC$	
<i>Wool</i>	$R^2$	<b>0.36**</b>	<b>1.40***</b>	<b>0.38*</b>	<b>0.55**</b>	0.12	0.07	<b>0.76***</b>	<b>0.68***</b>	0.06	0.12	<b>1.15***</b>	<b>0.55***</b>	<b>3.80***</b>	<b>4.91***</b>	<b>1.54***</b>			
	$R_{\text{cons}}^2$	-4.39	-0.23**	-0.39	-0.08**	-2.55	-2.60	-4.28	-0.15**	-2.42	-0.77	-5.80	-9.26	-0.39	<b>2.00***</b>	-6.01	-13.40	<b>6.44**</b>	
	$t - \text{stat}$	(2.32)	(4.04)	(1.77)	(2.44)	(-1.35)	(-1.03)	(-3.38)	(3.20)	(-0.93)	(-1.12)	(-3.66)	(2.87)	(-0.71)	(7.66)	(3.54)			
<i>Yellow Corn</i>	$R^2$	0.08	<b>0.53**</b>	0.10	0.05	0.13	0.10	0.03	0.14	0.02	0.10	<b>1.69***</b>	<b>0.70***</b>	<b>2.56***</b>	<b>0.88***</b>	0.29			
	$R_{\text{cons}}^2$	-2.95	-0.40*	<b>0.30**</b>	-1.16	<b>0.21***</b>	-3.22	-3.51	-6.14	-0.91	-1.40	-1.29	-0.87**	-31.67	<b>1.00***</b>	-2.52	-3.81	-11.44**	<b>4.09**</b>
	$t - \text{stat}$	(-1.19)	(2.48)	(-0.90)	(0.71)	(2.83)	(-1.49)	(-1.33)	(-0.70)	(1.55)	(0.51)	(1.06)	(-4.45)	(3.31)	(-5.46)	(3.17)	(1.52)		
<i>Coal</i>	$R^2$	0.15	0.00	<b>0.79***</b>	0.13	<b>0.81***</b>	<b>0.79***</b>	<b>0.46**</b>	0.01	<b>0.85***</b>	<b>0.42**</b>	<b>0.32*</b>	0.01	0.07	<b>0.35*</b>	0.34			
	$R_{\text{cons}}^2$	<b>0.62***</b>	-0.65	<b>1.85***</b>	-1.25	-0.63**	-0.82*	-0.49**	-0.41	<b>2.65***</b>	-0.89	<b>11.64***</b>	-10.63	<b>6.41***</b>	<b>0.36**</b>	<b>3.72***</b>	-0.24**	-0.24**	<b>8.00***</b>
	$t - \text{stat}$	(-1.21)	(0.12)	(-2.54)	(1.15)	(-2.85)	(-2.82)	(-2.15)	(0.34)	(2.93)	(-2.04)	(-1.78)	(-0.23)	(-0.84)	(-1.86)	(-1.64)			
<i>Heating Oil</i>	$R^2$	0.00	<b>0.61*</b>	0.10	<b>0.57*</b>	<b>1.91***</b>	<b>1.86***</b>	<b>1.59***</b>	0.04	0.01	<b>0.53*</b>	<b>2.60***</b>	0.01	<b>1.07**</b>	0.29	<b>1.11***</b>			
	$R_{\text{cons}}^2$	-5.22	-0.42	-0.45	-0.62	<b>4.07***</b>	<b>1.71***</b>	<b>0.71***</b>	-0.98	<b>0.62**</b>	-0.80	<b>11.57***</b>	-7.17	<b>3.40***</b>	-1.91	<b>2.01***</b>	-0.35***	<b>9.34***</b>	
	$t - \text{stat}$	(-0.01)	(1.88)	(-0.76)	(1.82)	(-1.78)	(-3.34)	(-3.04)	(0.49)	(0.18)	(-1.74)	(-3.91)	(0.23)	(-2.49)	(-1.29)	(-2.53)			
<i>Natural Gas</i>	$R^2$	0.57	<b>0.60*</b>	0.41	0.02	<b>2.48***</b>	<b>2.53***</b>	<b>3.82***</b>	0.03	0.20	0.19	<b>1.46**</b>	0.24	<b>0.94**</b>	0.00	<b>1.03**</b>			
	$R_{\text{cons}}^2$	-4.73	-0.98	-2.15	-1.52	-0.15*	<b>1.66***</b>	<b>3.33***</b>	-1.60	-0.19	-1.03	-1.78	-3.24	-0.83	-5.52	-2.82	-12.40***	<b>3.70*</b>	
	$t - \text{stat}$	(1.59)	(1.63)	(-1.35)	(0.26)	(-0.11)	(-3.33)	(-4.17)	(-0.36)	(-0.94)	(-0.92)	(-2.55)	(1.02)	(-2.03)	(0.03)	(-2.14)			
<i>Unleaded Regular Gas</i>	$R^2$	0.49	0.00	0.01	0.56	<b>5.43***</b>	<b>5.44***</b>	<b>6.78***</b>	0.00	<b>3.95***</b>	0.09	<b>6.78***</b>	<b>1.64**</b>	<b>4.93***</b>	0.12	<b>1.55***</b>			
	$R_{\text{cons}}^2$	-5.95	-2.20	-1.10	-0.80	<b>1.73***</b>	-0.41**	<b>0.06**</b>	-1.69	<b>3.55***</b>	-1.57	<b>6.49***</b>	-8.51	<b>3.35***</b>	-0.48	-1.51	-0.59***	<b>6.40***</b>	
	$t - \text{stat}$	(1.56)	(0.04)	(0.26)	(1.66)	(-0.14)	(-5.32)	(-5.98)	(0.11)	(-4.50)	(-0.67)	(-5.98)	(2.86)	(-5.05)	(0.76)	(-2.78)			
<i>WTI Oil</i>	$R^2$	0.04	<b>1.67***</b>	0.03	<b>0.30*</b>	<b>0.75***</b>	<b>0.71***</b>	<b>0.69***</b>	0.10	<b>0.25*</b>	0.13	0.06	0.03	0.02	0.03	<b>0.91***</b>			
	$R_{\text{cons}}^2$	-3.93	<b>0.71***</b>	-1.06	-0.66	<b>6.79***</b>	-1.59	-1.38	-1.85	-0.55	<b>1.03***</b>	-1.13	<b>7.22***</b>	<b>2.93***</b>	-3.39	-0.27**	-2.94	9.51	
	$t - \text{stat}$	(-0.79)	(4.42)	(0.47)	(1.79)	(-0.47)	(-3.61)	(-3.50)	(-3.47)	(1.31)	(2.04)	(-1.19)	(-0.86)	(0.71)	(-0.47)	(-0.57)			
<i>Aluminium</i>	$R^2$	<b>2.82***</b>	<b>0.49**</b>	0.05	<b>0.66**</b>	0.12	0.00	<b>1.73***</b>	0.11	<b>0.27*</b>	<b>0.79***</b>	<b>0.40**</b>	0.00	<b>1.38***</b>	<b>1.82***</b>	0.15			
	$R_{\text{cons}}^2$	-7.52	-1.64	-0.84	-0.15**	-7.56	-7.24	-2.04	-1.06	-7.13	-0.13**	-4.04	-21.79	<b>2.36***</b>	<b>2.72***</b>	-0.10**	-30.85***	<b>7.62***</b>	
	$t - \text{stat}$	(6.05)	(2.37)	(0.63)	(2.66)	(-0.03)	(0.07)	(-4.71)	(1.20)	(-1.83)	(-2.91)	(-2.16)	(0.24)	(-2.34)	(4.59)	(1.11)			
<i>Gold</i>	$R^2$	0.03	0.07	<b>1.07***</b>	0.06	<b>0.40**</b>	<b>1.08***</b>	<b>1.04***</b>	0.00	0.13	0.06	0.16	<b>1.97***</b>	<b>0.48**</b>	<b>0.57***</b>	0.01			
	$R_{\text{cons}}^2$	<b>3.60***</b>	-0.54	<b>0.95***</b>	-0.63	<b>13.98***</b>	<b>0.97***</b>	-1.16	-0.36**	<b>0.54***</b>	-1.39	<b>10.56***</b>	-64.98	<b>3.16***</b>	-2.74	-5.89	<b>15.16**</b>	<b>13.49**</b>	
	$t - \text{stat}$	(-0.78)	(0.89)	(2.97)	(0.83)	(2.14)	(-4.30)	(-4.27)	(-0.05)	(1.46)	(0.79)	(-1.34)	(5.60)	(-2.34)	(2.56)	(0.35)			
<i>High Grade Copper</i>	$R^2$	<b>0.94***</b>	<b>0.43**</b>	<b>0.84**</b>	<b>0.43**</b>	<b>1.30***</b>	<b>1.11***</b>	<b>4.52***</b>	0.16	0.01	<b>2.80***</b>	<b>0.97***</b>	<b>0.639***</b>	<b>6.39***</b>	<b>5.26***</b>	0.06			
	$R_{\text{cons}}^2$	<b>0.31***</b>	-0.12**	<b>0.78***</b>	-0.90	<b>6.88***</b>	-2.32	-2.93	-0.32***	-0.59	-1.38	<b>3.95***</b>	-6.74	<b>10.00***</b>	<b>7.10***</b>	-0.50**	-7.53***	<b>5.58**</b>	
	$t - \text{stat}$	(4.04)	(2.21)	(2.63)	(2.14)	(4.77)	(-4.40)	(-9.04)	(3.94)	(-1.63)	(-0.37)	(-5.75)	(3.91)	(-8.81)	(7.95)	(0.67)			
<i>Nickel</i>	$R^2$	<b>5.09***</b>	0.11	0.01	0.39	<b>1.00***</b>	<b>0.70*</b>	<b>6.72***</b>	0.01	0.55	<b>1.01**</b>	<b>3.57***</b>	<b>2.23***</b>	<b>2.58***</b>	0.28				
	$R_{\text{cons}}^2$	-24.08	-5.10	<b>0.33**</b>	-1.40	<b>10.17***</b>	-23.81	-26.19	-0.77	-0.95	-1.37	<b>3.12***</b>	-0.70	-16.24	-4.25	-5.35	-2.91*	-1.01	
	$t - \text{stat}$	(4.73)	(0.67)	(-0.24)	(1.28)	(2.05)	(-1.69)	(-1.72)	(-5.49)	(-1.52)	(-2.07)	(-2.09)	(3.94)	(-3.09)	(3.32)	(-1.09)			
<i>Palladium</i>	$R^2$	<b>5.08***</b>	<b>0.85**</b>	0.09	0.36	<b>0.50*</b>	0.40	<b>5.10***</b>	<b>0.60*</b>	<b>0.94**</b>	0.07	<b>3.42***</b>	<b>0.59*</b>	<b>3.57***</b>	<b>0.82**</b>	<b>0.57*</b>			
	$R_{\text{cons}}^2$	<b>4.44***</b>	-3.96	-3.17	-1.80	<b>4.33***</b>	<b>4.10***</b>	<b>2.02***</b>	-0.18*	-1.04	-2.48	-10.04	-6.47	<b>0.87***</b>	-2.55	-3.25	-20.15**	<b>10.17*</b>	
	$t - \text{stat}$	(5.49)	(2.20)	(0.69)	(1.43)	(0.22)	(-1.67)	(-1.51)	(-5.49)	(1.83)	(-2.31)	(-0.65)	(-4.46)	(1.83)	(-4.56)	(2.16)	(1.80)		
<i>Platinum</i>	$R^2$	<b>1.41***</b>	0.09	<b>0.71**</b>	0.08	<b>0.08</b>	<b>0.05</b>	<b>1.53***</b>	<b>0.55***</b>	<b>0.53**</b>	0.11	<b>0.83***</b>	0.00	<b>2.29***</b>	<b>2.41***</b>	0.16			
	$R_{\text{cons}}^2$	-1.93	-1.74	-0.41	-1.28	<b>1.98***</b>	<b>1.91***</b>	<b>3.78***</b>	-1.10	-1.82	-1.13	<b>2.82***</b>	-36.31	<b>4.73***</b>	<b>1.59***</b>	-4.44	-17.00***	<b>10.13***</b>	
	$t - \text{stat}$	(4.24)	(1.03)	(2.41)	(0.92)	(-0.48)	(-1.00)	(-0.77)	(-4.42)	(2.63)	(-2.58)	(-1.09)	(-3.11)	(0.01)	(-5.17)	(5.30)	(1.12)		
<i>Silver</i>	$R^2$	0.11	0.21	0.05	0.01	<b>0.29**</b>	<b>0.28**</b>	0.11	0.02	0.04	0.14	<b>0.34*</b>	<b>0.36**</b>	<b>1.02***</b>	<b>1.18***</b>	0.27			
	$R_{\text{cons}}^2$	<b>1.43***</b>	-0.50	-0.57	-0.63	<b>5.15***</b>	-2.52	-2.99	-0.61	-0.74	-1.28	<b>2.09***</b>	-13.53	<b>1.34***</b>	<b>0.12***</b>	-1.94	-12.37***	<b>9.41***</b>	
	$t - \text{stat}$	(-1.39)	(-1.54)	(0.66)	(0.37)	(-0.28)	(-2.24)	(-2.21)	(-1.39)	(0.61)	(0.83)	(1.21)	(-1.98)	(2.36)	(-3.43)	(3.69)	(1.46)		
<i>Tin</i>	$R^2$	<b>0.19*</b>	<b>0.79***</b>	0.03	<b>0.27*</b>	<b>2.89***</b>	<b>0.41***</b>	<b>1.22***</b>	<b>0.60***</b>	0.00	0.08	<b>3.19***</b>	<b>2.24***</b>	<b>5.67***</b>	<b>2.84***</b>	<b>0.69**</b>			
	$R_{\text{cons}}^2$	-1.03**	-0.19**	<b>0.52***</b>	-0.59	<b>11.51***</b>	<b>2.88***</b>	<b>3.74***</b>	-4.93	-0.93	-1.29	-1.46	<b>4.26***</b>	<b>5.68***</b>	<b>2.72***</b>	<b>0.83***</b>	-0.97***	<b>9.47**</b>	
	$t - \text{stat}$	(1.82)	(3.02)	(0.53)	(1.69)	(5.85)	(-2.66)	(-2.38)	(-4.61)	(3.22)	(-0.08)	(-0.92)	(-6.16)	(-5.77)	(5.77)	(2.36)			
<i>Zinc</i>	$R^2$	<b>1.28***</b>	<b>0.62***</b>	0.08	0.08	<b>0.87***</b>	0.12	<b>1.83***</b>	0.08	<b>0.18*</b>	0.02	<b>1.44***</b>	<b>0.38***</b>	<b>3.26***</b>	<b>2.70***</b>	<b>0.85***</b>			
	$R_{\text{cons}}^2$	<b>3.93***</b>	-0.86	-1.14	-0.99	<b>2.23***</b>	-1.96	-2.15	-0.37***	-1.60	-0.72	-1.63	-11.26	<b>3.28***</b>	<b>1.07***</b>	-8.11	-16.38*	6.82	
	$t - \text{stat}$	(4.73)	(2.67)	(0.82)	(0.90)	(3.17)	(-1.43)	(-1.35)	(-5.67)	(1.21)	(-1.72)	(-0.41)	(-4.10)	(2.43)	(-6.19)	(5.62)	(2.62)		

Table VI: Volatility Predictability (1 Month)

This table reports the regression results of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable(s). We predict the next month's volatility. Statistical inferences are based on a bootstrapped distribution. "de" denotes the dividend-payout ratio, " $\Delta\text{indpro}$ " the growth of industrial production, and " $\Delta M1$ " the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "lrr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bonds and the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. " $\text{MSA}$ " and " $\text{MFC}$ " denote the model selection approach and mean forecast combination.  $\Delta R^2$  and  $R_{\text{OOS}}^2$  are the in-sample difference between the adjusted  $R^2$  of the unrestricted and restricted model, and the out-of-sample  $R^2$ , respectively. We report the t-statistics of the respective predictive variables in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Statistic	de	$\Delta\text{indpro}$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	lrr	lty	svar	tbl	tms	unrate	MSA	MFC
Butter	$\Delta R^2$	0.00	-0.02	-0.03	<b>0.05**</b>	-0.01	<b>0.42***</b>	<b>0.40***</b>	<b>0.35***</b>	0.01	-0.02	0.02	0.00	<b>0.11**</b>	0.04	0.03	-0.01	-15.70***	-39.64
	$R_{\text{OOS}}^2$	<b>0.46***</b>	-0.43	-2.31	-1.07	-0.71	<b>0.13***</b>	<b>0.44***</b>	-0.53	-1.83	-0.72	-1.50	<b>0.40***</b>	-3.20	-1.54	-0.80	<b>0.95***</b>		
	t - stat	(-0.93)	(0.28)	(-0.36)	(-1.71)	(0.80)	(-4.44)	(-4.31)	(-4.11)	(-1.11)	(0.03)	(1.26)	(-1.00)	(2.40)	(-1.53)	(1.47)	(-0.74)		
Cocoa	$\Delta R^2$	<b>0.24***</b>	-0.06	0.05	-0.01	-0.05	<b>0.12**</b>	<b>0.13**</b>	-0.03	-0.03	<b>0.10**</b>	-0.06	<b>0.39***</b>	<b>0.22**</b>	<b>0.17**</b>	0.01	<b>0.34**</b>	-12.24***	-13.70
	$R_{\text{OOS}}^2$	<b>0.28***</b>	-1.22	-0.53	-1.38	-1.68	-0.47	<b>1.36***</b>	-1.04	<b>1.36***</b>	-1.27	-0.85	-3.71	-8.52	-2.72	-2.16	-2.73		
	t - stat	(-2.89)	(0.05)	(1.23)	(0.89)	(0.15)	(-2.12)	(-2.21)	(-0.01)	(-0.44)	(-2.00)	(-0.33)	(2.82)	(2.71)	(2.01)	(1.11)	(2.17)		
Coffee Arabica	$\Delta R^2$	0.14	-0.08	-0.06	-0.05	-0.09	-0.03	-0.05	-0.07	-0.02	-0.08	0.05	0.00	-0.06	-0.08	0.11	-0.04	-11.82***	-21.59
	$R_{\text{OOS}}^2$	-0.59	-1.22	-0.85	-0.98	<b>0.81**</b>	<b>0.25**</b>	<b>0.28**</b>	<b>0.68**</b>	-0.59	-0.31	-0.33	<b>2.44***</b>	-3.07	-0.30	-1.05	<b>1.13***</b>		
	t - stat	(-1.62)	(0.17)	(-0.55)	(0.61)	(0.05)	(-0.78)	(-0.68)	(0.45)	(0.90)	(0.34)	(1.27)	(1.03)	(-0.36)	(0.14)	(1.52)	(0.72)		
Corn Oil	$\Delta R^2$	0.01	-0.03	-0.07	0.08	<b>0.56***</b>	<b>0.64***</b>	<b>0.64***</b>	<b>0.44***</b>	-0.05	<b>1.18***</b>	-0.02	<b>0.69***</b>	<b>0.12*</b>	<b>0.64***</b>	-0.03	<b>0.18*</b>	-14.95***	-22.57
	$R_{\text{OOS}}^2$	<b>1.33***</b>	<b>0.40***</b>	-1.24	-0.93	<b>0.75***</b>	<b>0.51***</b>	<b>0.60***</b>	<b>1.91***</b>	-0.53	-2.10	-0.87	-0.78	-2.47	-1.88	-2.06	-0.88		
	t - stat	(1.12)	(0.63)	(-1.11)	(1.60)	(3.42)	(3.65)	(3.65)	(3.07)	(-0.17)	(4.87)	(0.76)	(3.78)	(1.82)	(3.64)	(-0.58)	(1.92)		
Cotton	$\Delta R^2$	-0.02	-0.04	0.11	-0.02	<b>0.68***</b>	-0.01	-0.01	-0.02	-0.03	<b>0.16**</b>	-0.02	<b>0.23**</b>	<b>0.18**</b>	0.03	<b>0.17**</b>	<b>0.41***</b>	-14.54***	-11.43*
	$R_{\text{OOS}}^2$	-0.70	-0.86	-1.01	-1.61	-2.42	-0.26	-0.02**	-1.82	-1.25	-0.98	-1.01	-3.05	-2.57	-3.18	-1.26	-0.99		
	t - stat	(0.51)	(-0.07)	(1.69)	(0.80)	(4.09)	(0.90)	(0.89)	(0.60)	(-0.18)	(2.38)	(-0.82)	(2.30)	(2.48)	(1.29)	(2.21)	(2.77)		
Live Cattle	$\Delta R^2$	-0.04	-0.04	<b>0.45***</b>	-0.07	<b>2.13***</b>	<b>1.79***</b>	<b>1.70***</b>	<b>1.12***</b>	0.04	0.02	-0.06	<b>0.20**</b>	<b>0.55***</b>	<b>0.20**</b>	-0.06	<b>0.37**</b>	-10.10***	-8.74**
	$R_{\text{OOS}}^2$	-1.07	-3.03	-0.62	<b>0.15***</b>	<b>0.15***</b>	-3.54	-4.31	<b>0.24***</b>	-0.44	<b>0.28***</b>	-1.05	<b>0.52***</b>	-12.67	-2.08	-0.72	<b>2.11***</b>		
	t - stat	(2.50)	(0.68)	(2.36)	(-0.23)	(5.72)	(6.40)	(6.24)	(5.09)	(-1.41)	(1.20)	(-0.48)	(1.96)	(3.39)	(1.96)	(-0.39)	(2.16)		
Lean Hog	$\Delta R^2$	-0.03	-0.05	-0.08	-0.03	<b>0.36***</b>	0.05	0.06	<b>0.12**</b>	-0.04	-0.02	-0.04	0.00	<b>0.21**</b>	0.06	0.02	0.01	-16.70**	-15.60
	$R_{\text{OOS}}^2$	-0.40	-1.57	-0.99	-1.32	-2.21	-0.27	-0.46	-1.83	-0.43	-0.03*	-1.61	-0.96	-7.40	-1.71	-1.28	<b>0.01**</b>		
	t - stat	(0.36)	(-0.15)	(-0.25)	(0.67)	(2.77)	(-1.50)	(-1.57)	(-2.03)	(-0.14)	(0.67)	(-0.58)	(-1.03)	(2.45)	(-1.44)	(1.15)	(-1.04)		
Milk	$\Delta R^2$	0.02	0.05	-0.04	0.03	<b>0.16**</b>	-0.03	-0.03	0.01	-0.01	-0.02	0.04	0.02	-0.03	0.04	-0.01	-0.03	-20.02	-23.87*
	$R_{\text{OOS}}^2$	-2.08	-1.29	-1.24	-0.80	-5.21	<b>0.69***</b>	<b>1.15***</b>	-2.74	-0.38	-1.94	-0.84	<b>1.15***</b>	-3.60	-1.15	-3.28	-1.68		
	t - stat	(1.34)	(-1.65)	(0.26)	(-1.38)	(2.53)	(-0.03)	(0.02)	(-1.12)	(0.73)	(0.56)	(-1.41)	(-1.31)	(0.23)	(-1.51)	(0.86)	(0.60)		
Oranges	$\Delta R^2$	<b>0.17**</b>	-0.03	-0.05	0.08	<b>0.42***</b>	<b>0.79***</b>	<b>0.93***</b>	<b>0.35***</b>	<b>0.29***</b>	-0.03	-0.04	-0.03	<b>0.10*</b>	-0.04	-0.04	0.08	-14.57*	-15.90
	$R_{\text{OOS}}^2$	-2.63	-1.83	-1.59	-0.73	-1.22	-1.80	-1.88	-1.43	<b>0.29***</b>	-1.07	-1.15	-2.42	-2.46	-2.00	-2.13	-2.13		
	t - stat	(-2.24)	(0.66)	(0.36)	(-1.67)	(-3.28)	(-4.43)	(-4.79)	(-3.01)	(-2.80)	(0.60)	(0.50)	(0.50)	(1.85)	(0.33)	(0.27)	(-1.52)		
Soybean Oil	$\Delta R^2$	0.01	-0.03	-0.05	-0.04	0.03	-0.04	-0.04	0.00	<b>0.26***</b>	<b>0.21**</b>	-0.04	<b>0.19**</b>	0.00	0.06	0.03	0.00	-15.07***	-38.43
	$R_{\text{OOS}}^2$	-0.65	-1.48	-1.56	-1.81	-0.61	-0.01**	-0.63	<b>0.96***</b>	-1.25	-0.75	-1.18	-0.05**	-5.81	<b>0.60***</b>	-0.04*	-1.14		
	t - stat	(-1.08)	(0.53)	(-0.34)	(-0.41)	(1.27)	(0.10)	(-0.21)	(0.94)	(-2.79)	(2.54)	(0.03)	(2.40)	(1.06)	(1.57)	(1.28)	(0.96)		
Soybeans	$\Delta R^2$	-0.03	0.01	-0.06	-0.04	<b>0.14*</b>	-0.04	-0.04	-0.05	0.01	<b>0.18**</b>	0.01	-0.03	0.05	-0.04	<b>0.17**</b>	0.01	-13.30***	-24.40
	$R_{\text{OOS}}^2$	<b>0.65***</b>	-1.50	-1.02	-1.15	-0.72	-0.89	-0.98	-1.28	<b>0.75***</b>	-0.89	-0.59	-0.69	-3.78	-1.60	-0.35	-0.77		
	t - stat	(-0.58)	(1.09)	(-0.19)	(0.36)	(1.96)	(-0.28)	(-0.39)	(0.13)	(-1.08)	(2.23)	(-1.07)	(0.57)	(1.47)	(-0.41)	(2.13)	(1.06)		
Soybean Meal	$\Delta R^2$	-0.03	0.02	-0.07	-0.05	-0.04	-0.06	-0.06	-0.03	-0.06	<b>0.98***</b>	-0.02	-0.05	-0.01	-0.05	-0.06	-0.07	-15.09**	-19.13
	$R_{\text{OOS}}^2$	<b>0.45***</b>	-0.78	-1.26	-1.54	-2.43	-1.55	-1.50	-2.33	-1.29	<b>1.15***</b>	-0.88	-1.80	-0.98	-1.54	-1.32	-1.62		
	t - stat	(-0.70)	(1.18)	(-0.17)	(-0.31)	(-4.48)	(0.11)	(0.69)	(-0.21)	(4.28)	(-0.82)	(-0.82)	(-0.30)	(0.87)	(-0.27)	(0.00)	(0.21)		
Sugar	$\Delta R^2$	<b>0.04**</b>	-0.01	-0.03	-0.01	-0.02	<b>0.04**</b>	<b>0.03**</b>	-0.01	-0.01	0.01	-0.02	<b>0.38***</b>	-0.01	<b>0.36***</b>	-0.01	0.01	-15.48	-79.65
	$R_{\text{OOS}}^2$	-1.96	-0.21	-1.55	-0.77	-1.22	-2.65	-2.11	-1.71	-1.18	-1.09	-0.44	-2.43	-0.69	-1.69	-1.19	-1.05		
	t - stat	(-2.23)	(-0.60)	(-0.24)	(-0.63)	(0.04)	(-2.17)	(-2.10)	(-1.62)	(0.02)	(1.41)	(0.03)	(5.09)	(0.18)	(4.95)	(-0.79)	(1.18)		
Wheat	$\Delta R^2$	-0.02	-0.03	-0.04	0.02	<b>0.44***</b>	-0.01	0.00	0.01	<b>0.05*</b>	-0.01	<b>0.11**</b>	-0.02	<b>0.13***</b>	-0.03	<b>0.17**</b>	<b>0.30***</b>	-14.67***	-32.13
	$R_{\text{OOS}}^2$	-1.35	-1.33	-1.04	-1.32	-0.29	-1.17	-1.31	-1.70	-1.30	-0.26	-0.60	-1.64	-2.42	-1.88	-0.64	-0.37		
	t - stat	(0.27)	(0.21)	(0.45)	(-1.26)	(3.75)	(-0.87)	(-1.04)	(-1.23)	(-1.70)	(-0.63)	(-1.98)	(0.70)	(2.46)	(-0.40)	(2.41)	(2.79)		

Table VI: Volatility Predictability (1 Month) (continued)

Commodity	Statistic	$\Delta e$	$\Delta \text{indpro}$	$\Delta M1$	$dfr$	$dfy$	$dp$	$dy$	$ep$	$erp$	$\text{infl}$	$\text{ltr}$	$\text{lty}$	$\text{svar}$	$\text{tbl}$	$\text{tms}$	$\text{unrate}$	MSA	MFC
Wool	$\Delta R^2$	-0.04	<b>0.15*</b>	-0.05	<b>1.47***</b>	<b>0.18**</b>	<b>0.65***</b>	<b>0.55***</b>	<b>0.94***</b>	<b>0.22***</b>	-0.03	0.10	-0.02	<b>0.20**</b>	<b>0.15*</b>	<b>0.39***</b>	-0.01		
	$R^2_{\text{cons}}$	-1.09	-0.46	-1.53	<b>1.78***</b>	<b>1.38***</b>	<b>1.28***</b>	<b>1.84***</b>	-0.82	<b>0.14**</b>	-0.46	-1.60	<b>1.04***</b>	-2.56	-0.42	-0.16	-2.19	-21.72***	-13.32*
	$t-stat$	(0.39)	(1.93)	(0.49)	(5.22)	(2.07)	(-4.02)	(-3.73)	(-4.80)	(2.47)	(0.64)	(-1.64)	(-0.81)	(2.37)	(-1.95)	(2.86)	(0.93)		
Yellow Corn	$\Delta R^2$	<b>0.10*</b>	-0.05	<b>0.17*</b>	<b>0.39***</b>	<b>0.93***</b>	-0.01	-0.02	-0.03	<b>0.22**</b>	0.01	-0.05	0.00	<b>0.28***</b>	<b>0.15*</b>	<b>0.24**</b>	<b>0.50***</b>		
	$R^2_{\text{cons}}$	-1.15	-1.18	-1.51	-0.44	-1.91	-0.28	-0.39	-0.86	-0.60	<b>0.35***</b>	-0.76	-2.28	-1.12	-2.13	-2.10	-0.73	-14.72***	-11.68
	$t-stat$	(1.82)	(-0.37)	(1.75)	(-2.74)	(4.19)	(0.92)	(0.66)	(-0.48)	(-2.53)	(1.08)	(0.42)	(-1.01)	(2.72)	(-1.90)	(2.28)	(2.61)		
Coal	$\Delta R^2$	-0.08	0.07	-0.03	-0.07	<b>0.58***</b>	<b>1.69***</b>	<b>1.67***</b>	<b>1.92***</b>	-0.08	<b>0.19*</b>	-0.06	-0.03	<b>0.56**</b>	-0.08	0.13	<b>0.99***</b>	-18.81***	-10.90
	$R^2_{\text{cons}}$	-1.41	-0.92	-1.57	0.26	0.85	-0.85	<b>1.22***</b>	-3.33	-0.82	-0.48	-1.23	<b>0.18**</b>	-1.71	<b>0.74***</b>	-0.75	-1.37		
	$t-stat$	(0.09)	(-1.37)	(0.85)	(0.36)	(2.81)	(-4.61)	(-4.58)	(-4.91)	(0.17)	(-1.82)	(-0.55)	(0.78)	(2.77)	(0.06)	(1.60)	(3.25)		
Heating Oil	$\Delta R^2$	-0.03	0.12	-0.09	-0.09	-0.07	<b>0.41**</b>	<b>0.38**</b>	<b>0.62***</b>	-0.06	<b>0.88***</b>	0.07	0.12	0.14	-0.02	-0.06	<b>0.16*</b>	-15.88	-15.26*
	$R^2_{\text{cons}}$	-1.14	<b>0.18*</b>	-1.41	-0.67	<b>0.54**</b>	-2.52	-2.98	-0.93	-1.02	<b>0.90***</b>	-0.66	-2.95	-1.34	-2.44	-2.32	-1.23		
	$t-stat$	(0.82)	(-1.50)	(0.19)	(-0.15)	(0.52)	(-2.33)	(-2.26)	(-2.79)	(0.61)	(-3.25)	(1.32)	(-1.50)	(1.58)	(-0.92)	(-0.63)	(-1.66)		
Natural Gas	$\Delta R^2$	-0.10	<b>0.20*</b>	-0.06	0.04	-0.05	<b>2.11***</b>	<b>2.46***</b>	<b>1.71***</b>	<b>0.78***</b>	<b>0.52***</b>	-0.03	<b>1.78***</b>	<b>0.68***</b>	<b>1.16***</b>	-0.08	<b>0.48**</b>	-12.83***	-24.84
	$R^2_{\text{cons}}$	-4.40	-0.53	-5.15	-0.60	-0.93	<b>1.81***</b>	<b>2.34***</b>	<b>1.97***</b>	<b>2.35***</b>	<b>0.35*</b>	-0.72	<b>1.20***</b>	<b>2.89***</b>	-1.81	-1.25	<b>0.52**</b>		
	$t-stat$	(-0.11)	(-1.76)	(-0.59)	(-1.21)	(-0.71)	(-4.88)	(-5.27)	(-4.39)	(-3.02)	(-2.54)	(0.81)	(-0.48)	(2.84)	(-3.64)	(0.48)	(-2.45)		
Unleaded Regular Gas	$\Delta R^2$	<b>0.43*</b>	<b>0.61**</b>	-0.13	-0.17	-0.10	<b>1.95***</b>	<b>2.04***</b>	<b>3.63***</b>	-0.07	0.22	-0.09	<b>2.63***</b>	<b>1.40***</b>	<b>0.90**</b>	<b>0.31*</b>	<b>1.80***</b>	-12.50***	<b>0.33**</b>
	$R^2_{\text{cons}}$	-0.56	<b>0.20*</b>	-1.65	-1.43	<b>2.52***</b>	-1.47	-1.71	-5.41	-0.50	-3.18	-2.22	-2.87	-3.50	-3.21	-1.06	-0.45		
	$t-stat$	(1.85)	(-2.11)	(-0.51)	(-0.27)	(0.66)	(-3.49)	(-3.57)	(-4.72)	(-0.76)	(-1.49)	(-0.71)	(-4.03)	(3.00)	(-2.47)	(-1.66)	(-3.36)		
WTI Oil	$\Delta R^2$	0.01	-0.02	-0.02	0.02	<b>0.05*</b>	0.00	0.00	<b>0.06**</b>	-0.01	<b>0.13***</b>	<b>0.19***</b>	0.02	<b>0.10**</b>	0.00	-0.01	-0.02	-20.40**	-49.57
	$R^2_{\text{cons}}$	-2.30	-0.40	-1.91	-1.13	-4.53	-3.93	-3.50	-4.48	-1.90	-0.86	<b>0.02*</b>	<b>0.02*</b>	-5.97	-1.48	-3.55	-2.35	-2.88	
	$t-stat$	(1.23)	(-0.38)	(0.35)	(-1.48)	(1.92)	(-1.03)	(-0.99)	(-2.26)	(0.46)	(-3.17)	(3.36)	(3.36)	(1.45)	(2.61)	(0.98)	(0.68)	(0.32)	
Aluminium	$\Delta R^2$	<b>0.09**</b>	0.01	<b>0.15**</b>	0.04	-0.01	<b>0.26***</b>	<b>0.28***</b>	<b>0.08**</b>	0.00	-0.02	-0.02	<b>0.13**</b>	0.00	0.01	<b>0.12**</b>	0.02	-14.81***	-49.55
	$R^2_{\text{cons}}$	-0.85	<b>0.53***</b>	<b>0.55***</b>	-1.25	-0.52	<b>0.34***</b>	<b>0.60***</b>	-0.61	-1.69	<b>0.56***</b>	-0.71	<b>0.07**</b>	-0.75	-1.03	-1.53	<b>0.19**</b>		
	$t-stat$	(-2.20)	(-1.17)	(2.30)	(-1.61)	(-0.73)	(-3.59)	(-3.69)	(-2.13)	(-0.93)	(0.02)	(-0.59)	(-0.59)	(2.54)	(0.99)	(2.44)	(1.21)		
Gold	$\Delta R^2$	<b>0.22***</b>	0.00	0.00	-0.02	-0.02	<b>0.16***</b>	<b>0.15***</b>	-0.01	0.00	0.00	0.02	<b>0.79***</b>	<b>0.04*</b>	<b>0.46***</b>	-0.01	<b>0.54***</b>	-7.24***	-47.64
	$R^2_{\text{cons}}$	-1.71	-0.89	-1.49	-1.76	<b>1.63***</b>	<b>4.04***</b>	<b>3.78***</b>	-0.04*	-1.30	<b>0.64***</b>	-0.76	<b>6.16***</b>	-29.12	<b>2.97***</b>	-0.46	-2.04		
	$t-stat$	(-4.41)	(1.07)	(0.96)	(0.55)	(0.12)	(-3.83)	(-3.73)	(-0.73)	(0.90)	(1.04)	(-1.43)	(6.37)	(1.92)	(4.85)	(0.80)	(4.04)		
High Grade Copper	$\Delta R^2$	<b>0.04*</b>	<b>0.12**</b>	0.04	0.02	0.00	<b>0.07**</b>	<b>0.07**</b>	-0.01	-0.02	0.01	-0.02	<b>0.12**</b>	<b>0.21***</b>	0.04	0.02	-0.04	-12.02***	-53.21
	$R^2_{\text{cons}}$	-2.18	-1.17	-0.63	-1.16	<b>1.34***</b>	-1.27	-1.28	-1.28	-0.82	-1.52	-1.27	-1.72	-6.66	-1.99	-2.30	-2.63		
	$t-stat$	(-1.69)	(-2.33)	(1.41)	(1.31)	(0.91)	(-2.02)	(-2.00)	(-0.88)	(0.42)	(-1.28)	(-0.44)	(-0.44)	(3.10)	(1.50)	(1.28)	(0.28)		
Nickel	$\Delta R^2$	-0.20	-0.02	-0.21	-0.17	-0.21	0.17	0.17	0.03	-0.21	0.35	0.15	<b>0.53*</b>	0.19	<b>0.41*</b>	-0.21	<b>0.39*</b>	-16.80**	<b>4.34***</b>
	$R^2_{\text{cons}}$	-0.97	-0.05	-1.63	-3.07	-3.37	-1.26	-1.68	-3.27	-3.27	-0.32	-0.50	-2.23	0.00	-2.01	<b>0.47**</b>	-1.87		
	$t-stat$	(-0.20)	(-0.95)	(0.07)	(0.42)	(0.42)	(0.12)	(-1.35)	(-1.34)	(-1.07)	(0.14)	(1.63)	(-1.31)	(1.37)	(-1.72)	(0.06)	(-1.70)		
Palladium	$\Delta R^2$	-0.11	<b>1.00***</b>	-0.16	-0.14	<b>1.26***</b>	<b>0.37*</b>	<b>0.37*</b>	<b>0.52**</b>	-0.15	<b>0.47**</b>	-0.08	-0.11	0.12	-0.04	-0.03	0.23	-7.46***	-4.19
	$R^2_{\text{cons}}$	-2.57	<b>1.92***</b>	-1.36	-1.95	<b>0.89***</b>	<b>1.34***</b>	<b>1.74***</b>	<b>1.54***</b>	-0.82	-0.86	-1.22	-1.81	-2.68	-1.39	-1.09	<b>1.73***</b>		
	$t-stat$	(0.53)	(-2.71)	(0.08)	(0.32)	(3.01)	(-1.83)	(-1.82)	(-2.06)	(0.20)	(2.00)	(2.00)	(-0.58)	(1.32)	(-0.85)	(0.89)	(1.57)		
Platinum	$\Delta R^2$	-0.04	-0.03	<b>0.24**</b>	-0.04	<b>0.11*</b>	<b>0.08*</b>	<b>0.03</b>	<b>0.12**</b>	-0.04	-0.04	-0.01	-0.04	0.03	0.00	<b>0.19**</b>	0.06	-16.45**	-38.00
	$R^2_{\text{cons}}$	-1.91	-0.72	-0.46	-0.63	-1.26	-1.12	-1.54	-0.79	<b>0.46***</b>	<b>0.37***</b>	-0.58	-2.41	-3.55	-2.03	-1.77	<b>0.00*</b>		
	$t-stat$	(0.11)	(-0.41)	(2.22)	(-0.04)	(1.94)	(-1.80)	(-1.41)	(-2.09)	(3.93)	(0.01)	(-0.87)	(0.09)	(1.33)	(-0.95)	(2.41)	(1.38)		
Silver	$\Delta R^2$	<b>0.41***</b>	-0.01	0.04	-0.03	0.00	<b>0.46***</b>	<b>0.43***</b>	0.03	0.01	<b>0.07**</b>	-0.01	<b>1.02***</b>	-0.01	<b>0.49***</b>	<b>0.09*</b>	<b>0.91***</b>	-17.99***	-29.59
	$R^2_{\text{cons}}$	-3.87	-1.00	-1.53	-1.13	-0.83	<b>0.92***</b>	<b>0.70***</b>	<b>0.15**</b>	-0.83	<b>0.32***</b>	-2.06	<b>2.23***</b>	-29.29	<b>1.67***</b>	-1.61	<b>0.08*</b>		
	$t-stat$	(-4.58)	(-0.78)	(1.33)	(-0.23)	(1.02)	(-4.84)	(-4.69)	(-1.59)	(1.28)	(2.08)	(0.80)	(5.67)	(0.84)	(3.95)	(1.90)	(4.49)		
Tin	$\Delta R^2$	0.00	-0.03	<b>0.87***</b>	-0.03	<b>0.26***</b>	0.01	0.01	-0.02	-0.02	0.00	-0.02	-0.03	<b>0.44***</b>	-0.02	0.04	<b>0.13*</b>	-16.54**	-35.57
	$R^2_{\text{cons}}$	-1.36	-1.20	<b>2.50***</b>	-1.15	-0.64	-0.67	-0.74	-2.20	-1.37	-1.98	-1.47	-1.49	-2.94	-1.34	-0.36	-0.80		
	$t-stat$	(-1.02)	(0.44)	(4.36)	(-0.39)	(2.92)	(-1.18)	(-1.18)	(-1.15)	(-0.49)	(1.06)	(0.74)	(0.11)	(4.29)	(-0.56)	(1.52)	(1.89)		
Zinc	$\Delta R^2$	<b>0.21***</b>	0.04	<b>0.10*</b>	-0.03	0.00	<b>0.11**</b>	<b>0.11**</b>	-0.02	-0.01	0.00	<b>0.29***</b>	0.01	0.03	-0.04	<b>0.18**</b>	<b>0.16**</b>	-19.53**	-20.50
	$R^2_{\text{cons}}$	-0.26	-0.70	-0.72	-1.04	-4.08	<b>0.66***</b>	<b>0.37***</b>	<b>1.37***</b>	-1.59	-1.36	-0.33	<b>0.74***</b>	-18.46	-1.97	-4.09	-3.77		
	$t-stat$	(-3.19)	(-1.44)	(1.72)	(0.45)	(0.98)	(-2.38)	(-2.45)	(-0.08)	(-0.81)	(1.05)	(-2.88)	(1.14)	(1.48)	(0.03)	(2.33)	(2.02)		

Table VII: Volatility Predictability (12 Months)

This table reports the regression results of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable(s). We predict the next year's volatility. Statistical inferences are based on a bootstrapped distribution. "de" denotes the dividend-payout ratio, " $\Delta\text{indpro}$ " the growth of industrial production, and " $\Delta\text{M1}$ " the growth of money supply M1. "dftr" is the default return spread as the difference between long-term U.S. BAA- and AAA-rated corporate bond returns and long-term U.S. government bond returns. "dfr" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "inft" the inflation rate, "lfr" the long-term U.S. government bond returns, "lty" the long-term U.S. government yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. " $\Delta R^2$  and  $R^2_{\text{cos}}$  are the in-sample difference between the adjusted  $R^2$ 's of the unrestricted and restricted model, and the out-of-sample  $R^2$ , respectively. We report the t-statistics of the respective predictive variables in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Statistic	de	$\Delta\text{indpro}$	$\Delta\text{M1}$	dfr	dfr	dy	ep	erp	inft	lfr	lty	swar	tbl	tms	unrate	MSA	MFC
Butter	$\Delta R^2$	0.00	<b>0.00***</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	$R^2_{\text{cos}}$	-3.53	-1.31	-0.88	-3.77	-4.07	-2.28	-2.28	-0.85	-1.46	-1.01	-1.52	-1.96	-7.90	-6.57	-2.27	-15.96*	-3,687.92*
	t - stat	(-0.26)	(-3.00)	(0.13)	(-0.87)	(-0.91)	(-0.96)	(-0.66)	(0.66)	(-0.98)	(0.30)	(0.82)	(0.95)	(-1.27)	(-1.27)	(0.97)		
Cocoa	$\Delta R^2$	<b>0.00**</b>	0.00	0.00	<b>0.01***</b>	<b>0.01***</b>	<b>0.01***</b>	<b>0.00*</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.01*</b>		-3,076.27
	$R^2_{\text{cos}}$	-2.81	-1.38	-2.35	-4.95	-1.80***	<b>2.09***</b>	-0.64	-0.64	-0.84	-1.80	-5.37	-15.07	-4.78	-6.10	-4.74	-20.37***	
	t - stat	(-2.19)	(-1.04)	(-0.55)	(-2.78)	(-3.39)	(-1.94)	(-0.47)	(-0.47)	(0.11)	(-1.05)	(-0.16)	(1.50)	(0.75)	(-1.36)	(-2.24)		
Coffee Arabica	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.01*</b>	<b>0.04***</b>	0.00		-2,034.13
	$R^2_{\text{cos}}$	-3.42	-1.06	-1.81	-2.30	-2.74	-6.21	-0.77	-0.77	-1.08	-1.40	-4.35	-48.20	-2.23	<b>2.33***</b>	<b>0.51**</b>	-35.07***	
	t - stat	(0.50)	(-0.38)	(1.22)	(-0.95)	(0.76)	(0.67)	(0.34)	(-0.68)	(-0.38)	(-0.44)	(-0.27)	(-0.68)	(-2.08)	(3.95)	(1.29)		
Corn	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	<b>0.01*</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-2,641.68
	$R^2_{\text{cos}}$	<b>0.71***</b>	-0.40	-0.69	-1.38	-0.82	-1.75	-2.71***	-1.38	-1.05	-1.40	-3.04	-32.03	-2.00	<b>0.45***</b>	<b>0.45***</b>	-15.72***	
	t - stat	(-1.23)	(0.28)	(0.18)	(0.70)	(-0.77)	(-2.08)	(-2.24)	(-1.25)	(-1.30)	(-1.25)	(-0.11)	(0.58)	(1.08)	(-2.02)	(-1.21)		
Cotton	$\Delta R^2$	0.00	<b>0.01***</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-1,426.53
	$R^2_{\text{cos}}$	-1.71	-0.23	-0.82	-1.21	-1.35	-1.52	-2.70	-0.34	-0.60	-1.34	-3.86	-13.95	-2.68	-2.00	-1.77	-19.53*	
	t - stat	(-1.61)	(-2.74)	(-0.36)	(-1.47)	(0.25)	(-0.99)	(-1.08)	(0.23)	(-1.06)	(-1.25)	(0.62)	(1.13)	(-0.78)	(1.51)	(-1.07)		
Live Cattle	$\Delta R^2$	0.00	<b>0.01***</b>	0.00	0.00	<b>0.01***</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-2,406.69
	$R^2_{\text{cos}}$	-2.91	-0.83	-0.32	-1.05	-3.28	-0.90	-0.33	-0.31	-0.59	-0.52	-0.67	-4.06	-3.90	-4.35	-1.14	-37.12***	
	t - stat	(0.49)	(-3.02)	(1.54)	(-0.48)	(-2.95)	(-1.05)	(-1.14)	(-1.60)	(-0.72)	(2.59)	(-0.61)	(-0.29)	(-0.48)	(-0.50)	(0.44)		
Lean Hog	$\Delta R^2$	0.00	<b>0.03***</b>	0.00	0.00	0.00	<b>0.01*</b>	<b>0.02***</b>	<b>0.00*</b>	0.00	0.00	0.00	<b>0.01**</b>	0.00	0.00	0.00		-1,658.20
	$R^2_{\text{cos}}$	-0.23	-1.31	-1.42	-0.79	-3.28	-2.20	-2.65	<b>0.46***</b>	-0.87	-1.01	-4.02	-1.82	-2.33	-3.17	-1.30	-18.65**	
	t - stat	(0.94)	(-3.78)	(0.19)	(1.15)	(0.33)	(-2.15)	(-2.27)	(-3.30)	(-0.90)	(-1.35)	(-0.01)	(-0.50)	(2.10)	(-0.37)	(-0.28)		
Milk	$\Delta R^2$	0.00	<b>0.00***</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-2,538.21
	$R^2_{\text{cos}}$	-6.18	-1.08	-0.83	-0.52	-3.56	-3.85	-2.68	-1.17	-1.86	-1.47	-4.13	-5.60	-4.75	-2.77	-2.97	-21.83**	
	t - stat	(-0.80)	(-3.04)	(1.00)	(1.26)	(-1.46)	(-1.69)	(-1.31)	(0.83)	(-0.67)	(0.29)	(0.46)	(0.11)	(0.97)	(-1.23)	(-1.95)		
Oranges	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	<b>0.01*</b>	0.00	<b>0.01**</b>	0.00	<b>0.01*</b>	0.00	0.00	0.00	0.00	0.00		-1,226.45
	$R^2_{\text{cos}}$	-3.98	-1.75	-1.20	-1.42	-3.52	-3.15	-2.62	-2.24	-0.38	-0.94	-0.58	-3.03	-2.97	-2.43	-2.99	-23.08**	
	t - stat	(-0.99)	(0.87)	(-0.44)	(0.29)	(-1.36)	(-2.11)	(-1.83)	(-1.28)	(2.11)	(0.54)	(-1.87)	(0.99)	(-0.50)	(0.04)	(1.89)		
Soybean Oil	$\Delta R^2$	0.00	0.00	0.00	<b>0.00*</b>	<b>0.01***</b>	<b>0.01***</b>	<b>0.01***</b>	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.00**</b>	<b>0.02***</b>		-3,432.63
	$R^2_{\text{cos}}$	-0.94	-1.59	-0.93	-1.40	-4.85	<b>1.12***</b>	<b>3.14***</b>	-1.73	-0.47	-1.30	-5.43	-13.20	-2.78	-3.18	-3.82	-12.67**	
	t - stat	(-0.23)	(0.10)	(0.18)	(0.50)	(-1.96)	(-2.64)	(-2.67)	(-2.74)	(-0.25)	(0.41)	(-0.10)	(-0.33)	(0.66)	(0.65)	(-2.17)		
Soybeans	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.01*</b>	0.00	0.00	0.00	0.00	<b>0.01**</b>	0.00	0.00	0.00		-2,238.73
	$R^2_{\text{cos}}$	-2.59	-0.66	-0.35	-0.58	-1.73	-0.90	-1.14	<b>0.62***</b>	-1.94	-0.32	-0.17	-3.45	-2.42	-0.83	-2.12	-22.22***	
	t - stat	(0.17)	(-0.22)	(0.87)	(-0.63)	(0.81)	(-1.84)	(-1.88)	(-2.14)	(-0.41)	(-0.65)	(-0.69)	(2.12)	(-1.31)	(1.58)	(-1.66)		
Soybean Meal	$\Delta R^2$	0.00	0.00	<b>0.01*</b>	0.00	0.00	<b>0.02**</b>	<b>0.01**</b>	<b>0.00*</b>	0.00	0.00	0.00	0.00	0.00	0.00	0.00		-2,263.99
	$R^2_{\text{cos}}$	-1.61	<b>0.02*</b>	-0.51	-0.95	-3.43	-0.46	-1.47	<b>1.09***</b>	-0.99	-0.69	-0.43	-7.49	<b>2.29***</b>	-3.67	-1.37	-10.80**	
	t - stat	(-1.48)	(0.62)	(1.77)	(0.13)	(-1.28)	(-2.95)	(-2.78)	(-2.05)	(1.59)	(-1.01)	(-0.80)	(-0.92)	(-0.30)	(-1.66)	(2.06)		
Sugar	$\Delta R^2$	0.00	<b>0.00**</b>	<b>0.00**</b>	0.00	0.00	0.00	0.00	0.00	<b>0.00***</b>	0.00	0.00	0.00	0.00	0.00	0.00		-3,325.81
	$R^2_{\text{cos}}$	-6.57	-0.08	-1.88	-1.27	-7.85	-2.20	-2.81	-1.53	-0.39	-1.35	-2.77	-2.71	-2.28	-5.30	-4.13	-16.05**	
	t - stat	(1.28)	(2.08)	(-1.92)	(-0.20)	(-0.37)	(-0.50)	(-0.43)	(-1.60)	(0.30)	(2.84)	(0.76)	(0.07)	(1.56)	(1.07)	(-1.14)		



Table VIII: Time-Variation in Return Predictability (1 Month)

This table summarizes the results about the time-variation in the in-sample return predictability. We predict the next month's excess return. We report the adjusted  $R^2$ 's of a kitchen sink approach. We consider three different events. First, the introduction of futures. Second, the introduction of options. Third, the beginning of the global financial crisis in December 2007. "Start" denotes the starting point of trading futures and options, respectively. " $R^2$  (prior)" and " $R^2$  (after)" indicate the in-sample  $R^2$  prior to and after the time point of introduction, respectively. We use 120 observations to compute the  $R^2$ 's. Here, we impose the restriction that at least 10 years of observations must be available. In the case of the global financial crisis, 97 observations are used. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Panel (A): Introduction of Derivatives Trading:				Panel (B):				
	Futures		Options		Financial Crisis				
	Start	$R^2$ (prior)	$R^2$ (after)	Start	$R^2$ (prior)	$R^2$ (after)	Start	$R^2$ (prior)	$R^2$ (after)
Butter	09.2005	-5.46	<b>12.15**</b>	03.1990	-1.18	-2.69	12.2007	2.32	<b>12.35**</b>
Cocoa	07.1959	4.31	3.34				12.2007	-1.62	5.50
Coffee Arabica	05.2006						12.2007	3.27	-0.95
Corn Oil							12.2007	<b>22.83***</b>	<b>25.60***</b>
Cotton	07.1959	1.79	-5.12	01.1990	2.64	4.27	12.2007	<b>8.86*</b>	0.02
Live Cattle	11.1964	3.40	5.77	10.1984	-0.10	-1.45	12.2007	<b>8.46*</b>	7.63
Lean Hog	02.1996	-2.35	-3.50				12.2007	-1.45	-1.87
Milk	01.1996	0.27	5.23	01.1996	0.27	5.23	12.2007	5.88	<b>26.64***</b>
Oranges	02.1967	-6.89	-2.81	03.1990	-7.98	-1.74	12.2007	1.19	-2.72
Soybean Oil	07.1959	-1.59	<b>6.70*</b>	02.1989	-2.14	<b>11.33**</b>	12.2007	-4.53	-0.30
Soybeans	07.1959	-4.46	2.37	02.1989	<b>9.78**</b>	<b>9.41**</b>	12.2007	-7.08	-5.25
Soybean Meal	07.1959	-2.09	-3.28	02.1989	<b>13.59**</b>	<b>14.40***</b>	12.2007	-2.63	-10.38
Sugar	01.1961	-6.67	2.12	03.1990	-0.87	<b>12.19**</b>	12.2007	<b>9.48*</b>	-0.45
Wheat	07.1959	-4.14	-4.29	02.1989	5.96	<b>5.89*</b>	12.2007	3.03	2.18
Wool							12.2007	5.63	<b>12.34*</b>
Yellow Corn	07.1959	-0.93	-3.54	02.1989	<b>7.41*</b>	<b>14.76***</b>	12.2007	6.36	1.25
Coal	07.2001	-1.24	<b>9.61*</b>				12.2007	5.35	<b>17.92**</b>
Heating Oil	11.1978	<b>12.48**</b>	-3.47	02.1989	-3.71	-1.20	12.2007	4.41	<b>19.23***</b>
Natural Gas	04.1990	-1.25	<b>9.39**</b>	10.1992	4.27	1.77	12.2007	10.03	<b>37.10***</b>
Unleaded Regular Gas	10.2005	2.83	7.69	10.2005	2.83	7.69	12.2007	-1.30	<b>11.87*</b>
WTI Oil	03.1983	<b>19.20***</b>	2.27	01.1989	5.29	6.41	12.2007	2.67	<b>24.11***</b>
Aluminium	05.2002	<b>13.73**</b>	<b>10.39*</b>				12.2007	<b>10.61*</b>	<b>12.59*</b>
Gold	12.1974	<b>16.57***</b>	<b>9.90**</b>	09.1988	<b>7.50*</b>	5.07	12.2007	4.83	<b>16.59***</b>
High Grade Copper	07.1959	-3.28	-3.08	06.1990	<b>16.80***</b>	-2.21	12.2007	-1.62	<b>27.09***</b>
Nickel	03.2015						12.2007	6.81	<b>10.68*</b>
Palladium	01.1977		4.55	01.1968		<b>6.63*</b>	12.2007	-4.49	0.38
Platinum	03.1968	5.36	1.01	10.1990	-6.66	0.33	12.2007	2.23	8.80
Silver	06.1963	1.21	0.94	03.1989	<b>9.71**</b>	2.16	12.2007	1.23	7.08
Tin							12.2007	5.74	2.07
Zinc							12.2007	0.18	<b>11.08*</b>



Table IX: Time-Variation in Return Predictability (12 Months)

This table summarizes the results about the time-variation in the in-sample return predictability. We predict the next year's excess return. We report the adjusted  $R^2$ s of a kitchen sink approach. We consider three different events. First, the introduction of futures. Second, the introduction of options. Third, the beginning of the global financial crisis in December 2007. "Start" denotes the starting point of trading futures and options, respectively. " $R^2$  (prior)" and " $R^2$  (after)" indicate the in-sample  $R^2$  prior to and after the time point of introduction, respectively. We use 120 observations to compute the  $R^2$ s. Here, we impose the restriction that at least 10 years of observations must be available. In the case of the global financial crisis, 97 observations are used. \*, \*\*, \*\*\* indicate the significance at the 10%, 5%, and 1% significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Panel (A): Introduction of Derivatives Trading:				Panel (B):				
	Futures		Options		Financial Crisis				
	Start	$R^2$ (prior)	$R^2$ (after)	Start	$R^2$ (prior)	$R^2$ (after)	Start	$R^2$ (prior)	$R^2$ (after)
Butter	09.2005	23.68***	26.49***	03.1990	41.49***	47.57***	12.2007	22.66***	28.23***
Cocoa	07.1959	48.61***	18.25***				12.2007	38.53***	43.60***
Coffee Arabica	05.2006						12.2007	60.58***	35.83***
Corn Oil							12.2007	27.03***	55.34***
Cotton	07.1959	48.78***	38.79***	01.1990	22.20***	57.74***	12.2007	63.53***	39.04***
Live Cattle	11.1964	34.33***	28.98***	10.1984	45.79***	23.11***	12.2007	47.54***	41.54***
Lean Hog	02.1996	51.12***	21.67***				12.2007	39.71***	41.26***
Milk	01.1996	42.49***	28.19***	01.1996	42.49***	28.19***	12.2007	33.38***	61.44***
Oranges	02.1967	11.25**	6.79*	03.1990	29.55***	8.36*	12.2007	14.49**	40.52***
Soybean Oil	07.1959	35.57***	-0.06	02.1989	55.11***	39.10***	12.2007	60.21***	70.36***
Soybeans	07.1959	21.56***	11.48**	02.1989	54.86***	32.95***	12.2007	58.08***	63.48***
Soybean Meal	07.1959	41.90***	28.93***	02.1989	39.59***	10.50**	12.2007	42.75***	39.24***
Sugar	01.1961	38.82***	65.50***	03.1990	33.34***	44.31***	12.2007	35.54***	69.03***
Wheat	07.1959	44.40***	-4.58	02.1989	47.84***	34.33***	12.2007	32.05***	54.18***
Wool							12.2007	48.07***	32.76***
Yellow Corn	07.1959	49.87***	12.95***	02.1989	43.35***	25.91***	12.2007	51.09***	50.40***
Coal	07.2001	11.53**	8.41*				12.2007	23.17***	65.01***
Heating Oil	11.1978	29.05***	27.55***	02.1989	25.91***	19.33***	12.2007	32.31***	80.70***
Natural Gas	04.1990	47.08***	21.28***	10.1992	41.40***	16.03***	12.2007	20.36**	63.45***
Unleaded Regular Gas	10.2005	25.45***	59.32***	10.2005	25.45***	59.32***	12.2007	27.32***	79.02***
WTI Oil	03.1983	59.24***	38.01***	01.1989	46.23***	27.31***	12.2007	26.27***	80.41***
Aluminium	05.2002	33.47***	17.27***				12.2007	47.20***	62.90***
Gold	12.1974	68.36***	53.26***	09.1988	68.27***	46.94***	12.2007	47.10***	77.58***
High Grade Copper	07.1959	52.41***	57.36***	06.1990	49.13***	46.84***	12.2007	44.74***	83.51***
Nickel	03.2015						12.2007	18.84***	73.08***
Palladium	01.1977		66.09***	01.1968		42.00***	12.2007	26.27***	78.53***
Platinum	03.1968	11.02**	29.45***	10.1990	7.31*	57.70***	12.2007	33.46***	86.49***
Silver	06.1963	57.03***	71.50***	03.1989	31.03***	47.03***	12.2007	43.52***	54.83***
Tin							12.2007	59.50***	59.50***
Zinc							12.2007	28.51***	78.44***

Table X: Time-Variation in Volatility Predictability (1 Month)

This table summarizes the results about the time-variation in the in-sample volatility predictability. We predict the next month's volatility. We report the differences between the adjusted  $R^2$ 's of the unrestricted and restricted model based on a kitchen sink approach. We consider three different events. First, the introduction of futures. Second, the introduction of options. Third, the beginning of the global financial crisis in December 2007. "Start" denotes the starting point of trading futures and options, respectively. " $\Delta R^2$  (prior)" and " $\Delta R^2$  (after)" indicate the in-sample  $R^2$  difference prior to and after the time point of introduction, respectively. We use 120 observations to compute the  $\Delta R^2$ 's. Here, we impose the restriction that at least 10 years of observations must be available. In the case of the global financial crisis, 97 observations are used. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Panel (A): Introduction of Derivatives Trading:				Panel (B): Financial Crisis				
	Start	$\Delta R^2$ (prior)	$\Delta R^2$ (after)	Start	$\Delta R^2$ (prior)	$\Delta R^2$ (after)	Start	$\Delta R^2$ (prior)	$\Delta R^2$ (after)
Butter	09.2005	0.45	1.38	03.1990	5.48	16.08***	12.2007	-1.05	8.44
Cocoa	07.1959	9.15**	5.06				12.2007	16.20***	17.13***
Coffee Arabica	05.2006						12.2007	1.75	-0.63
Corn Oil							12.2007	10.90**	18.10***
Cotton	07.1959	0.63	5.75*	01.1990	-2.67	1.33	12.2007	3.07	4.97
Live Cattle	11.1964	4.07	24.43***	10.1984	12.29**	15.73***	12.2007	22.73***	24.80***
Lean Hog	02.1996	5.99	-0.89	01.1996	1.21	4.27	12.2007	-1.06	2.91
Milk	01.1996	1.21	4.27	01.1996	1.21	4.27	12.2007	-1.43	-0.11
Oranges	02.1967	5.07	-1.92	03.1990	1.63	0.00	12.2007	-3.22	2.73
Soybean Oil	07.1959	5.79*	-3.87	02.1989	-0.85	1.31	12.2007	2.13	14.33***
Soybeans	07.1959	3.87	-4.64	02.1989	9.85***	6.62	12.2007	6.03	5.29
Soybean Meal	07.1959	9.81**	-3.30	02.1989	-0.08	1.21	12.2007	-0.41	0.99
Sugar	01.1961	2.39	1.67	03.1990	0.04	0.20	12.2007	3.15	5.76**
Wheat	07.1959	6.08*	-0.77	02.1989	1.26	2.59	12.2007	-0.17	0.52
Wool							12.2007	4.72	16.31**
Yellow Corn	07.1959	4.23	3.55	02.1989	2.09	3.98	12.2007	0.45	0.88
Coal	07.2001	9.87**	20.40***				12.2007	10.47**	28.32***
Heating Oil	11.1978			02.1989	6.28**	4.44	12.2007	-1.88	16.14***
Natural Gas	04.1990	4.75	-0.23	10.1992	12.04**	1.10	12.2007	8.60	8.56
Unleaded Regular Gas	10.2005	4.92	10.64**	10.2005	4.92	10.64**	12.2007	4.01	14.78***
WTI Oil	03.1983	2.63	2.70*	01.1989	2.65**	2.93	12.2007	0.03	19.65***
Aluminium	05.2002	1.61	24.11***				12.2007	12.14**	15.04***
Gold	12.1974	18.17***	9.36***	09.1988	8.61***	4.20	12.2007	15.08**	13.67***
High Grade Copper	07.1959	1.69	3.07	06.1990	2.16	-0.17	12.2007	2.29	12.54***
Nickel	03.2015						12.2007	13.14**	8.25
Palladium	01.1977			01.1968			12.2007	4.25	15.18**
Platinum	03.1968	-1.23	0.36	10.1990	0.12	4.51	12.2007	-0.07	0.42
Silver	06.1963	0.29	9.39***	03.1989	3.93	4.95	12.2007	0.87	3.93
Tin							12.2007	-2.07	7.71**
Zinc							12.2007	11.96***	23.23***

Table XI: Time-Variation in Volatility Predictability (12 Months)

This table summarizes the results about the time-variation in the in-sample volatility predictability. We predict the next year's volatility. We report the differences between the adjusted  $R^2$ 's of the unrestricted and restricted model based on a kitchen sink approach. We consider three different events. First, the introduction of futures. Second, the introduction of options. Third, the beginning of the global financial crisis in December 2007. "Start" denotes the starting point of trading futures and options, respectively. " $\Delta R^2$  (prior)" and " $\Delta R^2$  (after)" indicate the in-sample  $R^2$  difference prior to and after the time point of introduction, respectively. We use 120 observations to compute the  $\Delta R^2$ 's. Here, we impose the restriction that at least 10 years of observations must be available. In the case of the global financial crisis, 97 observations are used. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Panel (A): Introduction of Derivatives Trading:			Panel (B):		
	Start	$\Delta R^2$ (prior)	$\Delta R^2$ (after)	Start	$\Delta R^2$ (prior)	$\Delta R^2$ (after)
Butter	09.2005	0.56**	0.75***	12.2007	0.79***	0.26
Cocoa	07.1959	0.19	0.27	12.2007	0.52***	0.86***
Coffee Arabica	05.2006			12.2007	1.27***	0.21
Corn Oil	07.1959	0.53***	0.53	12.2007	0.74***	0.67***
Cotton	11.1964	0.52**	0.25***	12.2007	0.22	0.19
Live Cattle	02.1996	0.77*	0.47	12.2007	0.70***	0.86**
Lean Hog	01.1996	0.51***	0.33	12.2007	0.75	0.27
Milk	02.1967	0.61	0.58***	12.2007	0.30	0.70
Oranges	07.1959	0.19	-0.01	12.2007	1.99***	-0.97
Soybean Oil	07.1959	0.43***	0.45*	12.2007	-0.17	0.32***
Soybeans	07.1959	0.39	0.22	12.2007	0.56**	0.29
Soybean Meal	01.1961	1.04***	0.83***	12.2007	0.44**	0.89**
Sugar	07.1959	0.29	0.32	12.2007	0.72**	0.33***
Wheat				12.2007	0.33***	0.54***
Wool				12.2007	0.19	1.16**
Yellow Corn	07.1959	0.63	1.49***	12.2007	0.74**	0.54
Coal	07.2001	0.42	0.38**	12.2007	-0.01	0.43***
Heating Oil	11.1978			12.2007	1.29**	1.41***
Natural Gas	04.1990	0.35**	0.20	12.2007	0.22	2.07***
Unleaded Regular Gas	10.2005	0.28	1.03***	12.2007	0.38	1.64***
WTI Oil	03.1983	0.79***	0.36**	12.2007	1.00	1.13***
Aluminium	05.2002	0.63*	0.20	12.2007	0.17	0.80*
Gold	12.1974	0.22***	0.51***	12.2007	0.89**	1.08**
High Grade Copper	07.1959	0.02	0.40*	12.2007	1.15***	1.25***
Nickel	03.2015			12.2007	0.21	0.81**
Palladium	01.1977			12.2007	0.07	0.81**
Platinum	03.1968	0.35*	0.35***	12.2007	1.52***	1.63***
Silver	06.1963	0.55***	0.30***	12.2007	0.76***	0.70**
Tin				12.2007	1.05**	0.84***
Zinc				12.2007	0.39	0.77***

Table XII: Return Predictability and Business Cycle Stages (12 Months)

This table reports the in-sample  $R^2$ s of a regression of monthly excess returns on a constant and the lagged predictive variable across business cycle stages. We predict the next year's excess return. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "itr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider two business cycle stages. "Exp" denotes expansion, and "Rec" recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	de		Δindpro		ΔM1		dfr		dfy		dp		dy		ep	
	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec
Butter	0.01	0.00	0.30	1.43*	0.50*	5.67***	0.05	0.39	0.92***	0.34	0.03	2.08***	0.04	2.91***	0.01	2.19***
Cocoa	0.17	0.23	0.11	1.40*	0.11	0.14	0.00	0.03	0.03	0.49	0.01	0.71*	0.03	0.53	0.20	0.24
Coffee Arabica	0.93**	0.06	0.11	8.63***	0.69*	0.26	0.25	0.28	2.82***	0.13	0.34	0.49	0.35	0.31	0.00	0.29
Corn Oil	0.86***	0.00	0.05	0.33	0.19	0.08	0.01	0.09	1.80***	0.00	0.16	0.00	0.21	0.09	1.14***	0.00
Cotton	2.28***	0.08	1.23***	0.48	2.14***	1.17	0.01	0.09	4.46***	3.98***	1.63***	0.26	1.62***	0.35	0.12	0.66*
Live Cattle	1.18***	0.09	0.90***	0.02	0.29	4.46**	0.29	0.08	3.54***	6.32***	0.19	0.01	0.18	0.04	0.09	0.15
Lean Hog	0.54**	3.22***	0.58**	0.15	0.04	0.38	0.01	0.14	2.47***	0.83	0.00	0.10	0.00	0.11	0.35**	3.87***
Milk	0.04	0.07	0.42*	0.82	0.04	3.10*	0.01	0.09	0.56***	0.74	1.62***	3.52***	1.63***	4.96***	2.51***	4.71***
Oranges	0.23	0.09	0.02	1.49*	0.00	0.16	0.03	0.15	0.45*	3.35***	0.00	0.54	0.00	0.27	0.08	1.07*
Soybean Oil	0.55**	3.89***	0.65**	1.15	0.29	0.21	0.04	0.25	0.87***	4.71***	0.03	1.60**	0.02	2.46***	0.09	0.09
Soybeans	1.03***	0.91	1.45***	1.17*	0.13	0.00	0.04	0.01	2.91***	3.55***	0.00	0.38	0.00	0.76	0.40*	0.02
Soybean Meal	0.56**	0.96	0.28	0.14	0.28	0.52	0.01	0.09	1.37***	3.45***	0.08	0.74	0.06	1.42	0.68**	0.01
Sugar	0.13	0.08	0.00	0.12	0.02	0.04	0.03	0.11	0.00	0.46	0.11	0.49*	0.14	0.50	0.01	1.06**
Wheat	0.25	2.88***	0.49**	1.28*	0.13	0.04	0.15	0.10	0.37*	4.44***	0.05	0.06	0.06	0.13	0.02	1.59***
Wool	0.12	4.57***	0.97***	0.57	0.72**	0.12	0.10	0.19	1.49***	7.35***	0.01	0.20	0.01	0.45	0.02	1.85***
Yellow Corn	0.00	0.09	0.29	0.46	0.32	0.12	0.11	0.25	2.15***	0.59	0.00	0.17	0.00	0.08	0.00	0.03
Coal	3.94***	2.18*	0.06	0.52	0.37	0.44	0.01	0.11	0.04	2.08*	2.96***	2.92**	2.95***	2.70*	0.48**	8.96***
Heating Oil	4.56***	1.99	0.05	0.70	0.16	0.08	0.24	0.02	2.53**	2.59	4.02***	4.89*	4.07***	4.64*	0.94*	5.95**
Natural Gas	0.39	0.31	0.30	0.45	0.90*	8.77**	0.34	1.81	0.67	0.75	5.91***	5.47	6.13***	4.88	5.13***	5.41
Unleaded Regular Gas	2.30***	9.32**	0.15	1.74	0.34	0.05	0.20	0.06	2.20**	2.59	9.32***	0.81	9.42***	0.62	6.10***	2.58
WTI Oil	1.86***	1.42***	0.39*	2.84**	0.00	0.09	0.05	0.54	0.01	0.05	1.52***	0.61	1.50***	0.69*	0.16	0.04
Aluminum	1.72***	1.59**	0.10	0.10	0.38	0.34	0.28	0.00	0.11	0.11	0.00	1.50**	0.00	1.51**	0.88***	0.06
Gold	1.66***	3.29***	0.00	1.43*	2.09***	0.11	0.08	0.22	0.05	5.35***	0.60***	0.41	0.57**	0.57*	0.00	5.53***
High Grade Copper	0.01	2.50***	0.13	0.02	1.72***	2.64*	0.16	0.21	0.03	2.91***	1.86***	2.49***	1.73***	3.21***	2.67***	0.09
Nickel	1.38**	0.38	0.28	0.53	0.01	0.09	0.61	0.00	0.99*	0.45	0.76	2.81	0.83	2.57	3.20***	2.97
Palladium	0.78*	1.60	0.62	0.97	0.00	0.00	0.00	0.75	7.88***	7.24**	1.10**	13.15***	1.00*	13.58***	0.45	8.40***
Platinum	0.05	3.23***	0.20	2.61**	0.75**	0.47	0.03	0.14	0.00	0.00	0.04	0.79	0.03	0.91	0.14	0.31
Silver	1.02***	0.50	0.25	1.00	0.20	0.36	0.01	0.02	1.07***	2.33**	0.05	0.77**	0.06	0.98**	0.23	0.11
Tin	0.61***	10.09***	0.79**	0.00	0.00	0.42	0.14	0.07	0.15	21.47***	0.22	2.81***	0.19	3.00***	0.00	1.07**
Zinc	0.42**	1.53***	0.56**	0.01	0.05	0.45	0.01	0.06	0.95***	2.06**	0.37**	1.41***	0.37**	1.50***	1.38***	0.03

Table XII: Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	erp		infl		ltr		lty		svar		tbl		tms		unrate	
	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec
<i>Butter</i>	0.18	<b>2.18***</b>	0.01	0.28	0.21	0.07	<b>3.57***</b>	0.02	<b>0.67**</b>	0.30	<b>5.18***</b>	<b>1.03***</b>	0.20	0.14	<b>2.76*</b>	
<i>Cocoa</i>	0.16	<b>0.51*</b>	<b>0.70**</b>	0.06	0.05	0.62	<b>3.21***</b>	0.85	<b>0.29*</b>	<b>1.17**</b>	<b>3.98***</b>	0.33	<b>6.36***</b>	0.15	0.85	
<i>Coffee Arabica</i>	0.02	1.34	0.10	1.24	0.13	0.45	0.05	<b>3.51*</b>	0.22	<b>7.67***</b>	<b>3.61***</b>	<b>8.17***</b>	<b>3.69*</b>	<b>6.38***</b>	0.40	
<i>Corn Oil</i>	0.17	<b>1.90**</b>	0.04	0.00	0.00	<b>2.20**</b>	<b>3.10***</b>	0.08	<b>1.19***</b>	0.01	<b>2.93***</b>	0.01	0.15	0.08	0.34	
<i>Cotton</i>	0.06	0.39	<b>0.39**</b>	<b>1.03**</b>	0.00	0.85	<b>2.02***</b>	0.88	0.19	<b>1.15**</b>	<b>4.30***</b>	<b>2.38***</b>	<b>5.15***</b>	<b>0.67**</b>	2.48	
<i>Live Cattle</i>	0.00	0.46	<b>0.30*</b>	0.09	0.11	0.20	<b>6.41***</b>	<b>2.69***</b>	<b>2.57***</b>	<b>5.14***</b>	<b>10.54***</b>	<b>3.06***</b>	0.08	0.13	<b>3.82**</b>	
<i>Lean Hog</i>	0.03	0.03	0.08	0.41	0.02	0.00	<b>3.86***</b>	<b>2.40**</b>	<b>0.57**</b>	0.07	<b>4.56***</b>	0.25	<b>1.25*</b>	<b>5.20***</b>	1.49	
<i>Milk</i>	0.08	<b>3.73***</b>	<b>0.79***</b>	0.13	0.23	0.54	<b>8.04***</b>	0.00	<b>0.96***</b>	<b>2.77***</b>	<b>8.07***</b>	0.08	<b>2.69**</b>	<b>0.85**</b>	1.47	
<i>Oranges</i>	0.01	<b>1.28*</b>	0.13	0.10	0.09	0.07	<b>2.91***</b>	1.08	0.08	<b>1.52*</b>	<b>3.88***</b>	<b>0.56**</b>	0.25	0.01	0.64	
<i>Soybean Oil</i>	0.03	<b>3.03***</b>	0.00	<b>3.79***</b>	0.01	<b>2.24**</b>	<b>1.67***</b>	0.52	0.21	<b>3.56***</b>	<b>2.49***</b>	<b>0.52**</b>	<b>3.73***</b>	<b>0.49*</b>	0.01	
<i>Soybeans</i>	0.14	<b>1.92**</b>	0.02	0.58	0.00	1.17	<b>3.47***</b>	0.24	<b>2.36***</b>	<b>2.23**</b>	<b>5.48***</b>	<b>1.55***</b>	<b>4.28***</b>	0.21	0.46	
<i>Soybean Meal</i>	0.30	<b>3.06**</b>	<b>0.79***</b>	0.00	0.08	0.97	<b>1.76***</b>	0.65	0.22	<b>2.04**</b>	<b>2.95***</b>	<b>1.16***</b>	<b>3.79**</b>	0.02	0.08	
<i>Sugar</i>	0.20	0.01	<b>0.40**</b>	0.01	0.21	0.03	0.00	0.70	0.02	0.01	0.00	0.00	0.89	0.17	1.53	
<i>Wheat</i>	0.08	0.51	0.17	<b>0.62*</b>	0.01	0.89	<b>2.36***</b>	<b>1.29*</b>	<b>0.48**</b>	0.30	<b>3.42***</b>	<b>0.69**</b>	<b>10.79***</b>	0.40	1.28	
<i>Wool</i>	0.00	<b>1.49**</b>	0.11	<b>4.61***</b>	0.08	0.26	<b>0.79**</b>	<b>3.30**</b>	<b>0.34*</b>	<b>3.39***</b>	<b>2.46***</b>	<b>2.36***</b>	<b>9.12***</b>	<b>1.22***</b>	0.05	
<i>Yellow Corn</i>	0.01	<b>0.57*</b>	0.05	0.02	0.01	<b>1.30*</b>	<b>3.89***</b>	0.01	<b>2.28***</b>	0.01	<b>4.26***</b>	0.12	<b>2.09**</b>	<b>0.77**</b>	1.26	
<i>Coal</i>	0.00	0.18	0.05	<b>7.54***</b>	0.19	0.74	<b>0.91***</b>	0.02	0.28	0.00	<b>0.86**</b>	0.00	<b>22.26***</b>	<b>0.75**</b>	<b>2.35*</b>	
<i>Heating Oil</i>	0.01	0.08	0.07	2.79	<b>0.75*</b>	0.36	<b>8.10***</b>	0.48	0.03	0.08	<b>3.80***</b>	0.53	<b>21.68***</b>	<b>4.27***</b>	0.67	
<i>Natural Gas</i>	0.21	1.44	0.07	0.05	0.06	1.07	<b>4.25***</b>	<b>15.06***</b>	0.09	0.20	<b>3.15***</b>	0.03	<b>6.06*</b>	<b>2.99***</b>	4.64	
<i>Unleaded Regular Gas</i>	0.01	0.81	<b>2.75***</b>	0.53	<b>0.78*</b>	1.27	<b>15.88***</b>	0.30	0.14	2.14	<b>9.36***</b>	0.10	<b>10.06**</b>	<b>9.78***</b>	0.20	
<i>WTI Oil</i>	0.00	0.03	<b>0.38*</b>	0.02	0.08	0.17	0.07	0.74	0.16	0.07	0.03	<b>1.21*</b>	1.12	<b>1.74***</b>	1.84	
<i>Aluminum</i>	0.04	0.01	<b>1.32***</b>	0.13	<b>1.01***</b>	0.09	<b>0.35*</b>	<b>1.55*</b>	0.00	0.02	<b>1.32***</b>	<b>1.51***</b>	0.09	0.10	0.94	
<i>Gold</i>	0.03	0.33	<b>0.56**</b>	<b>0.95**</b>	0.06	0.00	0.06	<b>1.75**</b>	0.01	<b>10.75***</b>	0.05	0.00	<b>5.54***</b>	0.00	<b>4.01**</b>	
<i>High Grade Copper</i>	<b>0.28*</b>	<b>1.38***</b>	0.10	<b>1.16**</b>	0.19	1.24	<b>3.74***</b>	<b>3.19***</b>	<b>0.72***</b>	0.11	<b>7.23***</b>	<b>3.22***</b>	<b>4.62***</b>	0.27	0.05	
<i>Nickel</i>	0.13	0.23	0.01	3.73	<b>1.97**</b>	4.99	<b>2.33***</b>	0.03	<b>3.32**</b>	2.82	<b>4.40***</b>	<b>2.14**</b>	0.58	0.32	0.07	
<i>Palladium</i>	<b>0.72*</b>	0.55	0.01	1.09	0.30	0.89	<b>5.60***</b>	<b>15.79***</b>	0.22	<b>6.12**</b>	<b>3.90***</b>	0.00	<b>3.98*</b>	<b>1.34**</b>	<b>8.82**</b>	
<i>Platinum</i>	0.26	0.21	0.19	<b>1.98**</b>	0.06	0.00	<b>1.29***</b>	1.00	0.00	<b>1.05*</b>	<b>2.50***</b>	<b>1.07***</b>	<b>3.23**</b>	0.01	0.96	
<i>Silver</i>	0.03	<b>0.54*</b>	<b>0.42**</b>	<b>1.11**</b>	0.01	<b>1.68*</b>	<b>0.50**</b>	0.28	0.00	0.55	<b>0.42*</b>	0.01	<b>11.65***</b>	0.40	<b>7.46***</b>	
<i>Tin</i>	0.15	0.18	0.22	<b>3.26***</b>	0.20	0.17	<b>3.54***</b>	<b>4.45***</b>	<b>0.34*</b>	<b>9.31***</b>	<b>4.15***</b>	0.19	<b>15.11***</b>	0.20	1.75	
<i>Zinc</i>	0.01	0.01	<b>0.53**</b>	0.05	0.08	1.16	<b>2.20***</b>	0.35	<b>0.61**</b>	0.24	<b>4.07***</b>	<b>1.71***</b>	0.31	0.43	0.05	

Table XIII: Volatility Predictability and Business Cycle Stages (12 Months)

This table reports the in-sample  $\Delta R^2$ 's of a regression of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable across business cycle stages. We predict the next year's volatility. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "inff" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider two business cycle stages. "Exp" denotes expansion, and "Rec" recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	de		Δindpro		ΔM1		dfr		dfy		dp		dy		ep	
	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec
Butter	0.00	0.01	0.00	-0.07	0.00	0.02	0.00	-0.06	0.00	-0.06	0.00	-0.04	0.00	-0.04	0.00	0.01
Cocoa	0.00	-0.01	0.00	-0.04	0.00	-0.11	0.00	-0.02	0.01	0.03	0.01**	0.01	0.01**	0.01	0.01**	0.01
Coffee Arabica	<b>0.02*</b>	-0.13	0.00	-0.07	<b>0.01*</b>	-0.13	0.00	-0.09	-0.01	-0.04	0.00	-0.07	0.00	-0.07	0.00	-0.08
Corn Oil	0.00	-0.05	0.00	0.06	0.00	-0.04	0.00	-0.04	0.00	-0.04	0.01	0.07	0.01	0.10	0.01	<b>0.17*</b>
Cotton	0.00	-0.01	0.00	-0.02	<b>0.01*</b>	-0.07	0.00	0.07	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.00
Live Cattle	0.00	-0.01	<b>0.01*</b>	<b>0.15**</b>	0.00	-0.11	0.00	0.09	0.00	-0.04	0.00	-0.01	0.00	-0.01	0.00	0.00
Lean Hog	0.00	-0.02	0.00	-0.02	-0.01	-0.14	0.01	-0.07	-0.01	-0.07	0.01	<b>0.08*</b>	<b>0.01*</b>	<b>0.12**</b>	<b>0.03**</b>	<b>0.15**</b>
Milk	0.00	-0.01	0.00	0.02	0.00	<b>0.26**</b>	0.00	-0.04	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02
Oranges	0.00	-0.04	0.00	0.05	-0.01	-0.07	0.00	<b>0.10*</b>	0.00	-0.03	<b>0.02*</b>	-0.03	<b>0.01*</b>	-0.04	<b>0.01*</b>	-0.04
Soybean Oil	0.00	-0.03	0.00	-0.02	0.00	-0.07	0.00	-0.03	<b>0.03***</b>	0.08	<b>0.03***</b>	<b>0.19**</b>	<b>0.03***</b>	<b>0.20**</b>	<b>0.03***</b>	<b>0.19**</b>
Soybeans	0.00	-0.06	0.00	-0.06	0.00	-0.11	0.00	-0.03	0.00	-0.03	<b>0.02**</b>	<b>0.17*</b>	<b>0.02**</b>	<b>0.17*</b>	<b>0.04***</b>	<b>0.27**</b>
Soybean Meal	-0.01	-0.10	0.00	-0.11	-0.01	-0.08	0.00	-0.08	<b>0.02*</b>	0.01	0.00	<b>0.25*</b>	0.00	0.21	0.01	<b>0.30*</b>
Sugar	0.00	<b>0.03*</b>	0.00	-0.03	0.00	-0.07	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00	-0.01
Wheat	0.00	-0.01	0.00	-0.04	<b>0.01***</b>	-0.08	0.00	-0.04	<b>0.01**</b>	-0.04	<b>0.02**</b>	<b>0.04*</b>	<b>0.02**</b>	<b>0.04*</b>	<b>0.01*</b>	0.03
Wool	<b>0.01*</b>	-0.02	0.00	-0.02	0.00	-0.08	0.00	-0.04	0.00	-0.04	<b>0.01*</b>	0.03	<b>0.01*</b>	0.05	0.00	<b>0.08*</b>
Yellow Corn	0.00	-0.01	0.00	-0.03	0.00	-0.10	0.00	-0.05	-0.01	-0.05	0.01	0.00	0.01	0.02	<b>0.01*</b>	<b>0.06*</b>
Coal	0.00	-0.01	0.00	-0.06	-0.01	-0.06	0.00	-0.02	<b>0.01**</b>	<b>0.15*</b>	0.01	<b>0.67***</b>	0.02	<b>0.62***</b>	0.01	<b>0.68***</b>
Heating Oil	0.01	0.34	-0.01	-0.23	0.00	-0.10	0.00	-0.22	0.01	<b>0.86*</b>	-0.01	0.06	-0.01	-0.03	-0.01	0.33
Natural Gas	<b>0.04***</b>	-0.16	0.00	-0.19	<b>0.07***</b>	-0.19	0.01	-0.19	<b>0.02**</b>	-0.09	0.02	0.17	0.02	0.22	0.00	0.11
Unleaded Regular Gas	-0.01	0.20	-0.01	-0.17	-0.01	-0.16	-0.01	<b>0.49*</b>	<b>0.06**</b>	0.08	-0.01	0.13	-0.01	0.09	-0.01	0.37
WTI Oil	0.00	-0.01	0.00	-0.05	0.00	0.12	0.00	-0.05	0.00	-0.03	<b>0.01*</b>	0.00	<b>0.01*</b>	0.00	0.00	0.00
Aluminum	0.00	-0.01	0.00	-0.02	<b>0.00**</b>	0.07	0.00	-0.01	0.00	-0.03	0.00	0.06	0.00	0.05	<b>0.01**</b>	0.00
Gold	<b>0.00*</b>	0.00	0.00	0.05	0.00	-0.08	<b>0.01**</b>	-0.04	<b>0.00*</b>	-0.02	0.00	<b>0.06**</b>	0.00	<b>0.05**</b>	0.00	<b>0.03*</b>
High Grade Copper	0.00	0.00	0.00	-0.01	0.00	-0.07	0.00	-0.04	<b>0.02**</b>	-0.01	0.00	<b>0.11***</b>	0.00	<b>0.11**</b>	0.00	<b>0.06*</b>
Nickel	0.02	0.57	-0.02	-0.48	-0.02	-0.44	-0.02	0.50	-0.02	-0.44	0.00	-0.34	0.00	-0.39	<b>0.07*</b>	-0.04
Palladium	<b>0.04*</b>	-0.20	0.02	-0.22	<b>0.04*</b>	-0.21	0.02	0.13	-0.01	-0.19	0.02	-0.13	0.01	-0.14	-0.01	-0.18
Platinum	0.00	-0.02	<b>0.02**</b>	0.00	0.00	0.01	0.00	-0.02	0.00	-0.02	0.00	<b>0.11*</b>	0.00	<b>0.10*</b>	0.00	<b>0.09*</b>
Silver	0.00	<b>0.05*</b>	0.00	0.01	0.00	-0.12	<b>0.02**</b>	-0.06	0.00	-0.02	0.00	<b>0.16***</b>	0.00	<b>0.15***</b>	0.00	0.03
Tin	<b>0.02**</b>	-0.01	0.01	0.00	-0.01	-0.04	0.00	-0.03	<b>0.01*</b>	-0.02	<b>0.02*</b>	<b>0.05*</b>	<b>0.01*</b>	<b>0.05*</b>	0.00	0.02
Zinc	0.00	-0.03	0.00	0.00	0.00	-0.05	0.00	-0.08	0.00	-0.07	0.00	<b>0.09*</b>	0.00	<b>0.07*</b>	0.01	<b>0.12**</b>

Table XIII: Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	erp		infl		ltr		lty		svar		tbl		tms		umrate	
	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec	Exp	Rec
<i>Butter</i>	<b>0.00*</b>	-0.02	0.00	<b>0.12**</b>	0.00	0.10	0.00	-0.08	0.00	-0.04	0.00	-0.08	0.00	-0.08	0.00	-0.17
<i>Cocoa</i>	0.00	-0.01	0.00	-0.01	0.00	-0.01	0.00	-0.05	0.00	0.01	0.00	-0.05	0.00	-0.06	0.00	<b>0.53**</b>
<i>Coffee Arabica</i>	-0.01	-0.13	0.00	-0.10	0.00	-0.12	-0.01	0.17	0.00	<b>0.66**</b>	<b>0.03**</b>	0.14	<b>0.08***</b>	-0.11	0.01	-0.12
<i>Corn Oil</i>	0.00	-0.01	<b>0.02**</b>	-0.03	0.01	-0.01	0.00	-0.04	-0.01	-0.02	0.01	-0.06	<b>0.03**</b>	-0.01	0.00	0.01
<i>Cotton</i>	0.00	<b>0.06**</b>	0.00	-0.01	0.00	<b>0.13*</b>	0.01	-0.02	0.00	-0.01	0.01	-0.02	0.00	-0.03	<b>0.01*</b>	-0.04
<i>Live Cattle</i>	0.00	-0.01	0.00	0.00	0.00	0.05	0.00	-0.04	0.00	0.02	0.00	-0.05	0.01	-0.01	0.00	0.06
<i>Lean Hog</i>	0.00	<b>0.10**</b>	0.01	0.00	-0.01	0.03	-0.01	-0.05	<b>0.02**</b>	-0.03	-0.01	-0.05	-0.01	-0.08	-0.01	-0.13
<i>Milk</i>	0.00	-0.01	0.00	0.01	0.00	-0.03	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	-0.01	0.00	0.10
<i>Oranges</i>	<b>0.02**</b>	0.02	0.00	-0.01	0.00	<b>0.13*</b>	0.00	0.05	0.00	-0.04	0.00	0.01	<b>0.01*</b>	-0.03	-0.01	-0.07
<i>Soybean Oil</i>	0.00	-0.03	0.00	-0.01	0.00	<b>0.13*</b>	0.00	-0.04	0.00	-0.01	0.00	-0.04	<b>0.03***</b>	-0.04	<b>0.01*</b>	<b>0.16*</b>
<i>Soybeans</i>	0.00	-0.06	0.00	-0.02	0.00	0.08	0.00	-0.07	0.00	-0.06	0.00	-0.06	0.00	0.00	0.00	<b>0.35*</b>
<i>Soybean Meal</i>	0.00	-0.06	0.00	-0.04	0.00	-0.01	0.00	-0.08	-0.01	0.01	0.00	-0.09	<b>0.02*</b>	-0.10	0.00	<b>0.36*</b>
<i>Sugar</i>	0.00	0.00	0.00	<b>0.10***</b>	0.00	0.02	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	-0.02	0.00	-0.08
<i>Wheat</i>	0.00	0.00	<b>0.00*</b>	-0.01	0.00	0.07	0.00	-0.04	0.00	-0.03	<b>0.01**</b>	-0.04	<b>0.03***</b>	-0.05	<b>0.02***</b>	-0.03
<i>Wool</i>	0.00	0.00	0.00	-0.02	0.00	-0.03	0.00	-0.03	0.00	-0.02	0.00	-0.04	0.00	-0.03	0.00	-0.06
<i>Yellow Corn</i>	0.00	0.03	0.00	-0.02	0.00	-0.03	-0.01	-0.05	0.00	-0.03	-0.01	-0.05	-0.01	-0.05	0.00	0.05
<i>Coal</i>	0.01	-0.03	0.00	-0.02	0.00	-0.06	0.00	0.00	0.00	-0.05	0.00	0.01	<b>0.02**</b>	-0.04	<b>0.03**</b>	<b>0.20*</b>
<i>Heating Oil</i>	-0.01	0.10	<b>0.02*</b>	<b>1.04**</b>	0.00	-0.16	-0.01	-0.09	-0.01	-0.20	-0.01	0.55	0.01	<b>1.59**</b>	-0.01	<b>0.67*</b>
<i>Natural Gas</i>	0.00	-0.19	0.00	-0.13	0.00	-0.20	0.00	0.55	0.00	-0.20	0.00	0.33	<b>0.02**</b>	-0.15	<b>0.03***</b>	-0.11
<i>Unleaded Regular Gas</i>	-0.01	-0.13	<b>0.03**</b>	<b>0.76**</b>	-0.01	-0.10	-0.01	0.38	-0.01	<b>0.48*</b>	<b>0.03*</b>	<b>0.70**</b>	<b>0.08**</b>	<b>0.60*</b>	-0.01	0.33
<i>WTI Oil</i>	0.00	-0.01	0.00	-0.01	0.00	-0.03	0.01	0.00	0.00	-0.02	0.00	-0.04	0.00	0.02	0.00	<b>0.43**</b>
<i>Aluminium</i>	0.00	-0.02	0.00	0.01	0.00	-0.03	0.00	0.01	<b>0.00**</b>	-0.03	0.00	-0.02	<b>0.01***</b>	0.01	<b>0.01**</b>	<b>0.26**</b>
<i>Gold</i>	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	-0.01	0.00	-0.03	0.00	0.00	0.00	-0.06
<i>High Grade Copper</i>	0.00	-0.01	0.00	0.00	0.00	<b>0.11**</b>	0.00	-0.01	0.00	-0.03	0.00	-0.03	<b>0.01*</b>	-0.03	0.00	-0.07
<i>Nickel</i>	-0.02	0.04	-0.02	0.60	-0.01	<b>1.38**</b>	0.02	-0.26	<b>0.04*</b>	-0.16	0.04	0.27	-0.01	<b>1.42**</b>	-0.02	-0.15
<i>Palladium</i>	0.01	-0.22	0.01	-0.18	0.00	0.05	0.00	-0.21	-0.01	0.15	0.00	-0.19	<b>0.15***</b>	-0.18	<b>0.11***</b>	-0.15
<i>Platinum</i>	<b>0.01*</b>	-0.03	<b>0.03***</b>	0.01	0.00	-0.03	0.00	-0.04	<b>0.01*</b>	-0.01	0.00	-0.02	0.00	0.04	0.00	-0.06
<i>Silver</i>	0.00	-0.02	0.00	<b>0.04*</b>	0.00	-0.04	0.00	0.10	<b>0.00*</b>	-0.01	0.00	0.01	0.01	-0.03	0.00	-0.08
<i>Tin</i>	0.00	0.00	<b>0.01*</b>	-0.02	0.00	-0.01	0.00	-0.01	0.00	-0.02	0.00	-0.02	0.00	-0.03	0.01	-0.06
<i>Zinc</i>	0.00	-0.02	0.00	0.01	0.00	-0.09	0.00	-0.05	0.00	-0.04	0.00	-0.07	<b>0.01*</b>	0.00	0.00	-0.10

Table XIV: Summary Restricted Predictability

This table reports a summary of the out-of-sample results after imposing an economically motivated sign restriction. Panel (A) shows the percentage of significant  $R_{oos}^2$ s across the variables predicting the next month's and the next year's excess return. Panel (B) shows the percentage of significant  $R_{oos}^2$ s across the variables predicting the next month's and the next year's volatility. Following Campbell & Thompson (2008), we impose the restriction that we set the out-of-sample slope estimate equal to zero whenever it is different to that of the in-sample estimate. "de" denotes the dividend-payout ratio, " $\Delta indpro$ " the growth of industrial production, and " $\Delta M1$ " the growth of money supply  $M1$ . "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. Improvements compared to the unconstrained out-of-sample results (see Table III) are denoted in **bold** font. All data are sampled at the monthly frequency.

Panel (A): Return Predictability				Panel (B): Volatility Predictability			
1 Month		12 Months		1 Month		12 Months	
$\Delta indpro$	<b>26.67</b>	$\Delta indpro$	<b>40.00</b>	<i>infl</i>	33.33	$\Delta M1$	<b>23.33</b>
dfr	<b>26.67</b>	<i>tbl</i>	30.00	$\Delta M1$	<b>23.33</b>	$\Delta indpro$	<b>20.00</b>
erp	<b>26.67</b>	<i>infl</i>	26.67	erp	<b>23.33</b>	ltr	<b>13.33</b>
$\Delta M1$	10.00	$\Delta M1$	20.00	$\Delta indpro$	<b>20.00</b>	<i>dfy</i>	10.00
<i>infl</i>	10.00	<i>erp</i>	16.67	svar	<b>20.00</b>	infl	<b>10.00</b>
svar	<b>10.00</b>	ltr	<b>13.33</b>	<i>dfy</i>	13.33	<i>tms</i>	10.00
<i>ltr</i>	6.67	dfr	<b>10.00</b>	ltr	<b>10.00</b>	<i>svar</i>	6.67
tbl	<b>3.33</b>	<i>dfy</i>	6.67	dfr	<b>6.67</b>	<i>tbl</i>	6.67
<i>tms</i>	3.33	svar	<b>6.67</b>	<i>tbl</i>	6.67	<i>unrate</i>	6.67
<i>de</i>	0.00	<i>tms</i>	6.67	tms	<b>6.67</b>	<i>de</i>	3.33
<i>dfy</i>	0.00	<i>unrate</i>	6.67	<i>ep</i>	3.33	dfr	<b>3.33</b>
<i>dp</i>	0.00	<i>ep</i>	3.33	<i>lty</i>	3.33	<i>ep</i>	3.33
<i>dy</i>	0.00	<i>lty</i>	3.33	<i>unrate</i>	3.33	<i>dp</i>	0.00
<i>ep</i>	0.00	<i>de</i>	0.00	<i>de</i>	0.00	<i>dy</i>	0.00
<i>lty</i>	0.00	<i>dp</i>	0.00	<i>dp</i>	0.00	<i>erp</i>	0.00
<i>unrate</i>	0.00	<i>dy</i>	0.00	<i>dy</i>	0.00	<i>lty</i>	0.00



Table XV: Time-Variation in Volatility of Returns

This table summarizes the results about the time-variation in the volatility of commodity returns. We consider three different events. In Panel (A), we consider the introduction of futures and options. In Panel (B), we consider the beginning of the global financial crisis in December 2007. "Start" denotes the starting point of trading futures and options, respectively. "Std Dev (prior)" and "Std Dev (after)" indicate the standard deviation prior to and after the time point of introduction, respectively. " $\Delta$  Std Dev" is the difference between the volatility after and before the respective event. We use 120 observations to compute the volatility. Here, we impose the restriction that at least 10 years of observations must be available. In the case of the global financial crisis, 97 observations are used. We use the  $F$ -test proposed by [Snedecor & Cochran \(1989\)](#) to determine whether the difference in volatility is statistically significantly different from zero. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Panel (A): Introduction of Derivatives Trading:				Panel (B): Financial Crisis			
	Futures		Options		Financial Crisis (prior)		Financial Crisis (after)	
	Start	Std Dev (prior)	Std Dev (after)	$\Delta$ Std Dev	Start	Std Dev (prior)	Std Dev (after)	$\Delta$ Std Dev
Butter	09.2005	0.1644	0.0780	<b>-0.0864***</b>	03.1990	0.0804	0.0629	<b>-0.0175***</b>
Cocoa	07.1959	0.0784	0.0785	0.0001	01.1990	0.0873	0.057	<b>-0.0302***</b>
Coffee Arabica	05.2006				10.1984	0.0586	0.0445	<b>-0.0142***</b>
Corn Oil	07.1959	0.0301	0.0283	-0.0017	01.1996	0.031	0.0559	<b>0.0249***</b>
Cotton	11.1964	0.0452	0.0472	0.002	03.1990	0.1691	0.2787	<b>0.1095***</b>
Live Cattle	02.1996	0.0795	0.1237	<b>0.0442***</b>	02.1989	0.0908	0.0536	<b>-0.0372***</b>
Lean Hog	01.1996	0.0310	0.0559	<b>0.0249***</b>	02.1989	0.0689	0.0465	<b>-0.0224***</b>
Milk	02.1967	0.1962	0.1856	-0.0106	02.1989	0.0766	0.0622	<b>-0.0144**</b>
Oranges	07.1959	0.0700	0.0546	<b>-0.0154***</b>	03.1990	0.1622	0.076	<b>-0.0862***</b>
Soybean Oil	07.1959	0.0609	0.0455	<b>-0.0155***</b>	02.1989	0.0667	0.0713	0.0046
Soybeans	07.1959	0.0895	0.0766	<b>-0.013*</b>	02.1989	0.0761	0.0663	-0.0098
Soybean Meal	01.1961	0.0723	0.1384	<b>0.0661***</b>	02.1989	0.0761	0.0663	-0.0098
Sugar	07.1959	0.0431	0.0416	-0.0014	02.1989	0.0761	0.0663	-0.0098
Wheat	07.1959	0.0431	0.0416	-0.0014	02.1989	0.0761	0.0663	-0.0098
Wool	07.1959	0.0431	0.0416	-0.0014	02.1989	0.0761	0.0663	-0.0098
Yellow Corn	07.1959	0.0427	0.0400	-0.0027	02.1989	0.0761	0.0663	-0.0098
Coal	07.2001	0.0328	0.0823	<b>0.0495***</b>	02.1989	0.0952	0.1173	<b>0.0221**</b>
Heating Oil	11.1978	0.0377	0.0943	<b>0.0566***</b>	10.1992	0.0621	0.1997	<b>0.1377***</b>
Natural Gas	04.1990	0.0497	0.1390	<b>0.0893***</b>	10.2005	0.1509	0.1191	<b>-0.0318**</b>
Unleaded Regular Gas	10.2005	0.1509	0.1191	<b>-0.0318**</b>	01.1989	0.0840	0.0880	0.0039
WTI Oil	03.1983	0.0641	0.1030	<b>0.0389***</b>	01.1989	0.0840	0.0880	0.0039
Aluminium	05.2002	0.0504	0.0630	<b>0.0126**</b>	09.1988	0.0785	0.0331	<b>-0.0454***</b>
Gold	12.1974	0.0581	0.0806	<b>0.0225***</b>	06.1990	0.0839	0.0592	<b>-0.0246***</b>
High Grade Copper	07.1959	0.1048	0.0202	<b>-0.0846***</b>	01.1968			
Nickel	03.2015				10.1990	0.0709	0.0461	<b>-0.0249***</b>
Palladium	01.1977				03.1989	0.1281	0.0637	<b>-0.0644***</b>
Platinum	03.1968	0.0355	0.0378	0.0022				
Silver	06.1963	0.0164	0.0670	<b>0.0506***</b>				
Tin								
Zinc								

# Predictability in Commodity Markets: Evidence from over a Century

Online Appendix

**JEL classification:** G10, G11, G17

**Keywords:** Business Cycle, Commodity Excess Returns, Commodity Volatilities,  
Predictability

Table A1: Summary Statistics Predictive Variables

*This table summarizes (non-annualized) key statistics about the predictive variables. “de” denotes the dividend–payout ratio, “ $\Delta indpro$ ” the growth of industrial production, and “ $\Delta M1$ ” the growth of money supply M1. “dfr” is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. “dfy” is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. “dp” is the dividend–price ratio, “dy” the dividend yield, “ep” the earnings–price ratio, “erp” the market risk premium, “infl” the inflation rate, “ltr” the long-term U.S. government bond returns, “lty” the long-term U.S. government bond yields, “svar” the stock variance, and “tbl” the 3-month Treasury bill rate. “tms” is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. “unrate” is the unemployment rate. “Mean”, “Std Dev”, “Skew”, and “Kurt” denote the mean, standard deviation, skewness, and kurtosis, respectively. The next three columns show the first-order autoregressive coefficient and the p-value of the Jarque-Bera and Augmented Dicky Fuller test, respectively. “First Obs.” and “Nobs” denote the first observation of the time series and the number of observations. All data are sampled at the monthly frequency.*

Variable	Mean	Std Dev	Skew	Kurt	AR(1)	JB p-value	ADF p-value	First Obs.	Nobs
<i>de</i>	-0.5424	0.3158	0.8124	6.4439	0.9931	<0.01	<0.01	01.1871	1740
<i><math>\Delta indpro</math></i>	0.0026	0.0193	0.2794	13.9795	0.5076	<0.01	<0.01	02.1919	1163
<i><math>\Delta M1</math></i>	0.0040	0.0065	1.7852	17.3614	0.2514	<0.01	<0.01	02.1947	827
<i>dfr</i>	0.0003	0.0135	-0.3897	11.0916	-0.1268	<0.01	<0.01	01.1926	1080
<i>dfy</i>	0.0119	0.0071	2.0854	9.7171	0.9767	<0.01	<0.01	01.1919	1164
<i>dp</i>	-3.2088	0.4311	-0.7092	3.3307	0.9941	<0.01	<0.05	01.1871	1740
<i>dy</i>	-3.2054	0.4284	-0.7395	3.3522	0.9940	<0.01	<0.05	02.1871	1739
<i>ep</i>	-2.6663	0.3745	-0.7048	6.4535	0.9884	<0.01	<0.01	01.1871	1740
<i>erp</i>	0.0040	0.0477	-0.4122	11.7655	0.1117	<0.01	<0.01	01.1871	1740
<i>infl</i>	0.0020	0.0072	0.5630	18.4577	0.3031	<0.01	<0.01	01.1875	1691
<i>ltr</i>	0.0048	0.0243	0.6032	7.8052	0.0379	<0.01	<0.01	01.1926	1080
<i>lty</i>	0.0512	0.0269	1.1556	3.8979	0.9966	<0.01	0.87	01.1919	1164
<i>svar</i>	0.0025	0.0049	6.5792	60.9568	0.6201	<0.01	<0.01	02.1885	1571
<i>tbl</i>	0.0349	0.0300	1.0576	4.4489	0.9932	<0.01	0.25	02.1920	1151
<i>tms</i>	0.0163	0.0131	-0.1532	2.9822	0.9625	0.10	<0.01	02.1920	1151
<i>unrate</i>	0.0582	0.0165	0.5723	3.0451	0.9905	<0.01	0.53	01.1948	816

Table A2: Correlation Matrix Commodity Returns

This table reports the correlations among all commodity excess returns. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Butter	Cocoa	Coffee Arabica	Corn Oil	Corn Oil	Cotton	Live Cattle	Lean Hog	Milk	Oranges	Soybean Oil	Soybeans	Soybean Meal	Sugar	Wheat	Wool	Yellow Corn	Coal	Heating Oil	Natural Gas	Unleaded Regular Gas	WTI Oil	Aluminium	Gold	High Grade Copper	Nickel	Palladium	Silver	Tin	Zinc		
Butter	-0.02																															
Cocoa	0.02	0.11																														
Coffee Arabica	0.12	0.00	0.09																													
Corn Oil	0.05	0.02	-0.01	0.07																												
Cotton	-0.02	0.03	-0.01	0.02	0.05																											
Live Cattle	0.07	0.01	-0.10	0.02	0.01	0.24																										
Lean Hog	0.29	-0.01	-0.05	0.15	0.06	0.00	0.12																									
Milk	0.03	0.06	0.02	-0.01	-0.01	0.00	0.01	0.12	-0.08																							
Oranges	-0.02	0.16	0.08	0.19	0.18	0.02	0.03	0.05	-0.10	0.72																						
Soybeans	-0.03	0.12	0.09	0.10	0.09	0.02	0.00	0.08	-0.10	0.43	0.82																					
Soybean Meal	0.06	0.09	0.05	0.05	0.08	-0.06	-0.09	0.07	-0.04	0.13	0.15	0.16																				
Sugar	-0.03	0.14	0.05	0.05	0.08	0.07	0.05	0.03	-0.01	0.37	0.40	0.35	0.11																			
Wheat	0.02	0.09	0.14	0.07	-0.02	0.03	0.08	-0.03	0.06	0.05	0.03	-0.01	0.06	0.06																		
Wool	-0.02	0.13	0.01	0.16	0.17	0.00	0.03	0.04	0.00	0.52	0.60	0.53	0.16	0.02	0.05																	
Yellow Corn	0.07	0.02	0.10	0.18	0.03	0.07	0.08	0.08	0.19	-0.01	0.16	0.14	0.10	0.10	0.05	0.10	0.05	0.10	0.14	0.14	0.17	0.19	-0.01	0.14	0.20	0.13	0.08	0.12	0.12	0.08	0.18	
Coal	0.01	0.10	0.03	0.08	-0.04	0.12	0.08	0.01	0.01	0.01	0.07	0.05	0.02	-0.03	0.03	0.14	0.01	0.14	0.08	0.19	0.16	0.19	0.01	0.16	0.17	0.20	0.18	0.20	0.19	0.01	0.16	0.17
Heating Oil	-0.02	0.02	-0.03	0.00	0.03	-0.11	0.00	0.01	-0.01	-0.04	-0.04	-0.12	-0.10	0.00	0.04	0.13	0.10	0.20	0.19	0.01	0.01	0.10	0.11	0.41	0.31	0.44	0.09	0.32	0.23	0.44	0.09	
Natural Gas	0.03	0.10	0.06	0.11	-0.06	0.07	0.06	0.00	0.01	0.01	0.00	0.00	-0.02	-0.02	-0.01	0.14	0.01	0.16	0.63	0.17	0.17	0.10	0.05	0.26	0.26	0.20	0.26	0.23	0.14	0.20	0.26	
Unleaded Regular Gas	0.08	0.12	0.02	0.13	-0.09	0.09	0.08	0.08	0.05	0.05	0.05	0.06	0.02	-0.06	0.01	0.13	-0.04	0.18	0.74	0.17	0.67	0.17	0.10	0.15	0.20	0.30	0.40	0.29	0.22	0.39	0.30	
WTI Oil	-0.05	0.06	0.13	0.08	0.03	0.11	0.03	0.01	0.01	-0.07	0.12	0.10	0.05	0.06	0.04	0.09	0.01	0.17	0.19	-0.01	0.14	0.20	0.13	0.08	0.12	0.13	0.08	0.12	0.08	0.18	0.13	
Aluminium	-0.02	0.22	0.05	0.01	0.01	0.00	0.03	0.00	0.00	-0.02	0.16	0.20	0.14	0.13	0.21	0.07	0.13	0.20	0.19	0.01	0.01	0.16	0.17	0.41	0.31	0.44	0.09	0.32	0.23	0.44	0.09	
High Grade Copper	-0.03	0.18	0.12	0.08	0.13	0.05	0.01	0.01	0.01	-0.08	0.21	0.20	0.15	0.22	0.18	0.00	0.13	0.20	0.19	0.01	0.10	0.11	0.41	0.31	0.44	0.09	0.32	0.23	0.44	0.09	0.32	
Nickel	-0.01	0.05	0.12	0.08	0.07	0.14	0.04	-0.04	-0.04	-0.07	0.08	0.12	0.10	0.00	0.04	0.13	0.10	0.07	0.16	0.01	0.10	0.11	0.20	0.26	0.26	0.20	0.26	0.23	0.14	0.20	0.26	
Palladium	0.07	0.08	0.13	0.10	0.11	0.04	0.02	0.07	0.01	0.11	0.16	0.14	0.15	0.10	0.10	0.02	0.13	0.17	0.10	0.05	0.11	0.13	0.20	0.26	0.26	0.20	0.26	0.23	0.14	0.20	0.26	
Platinum	0.03	0.17	0.07	0.09	-0.02	0.13	0.07	0.05	0.01	0.12	0.14	0.12	0.03	0.17	0.17	0.12	0.10	0.16	0.15	0.11	0.11	0.15	0.20	0.30	0.40	0.29	0.22	0.39	0.30	0.40	0.29	
Silver	0.02	0.26	0.06	0.11	0.00	0.03	0.04	0.00	0.03	0.20	0.22	0.16	0.18	0.16	0.16	0.11	0.20	0.07	0.13	0.08	0.11	0.17	0.18	0.18	0.74	0.34	0.16	0.31	0.40	0.31	0.40	
Tin	0.06	0.14	0.05	0.18	0.06	0.04	0.09	0.09	-0.06	0.13	0.12	0.05	0.10	0.10	0.08	0.01	0.13	0.29	0.23	0.06	0.19	0.23	0.31	0.17	0.35	0.29	0.14	0.19	0.26	0.31	0.40	
Zinc	-0.03	0.15	0.09	0.08	0.01	0.02	0.08	0.08	0.10	-0.12	0.12	0.08	0.01	0.10	0.12	0.09	0.10	0.09	0.11	0.09	0.11	0.12	0.32	0.16	0.42	0.34	0.18	0.29	0.23	0.35	0.40	

Table A3: Correlation Matrix Commodity Volatilities

This table reports the correlations among all commodity volatilities. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Butter	Cocoa	Coffee Arabica	Corn Oil	Corn	Corn Oil	Cotton	Live Cattle	Lean Hog	Milk	Oranges	Soybean Oil	Soybeans	Soybean Meal	Sugar	Wheat	Wool	Yellow Corn	Coal	Heating Oil	Natural Gas	Unleaded Regular Gas	WTI Oil	Aluminum	Gold	High Grade Copper	Nickel	Palladium	Platinum	Silver	Tin	Zinc				
Butter	0.05																																			
Cocoa	0.06	-0.12																																		
Coffee Arabica	-0.23	0.23	-0.27																																	
Corn Oil	-0.09	-0.01	0.07	0.07																																
Corn	-0.19	0.12	0.14	-0.07	0.03																															
Live Cattle	0.25	-0.01	0.06	-0.05	-0.06	0.00																														
Lean Hog	0.30	0.05	-0.04	-0.18	0.00	-0.10	0.16																													
Milk	-0.11	0.14	-0.03	0.48	0.15	-0.01	0.14	0.13	0.08																											
Oranges	0.05	0.15	-0.04	0.26	0.06	0.02	0.20	0.31	0.13	0.60																										
Soybeans	-0.01	-0.09	0.04	0.17	0.10	0.07	0.07	0.25	0.11	0.39	0.69																									
Soybean Meal	-0.35	0.11	-0.23	0.36	0.17	0.19	-0.04	-0.19	-0.01	0.35	0.11	0.10																								
Sugar	0.05	0.00	-0.13	0.04	0.09	0.00	0.11	0.44	-0.16	0.24	0.39	0.37	0.06																							
Wheat	0.04	-0.10	-0.07	-0.15	0.05	-0.14	-0.06	0.24	-0.11	-0.11	0.01	0.01	-0.12	0.29																						
Wool	0.05	-0.19	0.10	0.03	0.29	0.12	0.09	0.29	0.17	0.38	0.55	0.64	0.11	0.49	0.08																					
Yellow Corn	0.02	0.26	-0.15	0.09	0.01	0.03	0.11	0.29	-0.02	0.20	0.25	0.17	0.04	0.30	0.24	0.16																				
Coal	0.13	0.05	0.12	0.06	0.09	-0.07	0.06	-0.03	0.05	0.14	0.03	0.05	0.08	-0.07	-0.04	0.05	0.05																			
Heating Oil	0.41	0.06	0.03	-0.02	-0.06	-0.22	0.10	0.27	0.36	0.11	0.17	0.04	-0.18	0.11	0.10	0.10	0.23	0.21																		
Natural Gas	0.19	-0.13	0.22	0.02	0.13	-0.20	0.12	0.08	0.06	0.16	0.12	0.17	-0.05	0.08	0.08	0.18	0.11	0.53	0.23																	
Unleaded Regular Gas	0.24	-0.02	0.19	-0.04	0.20	-0.02	0.21	0.19	0.09	0.13	0.10	0.13	0.10	0.12	0.14	0.08	0.22	0.48																		
WTI Oil	-0.09	-0.06	0.03	-0.08	0.02	0.04	0.01	0.01	0.01	0.02	0.10	0.10	0.10	0.06	-0.03	0.17	0.15	0.19	0.16	0.08	0.03	0.03	0.06	0.23	-0.04	-0.01										
Aluminum	-0.24	0.30	-0.23	0.30	-0.01	0.04	-0.12	0.09	-0.09	-0.09	0.17	0.20	0.17	0.30	0.17	0.07	0.07	0.33	0.33	0.08	0.03	0.03	-0.04	-0.01	-0.04	0.31										
High Grade Copper	-0.08	0.14	-0.08	0.07	-0.02	0.13	0.01	0.09	-0.06	0.13	0.19	0.20	0.09	0.04	0.13	0.06	0.36	0.36	0.08	0.08	0.15	0.00	0.06	0.41	0.31	0.04	0.47									
Nickel	0.08	-0.07	-0.03	-0.08	-0.04	-0.07	0.03	0.07	-0.04	0.05	0.07	0.10	-0.05	-0.07	0.18	-0.03	0.21	0.21	0.12	0.10	0.03	0.10	0.03	0.10	0.34	0.04	0.47	0.05								
Palladium	0.11	0.03	-0.11	0.02	-0.05	-0.14	0.08	0.20	-0.08	0.12	0.06	0.09	0.05	0.26	0.05	0.14	0.21	-0.06	0.10	0.04	0.02	0.04	0.02	-0.08	0.12	0.05	0.06									
Platinum	-0.04	-0.03	0.09	0.08	0.24	0.11	0.05	0.06	-0.08	0.22	0.17	0.26	0.20	0.12	0.04	0.23	0.10	0.28	0.15	0.22	0.15	0.22	0.36	0.29	0.14	0.21	0.17	-0.02								
Silver	-0.12	0.11	-0.26	0.15	0.07	-0.01	-0.07	0.22	-0.15	0.14	0.22	0.19	0.12	0.23	0.10	0.16	0.33	-0.13	-0.06	-0.06	-0.14	-0.03	0.60	0.26	0.06	0.15	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	
Tin	-0.03	0.15	-0.02	-0.15	0.02	0.03	-0.03	0.40	-0.03	0.40	0.07	0.09	-0.10	0.27	0.22	0.10	0.39	0.06	0.17	0.10	0.16	0.10	0.16	0.06	0.26	0.20	0.16	0.09	0.15	0.26						
Zinc	0.03	-0.04	0.04	-0.21	0.08	0.04	0.16	0.45	0.00	0.07	0.22	0.13	-0.03	0.34	0.33	0.26	0.40	0.03	0.23	0.14	0.18	0.18	0.25	0.22	0.22	0.28	0.15	-0.01	0.18	0.26	0.46					

Table A4: Correlation Matrix Predictive Variables

This table reports the correlations among all predictive variables. “de” denotes the dividend–payout ratio, “ $\Delta indpro$ ” the growth of industrial production, and “ $\Delta M1$ ” the growth of money supply M1. “dfr” is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. “dfy” is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. “dp” is the dividend–price ratio, “dy” the dividend yield, “ep” the earnings–price ratio, “erp” the market risk premium, “infl” the inflation rate, “ltr” the long-term U.S. government bond returns, “lty” the long-term U.S. government bond yields, “svar” the stock variance, and “tbl” the 3-month Treasury bill rate. “tms” is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. “unrate” is the unemployment rate. All data are sampled at the monthly frequency.

Variable	de	$\Delta indpro$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	svar	tbl	tms	unrate
de																
$\Delta indpro$	-0.03															
$\Delta M1$	0.11	-0.05														
dfr	0.12	0.09	-0.01													
dfy	0.22	-0.25	0.27	0.08												
dp	0.29	-0.02	0.02	0.01	0.12											
dy	0.29	-0.02	0.01	0.03	0.12	0.99										
ep	-0.37	0.00	-0.05	-0.06	-0.03	0.78	0.78									
erp	0.01	0.01	-0.04	0.21	0.00	-0.02	0.08	-0.03								
infl	-0.13	-0.01	-0.03	-0.01	0.08	0.18	0.17	0.26	-0.09							
ltr	-0.02	-0.12	0.02	-0.46	0.14	-0.01	-0.01	0.00	0.09	-0.13						
lty	-0.07	-0.04	0.10	0.00	0.51	0.18	0.17	0.21	-0.08	0.37	0.04					
svar	0.15	-0.10	0.20	-0.14	0.32	-0.08	-0.11	-0.18	-0.33	-0.13	0.14	0.02				
tbl	-0.13	-0.05	-0.04	-0.04	0.34	0.28	0.27	0.36	-0.10	0.43	0.04	0.89	-0.05			
tms	0.16	0.02	0.29	0.08	0.27	-0.26	-0.26	-0.36	0.07	-0.22	0.00	0.03	0.14	-0.42		
unrate	0.07	-0.02	0.31	0.07	0.64	0.04	0.05	-0.01	0.08	0.02	0.10	0.40	0.08	0.11	0.56	

Table A5: In-Sample Return Predictability and Business Cycle Stages (1 Month)

This table reports the in-sample  $R^2$ 's of a regression of monthly excess returns on a constant and the lagged predictive variable across business cycle stages. We predict the next month's excess return. "de" denotes the dividend-payout ratio, " $\Delta$ indpro" the growth of industrial production, and " $\Delta$ MI" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "inf" the inflation rate, "itr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	$\Delta$ indpro						$\Delta$ MI											
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec						
Butter	0.01	0.00	0.00	0.10	1.23	0.33	0.34*	1.02**	0.02	0.05	0.07	0.01	0.02	0.21	0.00	11.75***	0.02	17.66***
Cocoa	0.07	0.15	0.00	0.04	0.39	0.00	0.52***	0.56	0.30	1.52*	0.31	0.49	0.14	0.88*	0.04	0.37	0.72	0.89
Coffee Arabica	0.00	0.48	0.03	4.69***	0.05	17.16***	0.09	0.15	0.04	3.76*	1.87	1.62	0.08	0.07	0.02	0.13	0.02	1.03
Corn Oil	0.42*	1.17**	0.01	0.01	1.45	0.10	1.22***	1.73***	0.50	0.04	0.21	0.02	0.05	0.01	0.49	0.60	7.94**	1.61
Cotton	0.41**	0.39	0.25	0.05	0.87	0.02	0.29	0.64*	0.03	0.02	1.04	0.24	0.11	0.27	0.43	1.88*	0.02	1.46
Live Cattle	0.10	0.58*	0.06	0.00	0.12	0.02	1.25***	2.37***	0.01	2.01**	0.55	0.70	0.03	0.03	0.00	1.08	6.59**	0.19
Lean Hog	0.03	0.13	0.00	0.20	0.13	0.51	0.22	0.48	0.03	0.04	0.00	0.15	0.02	0.57	0.01	0.11	0.43	0.00
Milk	0.05	0.18	0.01	0.58	0.33	0.18	0.66**	2.69***	0.14	0.83	1.21	0.31	0.02	0.12	0.06	5.91***	1.99	14.50***
Oranges	0.12	0.01	0.41	0.14	0.25	0.08	0.02	0.00	0.00	0.12	0.80	0.03	0.00	0.28	0.02	0.75	1.78	4.42
Soybean Oil	0.52**	1.12**	0.00	0.23	1.74	0.02	2.36***	3.79***	0.43	1.23*	0.55	1.00	0.16	0.22	0.22	0.03	2.79	0.03
Soybeans	0.54**	0.97**	0.22	0.16	2.65*	0.01	1.65***	3.44***	0.09	1.18*	1.14	1.36	0.04	0.08	0.07	0.08	0.21	0.41
Soybean Meal	0.32	0.80	0.06	0.07	1.60	0.42	0.95***	0.92*	1.30**	0.26	0.06	0.73	0.08	0.20	0.10	0.78	0.09	2.55
Sugar	0.00	0.02	0.05	0.00	1.55**	0.95	0.01	0.09	0.02	0.05	0.74	1.21	0.08	0.00	0.53	1.23	0.20	0.70
Wheat	0.01	0.05	0.39	0.11	0.15	0.09	0.27	0.63	0.00	0.39	0.00	1.97	0.15	0.05	0.98*	0.07	1.94	3.18
Wool	0.23	0.86**	0.01	0.01	3.00***	0.79	1.73***	3.07***	0.13	1.95**	0.38	1.62	0.56*	0.00	1.69**	2.42*	3.88	2.14
Yellow Corn	0.01	0.55*	0.26	0.16	0.13	0.29	0.70**	0.97**	0.42	0.59	0.18	0.85	0.00	0.96*	0.88*	0.04	0.83	0.17
Coal	0.46*	0.84*	0.20	1.04	0.64	0.56	0.01	0.01	0.00	0.00	0.26	1.05	0.12	0.36	0.01	0.54	0.69	0.01
Heating Oil	0.65	0.78	0.34	0.39	0.15	5.35	0.12	0.23	0.20	2.95	0.89	4.14	0.19	1.20	0.00	0.17	0.00	1.07
Natural Gas	0.27	0.00	0.56	0.06	0.48	0.13	0.18	0.02	0.97	15.34***	0.92	14.84**	1.95***	2.05*	1.76*	1.26	0.03	8.22
Unleaded Regular Gas	0.59	0.66	0.17	4.21*	0.81	10.33*	0.08	0.05	0.29	0.16	0.00	10.26*	0.14	0.07	0.04	0.37	0.30	5.56
WTI Oil	0.02	0.03	0.44	0.07	0.23	2.33***	0.62**	1.13**	0.08	0.66	2.71*	0.03	0.05	0.00	0.02	0.77	3.66	0.61
Aluminium	0.01	0.40	0.25	0.01	2.84**	1.36	0.01	0.00	0.11	0.79	0.19	0.43	0.00	0.00	0.03	12.25***	0.66	23.24***
Gold	0.01	0.63*	0.71**	0.19	0.26	0.57	0.00	0.16	0.24	0.08	0.01	0.13	0.93***	0.84	1.36**	0.21	0.26	1.81
High Grade Copper	0.03	0.11	0.02	0.71*	0.33	2.59***	0.34*	2.71***	0.43	1.85**	1.21	1.28	0.03	0.09	0.07	4.53**	1.51	1.72
Nickel	0.01	1.82*	0.92	6.78*	6.59	15.55**	0.37	0.70	0.30	0.00	0.36	8.97	0.15	2.51*	0.09	0.04	4.74	0.82
Palladium	0.70*	0.03	1.08	0.32	8.81**	1.27	0.10	0.17	0.19	0.15	3.59	0.05	0.05	0.11	0.11	0.45	0.20	1.86
Platinum	0.06	0.20	0.01	0.45	2.89**	1.47	0.01	0.05	0.12	1.19*	0.94	1.75	0.06	0.29	0.07	0.11	0.78	0.26
Silver	0.15	0.01	0.51*	0.10	0.19	0.13	0.06	0.00	0.17	0.40	0.09	2.48*	0.14	0.01	0.72	0.00	1.00	2.28
Tin	0.01	0.11	0.01	0.07	2.34**	2.47**	0.46**	0.57	0.12	0.86	2.70*	0.13	0.53*	1.05*	0.15	1.64	0.52	2.17
Zinc	0.08	0.14	0.03	2.27***	0.02	5.40***	0.10	0.22	0.02	0.38	0.05	0.65	0.21	0.28	1.33**	3.12*	0.61	2.81

Table A5: In-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	dfr				dfy				dp								
	Exp	eExp	IExp	Rec	Rec	eRec	IRec	Exp	eExp	IExp	Rec	Rec	eRec	IRec			
<i>Butter</i>	0.15	0.16	0.13	0.01	0.07	0.04	0.04	0.02	0.15	0.00	0.68	0.62	0.02	0.01	0.12	<b>3.18**</b>	0.88
<i>Cocoa</i>	0.20	<b>0.79*</b>	0.03	0.24	0.11	0.25	0.25	0.10	0.54	0.30	1.11	0.64	0.03	0.33	0.47	0.38	0.21
<i>Coffee Arabica</i>	<b>0.65*</b>	0.10	<b>2.14**</b>	2.56	2.16	4.23	4.23	0.14	0.41	0.01	0.00	0.12	<b>8.62**</b>	0.05	0.04	0.65	0.01
<i>Corn Oil</i>	0.05	0.08	<b>0.94*</b>	0.49	0.17	0.23	0.23	0.17	0.36	0.00	0.31	2.06	0.18	0.27	<b>2.09**</b>	<b>10.12***</b>	0.05
<i>Cotton</i>	0.03	0.01	0.15	0.50	0.25	<b>4.57**</b>	0.05	<b>1.81***</b>	<b>2.08***</b>	<b>1.86***</b>	0.06	2.23	0.63	<b>0.44**</b>	<b>0.72*</b>	0.40	0.01
<i>Live Cattle</i>	0.27	0.22	0.26	0.47	0.03	0.08	0.30	0.20	0.66	0.00	0.29	0.06	1.20	0.09	0.01	0.10	0.00
<i>Lean Hog</i>	0.00	0.04	0.02	0.69	0.08	0.08	0.08	0.20	<b>0.83*</b>	0.25	0.20	0.09	0.01	0.00	0.02	0.12	0.17
<i>Milk</i>	0.02	0.26	0.04	0.93	<b>2.50*</b>	0.68	0.68	0.16	0.14	0.10	1.00	1.12	0.65	<b>0.27*</b>	0.03	0.38	0.35
<i>Oranges</i>	0.00	0.22	0.32	0.01	0.63	0.66	0.66	0.25	0.37	0.17	0.17	0.09	0.18	<b>0.36*</b>	0.04	1.05	0.01
<i>Soybean Oil</i>	0.02	0.20	<b>0.78*</b>	0.21	0.13	0.19	0.19	<b>0.54**</b>	<b>0.82**</b>	0.24	<b>1.22*</b>	<b>5.13**</b>	0.51	<b>0.43**</b>	<b>0.84**</b>	<b>2.38**</b>	0.05
<i>Soybeans</i>	0.04	0.01	0.11	0.08	0.89	0.62	0.62	<b>0.59**</b>	<b>1.08**</b>	0.02	<b>1.31*</b>	<b>2.52*</b>	1.08	0.05	<b>2.02**</b>	<b>2.91**</b>	1.27
<i>Soybean Meal</i>	0.02	0.26	0.03	0.08	<b>3.23*</b>	0.01	0.01	0.14	0.32	0.02	0.04	1.61	0.30	0.00	0.01	1.09	0.66
<i>Sugar</i>	0.01	0.07	0.10	0.32	0.29	0.55	0.55	0.03	0.00	0.27	0.31	1.87	0.01	0.00	0.02	<b>1.26*</b>	0.14
<i>Wheat</i>	0.00	0.01	0.01	0.00	0.29	0.98	0.98	0.08	0.07	0.31	0.00	1.33	0.50	0.00	0.02	0.19	0.02
<i>Wool</i>	<b>0.53**</b>	<b>1.34**</b>	0.31	<b>8.51***</b>	0.01	<b>16.97***</b>	0.01	<b>1.81***</b>	<b>2.23***</b>	<b>0.99**</b>	0.55	<b>5.45***</b>	0.02	<b>0.33*</b>	<b>2.83***</b>	<b>7.61***</b>	0.93
<i>Yellow Corn</i>	0.01	0.02	0.20	0.52	0.02	<b>4.14**</b>	0.02	0.34	0.49	0.50	0.48	<b>4.18**</b>	0.17	0.02	0.25	0.74	0.02
<i>Coal</i>	<b>0.34*</b>	<b>2.29***</b>	0.00	0.79	0.19	0.06	0.06	0.06	<b>0.73*</b>	<b>0.85*</b>	0.23	0.00	0.05	0.03	0.19	<b>3.68*</b>	<b>4.20**</b>
<i>Heating Oil</i>	0.24	<b>1.89**</b>	0.00	<b>14.42***</b>	<b>9.89**</b>	<b>8.05*</b>	0.06	0.12	0.16	0.03	0.22	1.71	6.56	0.45	<b>2.86**</b>	0.13	<b>17.36**</b>
<i>Natural Gas</i>	0.33	0.92	<b>2.67**</b>	0.37	0.75	3.50	3.50	0.16	0.19	0.17	0.62	0.19	2.93	<b>1.34**</b>	<b>2.45**</b>	0.86	0.69
<i>Unleaded Regular Gas</i>	0.54	<b>1.82*</b>	0.06	<b>20.98***</b>	1.04	<b>16.66**</b>	0.06	0.06	0.06	0.00	0.24	2.49	<b>11.43**</b>	0.63	0.00	0.97	7.21
<i>WTI Oil</i>	<b>0.30*</b>	<b>0.92*</b>	0.00	<b>4.78***</b>	<b>2.81*</b>	1.06	1.06	0.23	0.48	0.03	0.16	2.03	0.72	0.12	0.09	0.16	<b>1.27*</b>
<i>Aluminium</i>	<b>0.44*</b>	<b>0.84*</b>	0.33	<b>3.57***</b>	<b>2.51*</b>	0.15	0.15	0.03	<b>0.85*</b>	0.50	0.21	0.33	0.02	0.00	0.06	0.12	0.90
<i>Gold</i>	0.14	0.40	0.07	<b>3.36***</b>	0.68	0.65	0.65	0.07	0.25	0.06	0.03	<b>3.13**</b>	0.39	0.08	<b>0.98**</b>	<b>2.32**</b>	0.05
<i>High Grade Copper</i>	0.02	<b>0.94*</b>	0.25	<b>1.94**</b>	0.09	0.00	0.00	0.14	0.26	0.13	0.02	<b>2.95**</b>	0.42	0.01	0.02	<b>0.54*</b>	0.02
<i>Nickel</i>	0.00	0.81	0.21	2.94	0.34	0.40	0.40	0.11	0.04	1.24	1.67	1.00	1.33	0.05	<b>2.56*</b>	0.02	0.29
<i>Palladium</i>	0.39	0.40	0.06	1.37	0.04	1.94	1.94	<b>2.09***</b>	0.69	<b>2.44**</b>	0.94	3.76	2.35	<b>0.99*</b>	0.00	2.41	1.76
<i>Platinum</i>	0.09	0.14	0.00	0.20	0.05	0.34	0.34	0.05	0.00	0.43	0.18	1.00	0.24	0.00	0.03	0.00	1.13
<i>Silver</i>	0.03	0.13	0.02	<b>2.04**</b>	0.90	0.36	0.36	0.03	0.25	0.06	0.01	<b>3.33**</b>	0.03	0.00	0.17	0.14	0.00
<i>Tin</i>	<b>0.39*</b>	0.53	0.27	0.00	0.06	2.39	2.39	<b>0.53**</b>	0.33	<b>1.07**</b>	0.00	<b>3.25**</b>	1.11	0.07	0.10	<b>1.64**</b>	0.03
<i>Zinc</i>	<b>0.35*</b>	<b>1.31**</b>	0.01	<b>1.26*</b>	1.01	1.50	1.50	0.25	0.01	<b>1.56**</b>	0.95	1.11	<b>4.60**</b>	0.03	0.32	0.00	0.71



Table A5: In-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	dy			ep			erp					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	0.01	0.00	0.00	0.02	<b>2.38**</b>	<b>1.48*</b>	0.01	0.00	0.01	0.00	1.05	0.04
<i>Cocoa</i>	0.02	0.26	0.11	0.26	0.11	0.14	0.00	0.07	0.18	0.20	0.04	0.12
<i>Coffee Arabica</i>	0.04	0.00	0.02	0.32	0.18	0.00	0.05	0.12	0.11	<b>4.17**</b>	0.04	<b>10.27**</b>
<i>Corn Oil</i>	0.31	<b>0.84*</b>	0.14	0.84	<b>8.91***</b>	0.42	0.03	0.02	0.27	1.28	<b>5.39**</b>	0.18
<i>Cotton</i>	<b>0.49**</b>	<b>0.80**</b>	0.41	0.00	0.13	0.31	0.08	0.13	0.22	0.00	0.09	0.00
<i>Live Cattle</i>	0.10	0.03	0.22	0.00	0.08	0.04	0.01	0.16	<b>0.50*</b>	0.00	0.01	0.02
<i>Lean Hog</i>	0.00	0.00	0.00	0.03	0.09	0.20	0.01	0.06	0.00	0.25	0.01	0.84
<i>Milk</i>	<b>0.29*</b>	0.33	0.19	0.03	0.27	0.32	0.18	0.05	0.26	0.23	0.05	0.60
<i>Oranges</i>	<b>0.42**</b>	0.12	<b>0.61*</b>	0.08	1.67	0.03	0.21	0.07	0.31	0.01	0.52	0.09
<i>Soybean Oil</i>	<b>0.44*</b>	<b>1.01**</b>	0.12	<b>1.80**</b>	<b>6.55***</b>	0.00	0.07	0.03	0.32	0.85	<b>3.26**</b>	0.00
<i>Soybeans</i>	0.07	0.06	0.07	<b>1.20*</b>	<b>2.61*</b>	0.47	0.05	0.31	0.02	0.78	0.51	0.77
<i>Soybean Meal</i>	0.00	0.00	0.02	0.19	0.91	0.15	0.17	0.31	0.09	0.79	0.03	1.27
<i>Sugar</i>	0.00	0.02	0.02	0.52	<b>1.19*</b>	0.19	0.00	0.00	0.00	0.36	0.08	<b>1.23*</b>
<i>Wheat</i>	0.00	0.08	0.02	0.00	0.14	0.06	0.01	0.03	0.05	0.03	0.03	0.02
<i>Wool</i>	<b>0.44**</b>	0.14	<b>0.82**</b>	<b>1.84***</b>	<b>6.65***</b>	0.32	0.10	0.20	<b>1.05**</b>	<b>2.26***</b>	<b>2.45**</b>	<b>2.02**</b>
<i>Yellow Corn</i>	0.02	0.15	0.00	0.21	0.63	0.03	0.00	0.06	0.11	0.01	0.44	0.13
<i>Coal</i>	0.03	0.64	0.06	0.13	<b>4.11*</b>	<b>5.17**</b>	0.06	0.06	0.42	0.19	2.30	<b>4.14*</b>
<i>Heating Oil</i>	0.55	<b>2.92**</b>	0.02	0.34	0.22	<b>19.64***</b>	0.07	1.07	0.04	0.04	0.20	0.02
<i>Natural Gas</i>	<b>1.46**</b>	<b>2.55**</b>	0.52	0.42	1.97	0.01	0.92	<b>1.88*</b>	0.27	0.17	2.38	0.01
<i>Unleaded Regular Gas</i>	0.76	<b>2.66**</b>	0.09	0.07	1.05	<b>9.06*</b>	0.20	0.88	0.02	2.15	1.34	1.50
<i>WTI Oil</i>	0.15	0.12	0.22	0.00	0.07	<b>1.12*</b>	0.09	0.17	0.01	0.07	0.01	0.19
<i>Aluminium</i>	0.00	0.08	0.10	0.00	0.25	1.08	0.01	0.45	0.50	0.01	0.54	0.08
<i>Gold</i>	0.06	<b>0.74**</b>	0.04	<b>0.74**</b>	<b>2.55**</b>	0.01	0.07	<b>2.41***</b>	<b>0.71*</b>	0.17	<b>1.63**</b>	0.65
<i>High Grade Copper</i>	0.01	0.08	0.01	0.26	0.60	0.00	0.00	0.01	0.00	<b>1.89***</b>	0.19	<b>2.20**</b>
<i>Nickel</i>	0.05	<b>2.59*</b>	0.54	0.00	0.05	0.00	0.03	0.59	0.13	4.53	0.61	<b>11.10*</b>
<i>Palladium</i>	<b>1.07**</b>	0.00	1.22	2.50	2.15	1.49	0.37	0.00	0.60	0.36	5.55	0.06
<i>Platinum</i>	0.00	0.02	0.08	0.03	0.00	1.77	0.02	0.24	0.07	0.28	1.33	<b>3.08**</b>
<i>Silver</i>	0.00	0.12	0.15	0.12	0.66	0.00	0.10	0.21	<b>0.92**</b>	0.45	0.32	0.12
<i>Tin</i>	0.09	0.05	<b>0.71**</b>	0.14	<b>1.28*</b>	0.23	0.12	0.00	<b>0.95**</b>	<b>0.66**</b>	0.06	<b>1.46**</b>
<i>Zinc</i>	0.05	0.39	0.03	0.11	0.00	0.77	0.00	0.07	0.13	<b>1.12**</b>	0.01	<b>1.77**</b>

Table A5: In-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	infl				ltr				lty									
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	0.04	0.45	0.00	<b>1.38**</b>	0.24	1.34	0.06	0.39	0.01	0.24	0.16	1.70	0.14	<b>0.78*</b>	0.01	0.00	0.26	0.01
<i>Cocoa</i>	0.03	0.10	0.02	0.20	0.34	0.00	0.10	0.00	0.25	0.05	0.47	<b>5.47**</b>	<b>0.46**</b>	0.12	<b>1.38**</b>	0.13	0.11	1.83
<i>Coffee Arabica</i>	0.16	<b>1.74**</b>	0.16	0.33	0.24	4.69	0.41	0.10	<b>2.11**</b>	0.00	0.49	0.58	0.01	0.01	0.00	0.11	0.19	1.43
<i>Corn Oil</i>	0.11	0.59	0.13	0.21	0.02	1.46	<b>0.45*</b>	0.17	<b>0.90*</b>	0.16	1.53	0.01	<b>0.38*</b>	<b>1.36**</b>	0.01	0.11	0.08	0.01
<i>Cotton</i>	<b>0.56**</b>	0.40	<b>0.86**</b>	0.31	0.55	0.04	0.01	0.00	0.18	<b>1.40*</b>	0.77	<b>5.75**</b>	0.27	<b>1.32**</b>	<b>0.79*</b>	0.25	0.21	0.14
<i>Live Cattle</i>	0.00	0.00	0.01	<b>1.16**</b>	<b>1.47**</b>	<b>1.16*</b>	0.18	0.09	0.49	0.01	0.10	0.00	<b>0.46**</b>	<b>1.93**</b>	0.06	0.19	0.07	1.65
<i>Lean Hog</i>	0.05	0.06	0.08	0.14	0.89	0.06	0.20	0.02	<b>1.49**</b>	0.10	0.44	0.44	0.17	0.42	0.02	0.02	0.10	0.18
<i>Milk</i>	0.22	0.30	0.38	<b>2.98***</b>	<b>2.14**</b>	<b>3.00**</b>	<b>0.47**</b>	<b>0.67*</b>	0.44	1.04	1.92	0.86	<b>0.70**</b>	<b>2.39***</b>	0.03	0.03	0.01	0.00
<i>Oranges</i>	0.00	0.07	0.01	0.04	0.01	0.00	0.16	0.12	0.53	0.68	<b>5.19**</b>	0.80	0.10	0.29	0.01	0.06	0.69	0.04
<i>Soybean Oil</i>	<b>0.56**</b>	<b>1.16**</b>	0.08	0.69	0.88	0.61	0.23	0.00	<b>1.44**</b>	0.12	0.04	0.11	<b>0.33*</b>	<b>1.15**</b>	0.05	0.18	0.68	0.01
<i>Soybeans</i>	0.01	0.00	0.00	0.30	0.60	0.22	0.16	0.03	0.61	0.20	0.01	1.52	<b>0.51**</b>	<b>0.96**</b>	0.14	0.03	0.16	0.03
<i>Soybean Meal</i>	0.37	0.20	<b>0.76*</b>	0.01	0.30	0.01	0.01	0.00	0.04	0.18	0.06	0.06	0.30	0.48	0.18	0.04	0.08	1.10
<i>Sugar</i>	0.03	0.16	0.00	<b>2.58***</b>	<b>5.32***</b>	0.45	0.11	0.46	0.00	0.07	0.03	0.22	0.09	0.49	0.07	0.03	0.00	1.27
<i>Wheat</i>	0.23	0.27	0.16	0.02	0.41	0.51	0.00	0.14	0.28	0.19	0.36	0.41	0.32	<b>0.78*</b>	0.03	0.02	0.12	0.02
<i>Wool</i>	<b>0.50**</b>	0.30	<b>0.81**</b>	0.13	0.20	0.01	<b>0.93***</b>	<b>2.08***</b>	0.51	<b>4.51***</b>	0.06	<b>7.93***</b>	0.36	<b>0.81*</b>	0.04	0.23	0.28	0.15
<i>Yellow Corn</i>	0.02	0.07	0.02	0.15	0.01	0.29	0.00	0.06	0.02	0.14	0.10	0.91	<b>0.56**</b>	<b>1.47***</b>	0.02	0.01	0.00	0.01
<i>Coal</i>	0.15	0.16	0.06	<b>3.60***</b>	<b>3.51*</b>	2.62	0.23	<b>0.80*</b>	0.00	0.16	0.07	0.13	<b>0.43*</b>	<b>2.14***</b>	0.04	0.22	0.00	0.52
<i>Heating Oil</i>	0.47	<b>1.42*</b>	0.45	<b>3.75*</b>	0.35	<b>11.80**</b>	0.37	0.66	0.17	1.89	1.34	0.38	0.42	1.13	0.08	0.08	0.30	1.28
<i>Natural Gas</i>	0.82	0.11	<b>1.55*</b>	0.14	0.91	0.01	0.12	0.26	0.99	3.33	0.44	2.13	<b>1.13**</b>	<b>2.60**</b>	0.23	0.18	0.80	0.10
<i>Unleaded Regular Gas</i>	<b>1.26**</b>	1.66	1.65	0.20	0.13	0.87	<b>2.04***</b>	1.42	<b>2.65**</b>	0.11	0.10	0.45	0.70	1.36	0.33	0.30	1.19	0.08
<i>WTI Oil</i>	0.00	0.01	0.00	<b>1.62***</b>	0.07	<b>4.23***</b>	<b>0.94***</b>	<b>1.23**</b>	0.56	<b>3.79***</b>	<b>2.64*</b>	<b>3.04*</b>	0.17	<b>1.08**</b>	0.06	0.33	<b>2.76*</b>	0.27
<i>Aluminium</i>	0.02	0.25	0.00	<b>2.48***</b>	<b>2.03*</b>	<b>2.12*</b>	<b>0.89***</b>	<b>1.48**</b>	0.68	<b>1.54*</b>	1.67	0.32	0.01	0.01	0.02	0.00	0.00	0.01
<i>Gold</i>	0.01	0.02	0.17	0.01	0.01	0.18	0.16	0.54	0.19	0.68	0.29	2.03	0.31	<b>2.35***</b>	0.28	0.02	1.98	<b>4.64**</b>
<i>High Grade Copper</i>	0.09	0.08	0.00	0.04	0.04	0.21	0.04	0.11	0.07	0.25	0.49	0.66	<b>0.39*</b>	<b>1.87***</b>	0.01	0.01	0.00	0.10
<i>Nickel</i>	0.43	<b>2.59*</b>	0.05	0.68	2.65	0.10	0.01	0.40	0.08	1.81	0.66	7.18	0.17	1.77	0.16	0.80	0.68	5.48
<i>Palladium</i>	0.21	<b>2.14**</b>	0.05	<b>3.78*</b>	<b>9.51**</b>	3.39	0.03	0.17	0.54	0.38	0.51	0.27	<b>1.02**</b>	0.05	<b>1.61*</b>	0.55	0.36	0.69
<i>Platinum</i>	<b>0.67**</b>	<b>0.73*</b>	<b>0.63*</b>	0.11	0.05	0.57	0.01	0.12	0.13	0.25	0.25	0.00	<b>0.38*</b>	<b>0.88**</b>	0.09	0.18	0.98	0.22
<i>Silver</i>	0.12	0.03	0.24	0.04	0.20	0.03	0.04	0.07	0.11	0.30	0.14	0.36	0.17	<b>1.86***</b>	0.42	0.45	1.61	0.11
<i>Tin</i>	0.03	0.05	0.07	0.32	0.30	0.36	<b>0.36*</b>	<b>1.07**</b>	0.09	0.26	0.51	0.24	<b>1.14***</b>	<b>2.27***</b>	0.10	0.00	0.62	1.12
<i>Zinc</i>	0.06	0.05	0.27	0.25	0.35	0.38	0.33	0.31	0.34	0.47	0.80	0.00	<b>0.33*</b>	<b>1.90***</b>	0.08	0.05	0.03	0.09

Table A5: In-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	snar				tbl				tms									
	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec						
<i>Butter</i>	0.00	0.01	0.00	<b>0.88**</b>	0.84	0.56	0.16	<b>0.85**</b>	0.05	0.02	1.27	0.02	0.01	0.15	0.09	<b>4.94**</b>	0.01	
<i>Cocoa</i>	0.22	<b>0.80**</b>	0.00	0.57	<b>2.13**</b>	0.06	<b>0.92***</b>	0.47	<b>1.15**</b>	0.24	0.31	1.76	<b>0.45*</b>	0.49	0.19	0.72	0.04	
<i>Coffee Arabica</i>	0.02	0.01	0.10	0.05	0.36	2.86	<b>1.03**</b>	0.40	0.08	0.00	1.16	4.47	<b>2.38***</b>	<b>2.05**</b>	0.17	0.31	4.75	<b>8.95**</b>
<i>Corn Oil</i>	<b>0.69**</b>	<b>2.69***</b>	0.03	1.19	0.04	1.90	0.34	<b>1.09**</b>	0.01	0.11	0.08	0.02	0.00	0.20	0.01	0.03	0.01	
<i>Cotton</i>	<b>0.39**</b>	<b>1.54***</b>	0.00	0.02	0.73	0.71	<b>0.41*</b>	<b>1.54***</b>	0.59	0.72	0.24	0.65	0.12	0.00	0.01	<b>1.27*</b>	0.11	1.27
<i>Live Cattle</i>	<b>0.55**</b>	<b>1.23***</b>	0.17	<b>1.08**</b>	<b>1.91**</b>	<b>1.40*</b>	<b>0.78**</b>	<b>2.39***</b>	0.02	0.26	0.01	2.10	0.25	0.01	<b>0.78*</b>	0.12	0.17	0.33
<i>Lean Hog</i>	0.10	<b>0.60*</b>	0.07	0.01	0.14	0.40	0.19	0.62	0.00	0.05	0.50	0.09	0.00	0.03	0.02	0.97	1.95	0.05
<i>Milk</i>	0.00	0.00	0.00	0.70	0.00	<b>1.62**</b>	<b>0.55**</b>	<b>2.78***</b>	0.00	0.40	0.03	0.65	0.02	0.00	0.17	<b>1.81**</b>	0.06	<b>4.29**</b>
<i>Oranges</i>	0.01	0.00	0.04	0.73	1.56	0.08	0.13	0.42	0.03	0.06	0.50	0.03	0.01	0.02	0.05	0.01	0.00	0.00
<i>Soybean Oil</i>	<b>1.14***</b>	<b>3.01***</b>	0.12	<b>1.13*</b>	1.14	0.13	<b>0.84***</b>	<b>1.96***</b>	0.03	0.10	0.71	0.06	<b>0.66**</b>	0.36	<b>0.87*</b>	0.01	0.22	0.14
<i>Soybeans</i>	<b>1.30***</b>	<b>2.38***</b>	0.48	<b>1.37*</b>	0.54	1.13	<b>1.06***</b>	<b>1.42**</b>	0.59	0.00	0.13	0.19	<b>0.58**</b>	0.11	<b>1.29**</b>	0.25	0.00	0.45
<i>Soybean Meal</i>	<b>0.39*</b>	0.20	0.65	0.02	0.25	0.01	<b>0.59**</b>	0.69	0.66	0.18	0.03	1.25	0.34	0.06	<b>1.42**</b>	0.63	0.07	0.23
<i>Sugar</i>	0.10	0.16	0.09	0.05	0.05	0.29	0.23	<b>0.93*</b>	0.00	0.00	0.10	2.43	0.18	0.24	0.56	0.14	0.85	1.67
<i>Wheat</i>	0.12	0.02	0.42	0.13	0.10	0.00	<b>0.37*</b>	<b>0.96**</b>	0.10	0.10	0.00	0.12	0.02	0.00	0.18	0.27	0.79	1.64
<i>Wool</i>	<b>1.28***</b>	<b>4.30***</b>	0.03	0.34	0.35	0.13	<b>0.95***</b>	<b>1.37**</b>	0.41	0.99	0.97	0.58	<b>0.79**</b>	0.25	<b>1.48**</b>	<b>2.59**</b>	<b>2.98*</b>	0.97
<i>Yellow Corn</i>	<b>0.45**</b>	<b>0.55*</b>	0.45	<b>0.65*</b>	0.55	0.40	<b>0.54**</b>	<b>1.27**</b>	0.18	0.03	0.00	0.03	0.00	0.16	0.59	0.08	0.00	0.03
<i>Coal</i>	0.20	0.01	0.60	1.24	1.04	1.25	<b>0.51*</b>	<b>4.23***</b>	0.06	0.70	0.01	2.04	0.05	<b>1.63**</b>	0.04	<b>1.94*</b>	0.01	<b>6.34**</b>
<i>Heating Oil</i>	0.00	1.12	0.10	<b>5.96**</b>	<b>6.36*</b>	5.90	0.14	1.21	0.03	0.38	0.13	1.38	0.07	0.32	0.01	1.03	0.04	0.34
<i>Natural Gas</i>	0.05	<b>2.43**</b>	0.02	<b>10.01**</b>	<b>11.36*</b>	<b>28.52**</b>	0.61	<b>2.30**</b>	0.04	0.06	1.06	0.34	0.02	0.34	0.14	0.08	1.22	2.16
<i>Unleaded Regular Gas</i>	0.02	0.03	0.11	<b>4.06*</b>	0.06	2.07	0.30	1.23	0.27	0.06	0.60	0.00	0.06	0.21	0.01	0.25	0.04	0.84
<i>WTI Oil</i>	0.05	<b>0.79**</b>	0.13	<b>1.15**</b>	0.01	1.38	0.08	<b>1.41**</b>	0.16	0.23	1.88	0.54	0.06	0.03	0.22	0.00	0.03	0.47
<i>Aluminium</i>	0.02	0.00	0.10	0.65	0.18	1.09	0.15	0.27	0.13	0.07	0.10	0.05	<b>0.34*</b>	<b>0.81*</b>	0.32	0.41	0.99	0.19
<i>Gold</i>	<b>0.66**</b>	<b>2.64***</b>	0.04	0.56	0.17	<b>2.82**</b>	<b>0.50**</b>	<b>4.96***</b>	0.45	0.00	1.56	<b>3.14*</b>	0.15	<b>1.78***</b>	0.31	0.20	0.03	0.33
<i>High Grade Copper</i>	<b>1.42***</b>	<b>0.64*</b>	<b>2.31***</b>	<b>1.01**</b>	0.34	0.53	<b>0.61**</b>	<b>2.47***</b>	0.01	0.10	0.03	0.50	0.16	0.05	0.17	0.40	0.25	0.94
<i>Nickel</i>	<b>0.64*</b>	0.86	0.56	0.97	2.65	1.72	0.65	1.72	0.24	0.67	0.75	3.54	0.69	0.42	<b>2.60*</b>	0.13	0.57	0.50
<i>Palladium</i>	0.03	1.26	0.13	0.11	0.29	0.36	0.57	0.16	<b>2.03**</b>	0.35	1.73	0.04	0.02	0.30	0.44	0.00	5.68	1.89
<i>Platinum</i>	0.04	0.26	0.07	0.02	0.25	0.12	<b>0.34*</b>	<b>0.72**</b>	0.22	0.06	1.97	0.22	0.00	0.10	0.30	0.11	<b>3.25**</b>	0.00
<i>Silver</i>	0.05	<b>0.50*</b>	0.03	0.06	0.00	0.53	0.11	<b>2.76***</b>	<b>0.73*</b>	1.15	1.31	0.03	0.01	0.23	0.54	<b>1.88**</b>	0.04	1.59
<i>Tin</i>	<b>0.71**</b>	<b>2.42***</b>	0.00	<b>0.68*</b>	<b>2.12**</b>	0.00	<b>1.68***</b>	<b>3.38***</b>	0.17	0.06	0.88	1.95	0.31	0.18	0.15	0.31	0.74	0.93
<i>Zinc</i>	0.00	0.05	0.02	0.36	0.29	<b>3.08***</b>	<b>0.37*</b>	<b>1.33**</b>	0.00	0.04	0.17	0.48	0.02	0.48	0.60	0.00	<b>3.33**</b>	0.97

Table A5: In-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	unrate					
	Exp	eExp	IExp	Rec	eRec	IRec
<i>Butter</i>	0.02	0.16	0.00	0.00	1.37	<b>5.80*</b>
<i>Cocoa</i>	0.06	<b>2.05**</b>	<b>1.71**</b>	0.67	0.13	<b>5.49*</b>
<i>Coffee Arabica</i>	<b>0.78**</b>	0.65	0.01	0.18	0.06	<b>8.05*</b>
<i>Corn Oil</i>	0.00	0.00	0.74	0.05	0.74	0.08
<i>Cotton</i>	0.17	0.07	<b>2.56***</b>	0.30	1.40	1.11
<i>Live Cattle</i>	0.01	0.47	<b>1.97**</b>	0.09	0.01	0.08
<i>Lean Hog</i>	<b>0.51*</b>	0.10	0.61	0.50	0.00	4.10
<i>Milk</i>	0.04	0.38	0.03	0.45	2.96	0.85
<i>Oranges</i>	0.12	0.37	0.01	0.05	0.18	0.55
<i>Soybean Oil</i>	0.21	0.21	0.64	0.87	2.77	0.09
<i>Soybeans</i>	0.17	0.09	0.45	0.16	1.79	0.07
<i>Soybean Meal</i>	0.08	0.08	0.32	0.01	0.15	0.12
<i>Sugar</i>	0.00	0.00	0.39	1.09	1.90	0.01
<i>Wheat</i>	0.01	0.06	0.60	0.17	1.88	0.01
<i>Wool</i>	0.10	0.01	0.44	0.28	2.02	0.06
<i>Yellow Corn</i>	0.00	0.06	<b>0.99*</b>	<b>2.15*</b>	<b>4.87*</b>	1.08
<i>Coal</i>	<b>0.73**</b>	<b>3.56***</b>	0.08	0.00	0.03	1.55
<i>Heating Oil</i>	0.33	1.23	0.04	0.00	1.79	<b>11.14**</b>
<i>Natural Gas</i>	0.80	1.14	1.10	0.23	0.32	0.14
<i>Untended Regular Gas</i>	0.71	1.23	0.08	0.02	3.39	7.07
<i>WTI Oil</i>	0.37	0.61	0.05	0.06	0.10	<b>9.25**</b>
<i>Aluminium</i>	0.03	0.44	0.01	0.00	0.12	1.29
<i>Gold</i>	0.07	<b>1.48**</b>	<b>0.91*</b>	0.25	<b>4.16*</b>	3.68
<i>High Grade Copper</i>	0.13	0.81	0.02	0.47	1.87	4.37
<i>Nickel</i>	0.09	0.77	0.23	1.64	0.99	0.12
<i>Palladium</i>	0.59	0.56	0.56	1.33	0.31	1.22
<i>Platinum</i>	0.24	0.90	0.01	0.52	0.49	1.36
<i>Silver</i>	0.09	0.54	0.68	0.22	3.82	<b>5.09*</b>
<i>Tin</i>	0.03	<b>1.02*</b>	0.29	0.38	1.41	0.39
<i>Zinc</i>	0.04	0.30	0.65	0.22	1.65	3.64

Table A6: Out-of-Sample Return Predictability and Business Cycle Stages (1 Month)

This table reports the out-of-sample  $R^2$ s of a regression of monthly excess returns on a constant and the lagged predictive variable across business cycle stages. We predict the next month's excess return. "de" denotes the dividend-payout ratio, " $\Delta$ indpro" the growth of industrial production, and " $\Delta$ MI" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "inf" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	de						$\Delta$ indpro						$\Delta$ MI						
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	
Butter	-0.94	<b>0.69**</b>	-1.23	-3.98	-0.11	-0.20	-0.75	<b>0.90**</b>	-0.69	-0.30	-1.32	-0.61	-1.19	-0.05*	-0.37	-3.02	-0.05*	-0.37	-3.02
Cocoa	-1.72	-0.57	-1.57	-1.62	-0.25	-2.15	-1.05	<b>0.12*</b>	-0.66	<b>1.07*</b>	-1.18	-2.10	-1.23	-1.18	-2.10	-1.23	-1.18	-2.10	-1.23
Coffee Arabica	-1.32	-2.12	-3.17				-0.73	<b>0.09</b>	-1.28					-0.34	-0.46	<b>0.76**</b>	-0.34	-0.46	<b>0.76**</b>
Corn Oil	-2.79	-1.49	-3.39	-5.04			<b>0.38***</b>	<b>0.69**</b>	<b>0.12*</b>	-0.45				-1.49	-1.82	-0.14	-1.49	-1.82	-0.14
Cotton	-2.31	-1.09	-2.04	-1.10	-2.49	-3.23	<b>0.00**</b>	-0.29	-0.77	-1.01				-2.05	-2.20	-1.44	-2.05	-2.20	-1.44
Live Cattle	-1.72	<b>0.44**</b>	-1.01	-2.40	-1.46	-2.68	-1.36	-1.33	-0.01	-0.82				-0.96	-2.68	-1.33	-0.96	-2.68	-1.33
Lean Hog	-1.29	<b>0.24**</b>	-0.29*	-2.18	-2.32	-1.90	-0.34	-0.65	<b>0.06*</b>	0.12				-1.10	-0.35	-0.80	-1.10	-0.35	-0.80
Milk	-1.34	-4.41	-1.72	-3.71	-2.91	-7.97	-0.45	-1.21	-0.21	-0.17				-0.94	-0.13	-0.60	-0.94	-0.13	-0.60
Oranges	-1.26	-1.66	-2.62	-2.42			-0.82	<b>1.01**</b>	-0.51	<b>0.77*</b>				-1.22	-0.67	-0.20	-1.22	-0.67	-0.20
Soybean Oil	-2.69	-1.22	-3.69	-1.74*			-0.62	-0.38	-0.67	-0.13				-0.74	-1.84	-1.27	-0.74	-1.84	-1.27
Soybeans	-2.49	-0.69	-2.52	<b>0.02**</b>			-0.66	-0.21	-1.08	-0.36				-1.32	-1.72	-2.45	-1.32	-1.72	-2.45
Soybean Meal	-2.82	-1.96	-2.47	-1.21*			-0.90	-0.34	-0.37	-0.29				-0.62	-4.29	-1.30	-0.62	-4.29	-1.30
Sugar	-1.19	<b>0.09**</b>	-1.20	-2.27	0.24	0.01	-1.26	-0.87	-0.25	<b>0.85*</b>				-0.17*	-0.80	<b>0.47*</b>	-0.17*	-0.80	<b>0.47*</b>
Wheat	-2.32	-1.06	-0.73	-2.79	-1.07	-1.97	<b>0.36***</b>	<b>0.35*</b>	-1.38	-0.16				-1.28	-0.10	<b>0.52*</b>	-1.28	-0.10	<b>0.52*</b>
Wool	-3.54	-1.36	-0.97	-15.75	<b>4.04**</b>	-10.70	-1.26	-0.18	-0.98	-1.46				-1.45	-0.08	-2.11	-1.45	-0.08	-2.11
Yellow Corn	-2.19	-0.38	-1.53	-1.79	<b>0.84*</b>	-1.81	-0.50	-0.73	-0.37	-5.52				-1.02	0.52	-1.10	-1.02	0.52	-1.10
Coal	-1.23	<b>4.23***</b>	-0.23*	-13.82			-1.63	-2.90	-0.33					<b>1.08**</b>	1.45	<b>2.24*</b>	<b>1.08**</b>	1.45	<b>2.24*</b>
Heating Oil	-0.98	0.17	-0.98				-0.63	-0.82	0.01					-1.91	-1.53	-1.51	-1.91	-1.53	-1.51
Natural Gas	-0.93	-0.53	-1.41				-1.49	-3.79	-0.83					-2.02	-2.37	-0.51	-2.02	-2.37	-0.51
Unleaded Regular Gas	-1.36	-0.06	-1.77				-0.73	-0.64	<b>1.61***</b>	0.27				-0.86	-1.42	-1.07	-0.86	-1.42	-1.07
WTI Oil	-2.64	-0.91	-2.29	-3.64	<b>2.07***</b>	<b>1.78**</b>	-0.41	-0.16	-0.49	<b>1.65**</b>				<b>0.00*</b>	-4.35	<b>1.67**</b>	<b>0.00*</b>	-4.35	<b>1.67**</b>
Aluminum	-1.29	-2.15	-1.96	-8.95	0.09		-0.64	<b>0.75**</b>	-0.82	-1.22				-1.42	-2.09	-1.87	-1.42	-2.09	-1.87
Gold	-3.25	-1.23	-1.33	-2.95	-2.67	-1.63	-1.02	<b>0.22*</b>	-0.98	<b>0.93*</b>				-1.44	-1.66	-2.52	-1.44	-1.66	-2.52
High Grade Copper	-0.70*	-0.66	-1.70	-2.60	-0.55	<b>1.27**</b>	<b>0.73*</b>							-1.76	-3.11	-1.20	-1.76	-3.11	-1.20
Nickel	-1.96	-3.12	0.30				-0.75	-0.99	-1.32					-1.14	-3.53	<b>0.33*</b>	-1.14	-3.53	<b>0.33*</b>
Palladium	-1.05						-0.66	-0.14	-0.58	<b>0.39*</b>				-0.62	<b>0.68*</b>	<b>1.03**</b>	-0.62	<b>0.68*</b>	<b>1.03**</b>
Platinum	-1.79	-1.20	-2.01	-5.08	<b>5.55**</b>	-2.36	-0.66	-0.49	-2.19	-0.96				-1.24	-2.40	<b>0.27*</b>	-1.24	-2.40	<b>0.27*</b>
Silver	-2.11	-1.18	-2.04	-2.59	-2.05		-1.01	-1.10	-0.53	-0.01									
Tin	-0.59**	-3.32	-0.10**	-2.63	<b>2.91***</b>	<b>1.39***</b>	-1.01	-1.10	-0.53	-0.01									
Zinc	-2.08	-1.29	-1.71	-2.04	-1.49	<b>5.63***</b>	-0.79	-0.51	-0.64	<b>2.24**</b>									

Table A6: Out-of-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>dfr</i>				<i>dfp</i>									
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec		
<i>Butter</i>	-0.94	-0.51	-0.77	-2.05	-0.62	-1.05	<b>0.58**</b>	-0.92	-2.11	-0.99	-2.03	-3.29	<b>2.43**</b>	-4.38
<i>Cocoa</i>	<b>0.42***</b>	-1.34	-1.25	-0.12	-2.20	-1.04	<b>0.44**</b>	-1.85	-1.84	<b>0.07**</b>	-0.73*	-1.10	-0.75	-3.66
<i>Coffee Arabica</i>	-0.27	-0.77	<b>2.13**</b>	-1.52	-1.62	-3.60	-0.79	-0.78	-3.31	-2.74	-2.04	0.53		
<i>Corn Oil</i>	-0.02**	-3.08	<b>0.41**</b>	-4.35	-1.73	-1.76	-1.64	-0.55	-0.96	-0.81	-0.72	0.11**		
<i>Cotton</i>	-1.25	-0.89	-1.41	-4.35	-0.96**	-0.95	-1.48	-0.55	-0.58**	-0.20*	-1.32	-2.85	-0.98	-3.98
<i>Live Cattle</i>	<b>0.22**</b>	<b>0.47**</b>	-0.33	-1.61	-1.82	-0.82	-2.12	<b>1.46**</b>	-2.37	-1.05	-3.05	-2.85	-1.01	-2.89
<i>Lean Hog</i>	-0.71	-0.46	-0.94	0.43	-1.62	<b>1.06***</b>	-1.49	-0.86	-1.55	-0.56*	-2.38	-1.98	-1.16	-3.48
<i>Milk</i>	-1.05	-0.08	-0.73	-0.52	-0.92	-1.50	-1.31	<b>2.00**</b>	-2.62	-0.74	-0.78	-3.76	-9.57	-3.39
<i>Oranges</i>	-1.83	-0.41	-1.28	-2.70	-0.67	-0.97	-0.41	-1.18	-1.86	-1.18	-1.07	-0.14		
<i>Soybean Oil</i>	-0.92	-1.50	-0.03	-2.64	-1.88	-2.40	-3.07	<b>0.84*</b>	-1.31	<b>0.34**</b>	<b>0.12**</b>	-1.67		
<i>Soybeans</i>	-0.88	-0.67	-0.79	-1.20	-0.94	-0.22	-1.18	<b>0.98*</b>	-1.22	-1.05	-1.30	<b>1.15**</b>		
<i>Soybean Meal</i>	-0.44	-1.68	-0.90	-2.54	-1.03	-0.67	-1.34	-0.69	-1.65	-1.94	-1.19	-0.81		
<i>Sugar</i>	-1.16	-3.06	-1.36	-0.62	-1.87	-2.81	-2.15	-2.33	-2.14	-0.99	-0.97	-1.44	-1.02	-1.08
<i>Wheat</i>	-1.14	-1.62	-1.18	-3.88	-0.84	-2.74	-0.65	-1.14	-2.17	-1.29	-1.45	-1.84	-3.83	-3.13
<i>Wool</i>	-0.58	<b>1.26***</b>	<b>0.18*</b>	<b>7.40***</b>	<b>1.28***</b>	-2.96	<b>1.66***</b>	-4.28	-1.17	<b>0.95***</b>	-1.76	<b>1.96***</b>	<b>5.46***</b>	-3.53
<i>Yellow Corn</i>	-0.70	-1.64	-0.32	-3.19	-1.54	-1.98	-0.57	0.12	-1.66	-2.04	-1.49	-1.28	<b>1.90**</b>	-1.96
<i>Coal</i>	-0.71	<b>1.35***</b>	-1.28	-4.29	-0.92	<b>0.27*</b>	-1.24	0.12	-1.20	<b>1.93***</b>	-0.87	-1.13		
<i>Heating Oil</i>	-1.44	<b>2.60**</b>	-0.90		-0.15	-0.43	-0.84		-2.29	<b>4.66***</b>	-1.33			
<i>Natural Gas</i>	-1.12	-0.06	<b>1.88*</b>		-1.02	-0.09	0.13		-0.70*	0.28	-0.27			
<i>Unleaded Regular Gas</i>	-0.26	<b>2.44*</b>	-0.52		-0.32	-0.75	-0.15		-1.01*	<b>2.25*</b>	-0.10			
<i>WTI Oil</i>	-2.05	-2.08	-0.81	<b>8.59***</b>	<b>0.07**</b>	-0.20*	-1.86	-1.94	-2.01	<b>1.12***</b>	-3.11	-2.39	-0.42	-0.33
<i>Aluminium</i>	-0.06**	<b>1.64***</b>	-0.73	<b>1.57**</b>	-0.26**	-1.05	-0.31	-0.03	-2.50	-1.07	-0.56*	-1.83	-4.87	
<i>Gold</i>	-1.31	-2.46	-1.23	<b>2.92***</b>	<b>0.63***</b>	-1.54	-1.93	0.00	-2.58	<b>0.85***</b>	<b>1.05***</b>	-0.83	<b>1.29**</b>	-2.16
<i>High Grade Copper</i>	-0.36	-2.43	-7.86	-1.91	-0.55*	-4.40	-0.37	-1.63	-1.95	-1.15	-0.84	-1.46	-0.79	-3.73
<i>Nickel</i>	-1.34				<b>1.93**</b>				-0.10*					
<i>Palladium</i>	-0.82	-0.01	-3.39		-0.94	0.55	<b>1.61**</b>		-0.46**		-0.07			
<i>Platinum</i>	-1.08	-1.05	-0.57	<b>0.78*</b>	-0.81	-1.35	-1.50	-0.66	-1.41	-1.40	-2.21	-4.30	-3.34	
<i>Silver</i>	-0.41	-0.74	-1.15	<b>2.43**</b>	-1.76	-2.16	-3.71	-0.14	-2.08	-0.28*	<b>0.55***</b>	-1.18	<b>0.07*</b>	-2.95
<i>Tin</i>	<b>0.01**</b>	<b>1.54***</b>	<b>0.43**</b>	-4.39	-0.41**	<b>1.06**</b>	-0.14*	-3.71	-2.27	<b>0.46**</b>	-2.35	-1.77	-0.44	-2.68
<i>Zinc</i>	-1.92	-1.46	-0.61	-3.10	-0.56*	-0.35	-0.44	-3.74	-2.60	-0.61	-1.30	-5.35	-2.62	-2.90

Table A6: Out-of-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	dy				ep				erp								
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	IRec				
<i>Butter</i>	-2.22	-0.92	-2.04	-3.14	-2.22	-3.04	-1.92	-1.25	-1.36	-3.46	-2.76	-15.98	-1.08	-0.42	0.54**	-0.43	4.19**
<i>Cocoa</i>	-2.13	-0.46*	-0.84	-1.50	-1.66	-4.42	-2.42	-0.85	-0.62	-2.13	-2.45	-6.39	-1.01	-0.96	0.45***	4.29***	-1.60
<i>Coffee Arabica</i>	-3.17	-2.87	-2.03				-2.69	-1.23	-0.39				-1.19	-1.04			
<i>Corn Oil</i>	-1.02	-0.95	-0.83	-1.37	-1.38	-5.15	-2.75	-1.00	-1.31	-0.81*	-2.86	-3.52	-1.50	-1.58	-1.41	0.95	3.78***
<i>Cotton</i>	-0.59**	-0.42*	-1.35	-0.20*	-1.04	-2.69	-2.79	-0.23*	-1.95	-1.82	-1.77	-2.78	-1.60	-4.79	-1.15	1.46***	
<i>Live Cattle</i>	-2.39	-0.83	-2.90	-2.73	-1.04	-2.02	-2.18	-0.29*	-2.58	-2.41	-1.77	-2.78	-1.12	-1.99	-0.68	0.23**	-1.37
<i>Lean Hog</i>	-1.66	-0.81	-2.27	-1.62	-1.02	-2.38	-1.77	-0.92	-2.41	-1.40	-1.00	-1.16	-1.28	-2.96	-1.14	-1.63	-4.26
<i>Milk</i>	-3.18	-0.85	-0.84	-3.17	-10.27	-7.86	-2.41	-3.94	-0.06**	-2.66	-7.08	-7.49	-1.81	-0.44	-0.24	-1.00	0.12
<i>Oranges</i>	-1.84	-1.12	-1.07	-0.21	-1.32	-1.27	-1.32	-1.27	-0.61	-3.25	-1.32	-0.61	-0.47	-0.78	-0.26	-0.81	-2.44
<i>Soybean Oil</i>	-1.57	-0.07*	-0.20**	-2.06	-2.99	0.35***	-2.99	0.35***	-0.06*	-3.18	-2.99	-0.06*	-0.77	-3.01	1.09***	1.05**	
<i>Soybeans</i>	-1.46	-0.69	-1.52	-0.36	-1.41	-1.18	-2.16	-0.18*	-1.09	-2.04	-2.31	-0.01*	-1.58	-4.61	-0.25	1.89**	-1.82
<i>Soybean Meal</i>	-1.63	-1.72	-1.27	-0.84	-1.71	-2.57	-1.71	-1.35	-1.41	-0.22*	-2.31	-0.01*	-0.89	-0.58	-0.74	0.84*	-1.89
<i>Sugar</i>	-2.46	-1.15	-1.19	-1.58	-1.41	-1.18	-1.84	-0.59	-1.52	-1.11*	-2.31	-0.01*	-1.09	-1.18	-1.72	-1.35	-1.89
<i>Wheat</i>	-2.21	-1.24	-1.71	-1.68	-3.67	-2.57	-2.39	-1.05	-1.76	-1.76	-2.22	-3.08	-0.81	-1.44	0.90***	-2.28	-1.40
<i>Wool</i>	-1.24	1.54***	-1.80	1.15***	3.52**	-1.34	-2.34	-0.03*	-1.66	-3.72	-0.79	-18.47	-1.49	1.30***	-0.77	1.01**	-0.69
<i>Yellow Corn</i>	-1.97	-2.11	-1.62	-1.31	1.66**	-1.93	-1.87	-0.67	-1.63	-2.78	-0.02	-2.76	-1.01	-1.10	0.12**	-1.03	-5.35
<i>Coal</i>	-1.38	1.96***	-1.07	-1.46	-5.17	-0.66	-0.77*	-1.05	-0.40	-2.61	-0.02	-2.76	-1.06	-1.57	-1.09	-1.41	
<i>Heating Oil</i>	-2.12	4.74**	-1.39		-2.09		-2.09	1.05	-0.93				-1.76	-1.76	0.21		
<i>Natural Gas</i>	-0.55*	0.28	-0.35		-0.18*	0.84	-0.18*	0.84	-0.23				-0.32	-0.59	-0.78		
<i>Unleaded Regular Gas</i>	-1.01*	2.98**	-0.16		-1.32	0.44	-1.32	0.44	-0.09				-2.17	-1.90	-1.32		
<i>WTI Oil</i>	-1.64	1.11***	-3.42	-2.26	-1.15	-0.66	-1.52	0.81***	-5.77	-3.08	-1.82	-4.23	-2.46	-2.61	-1.82	-1.31	-2.26
<i>Aluminium</i>	-2.04	-0.97	-0.54*	-2.09	-5.17	-2.45	-1.85	-2.20	-0.54	-3.42	-0.91	-3.65	-1.26	-1.03	-0.93	-2.34	1.44
<i>Gold</i>	-3.17	1.19***	0.84***	-0.87	1.55**	-2.45	-3.07	0.98***	1.23***	-1.52	1.00**	-3.17	-1.32	-1.52	-1.69	-0.80	-0.12
<i>High Grade Copper</i>	-2.45	-1.01	-0.96	-2.20	-1.20	-3.90	-0.90	-0.56	-0.66	-2.03	-2.72	-3.17	-0.24**	0.45***	-1.36	0.03**	-0.89
<i>Nickel</i>	-0.01*						-0.15						-1.02				
<i>Palladium</i>	-0.33**	-3.11	-0.01	-2.89	-3.69		-0.61*	-3.11	-0.68	-2.59	0.53		-1.53	-0.63	-0.78		
<i>Platinum</i>	-1.49	-1.85	-2.23	-2.89	0.04	-2.82	-1.60	-0.86	-2.78	-2.59	0.53		-0.85	-1.02	-1.41	-1.20	0.42
<i>Silver</i>	-2.22	-0.64	0.44***	-1.16	0.04	-2.82	-2.44	-0.58	0.69***	-1.40	-1.00	-4.90	-1.03	-0.38	-1.12	-0.41	-0.49
<i>Tin</i>	-2.78	0.11**	-2.29	-3.13	-1.73	-2.43	-1.30	-2.89	-1.19	-2.13	-1.84	-1.89	-4.71	-3.28	-0.88	2.37***	1.05**
<i>Zinc</i>	-2.55	-0.70	-1.36	-5.97	-2.87	-3.45	-2.75	-0.97	-1.09	-2.58	-1.34	-4.19	-0.52	-2.11	-0.53	-0.64	-1.92

Table A6: Out-of-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>infl</i>					<i>lty</i>							
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	
<i>Butter</i>	-1.02	-0.15*	-0.70	<b>0.24*</b>	-0.36	0.39	-0.50	-0.53	-0.99	-1.54	-1.26	-1.59	-1.90
<i>Cocoa</i>	-0.33*	<b>1.22***</b>	-1.05	<b>0.49**</b>	-0.03	-3.44	-0.62	-3.44	-2.15	-3.35	-0.91*	-1.24	-2.14
<i>Coffee Arabica</i>	-0.89	-0.47	-2.41				-1.27	-1.00	<b>1.62**</b>		-3.88	-0.81	-1.23
<i>Corn Oil</i>	-1.59	<b>0.25*</b>	-3.05	-3.95	-1.04	-1.26	-0.84	-2.34	-1.93	-1.63	-1.41	-3.02	-3.30
<i>Cotton</i>	-0.84	-0.09*	-1.35	-0.90	-0.47	<b>1.19**</b>	-1.96	-0.97	-0.17	-2.78	-0.41**	-0.57	-1.06
<i>Live Cattle</i>	-0.75	-0.75	-2.31	-0.33	-0.47	<b>1.19**</b>	-0.83	-0.90	-1.49	-3.71	-1.21	-2.89	-3.61
<i>Lean Hog</i>	-0.33*	-2.08	-0.74	-1.23	-0.97	-2.52	<b>0.09**</b>	-0.94	<b>2.19***</b>	-1.77	-1.83	-2.50	-3.21
<i>Milk</i>	<b>0.14**</b>	<b>1.12***</b>	<b>1.11***</b>	<b>2.29***</b>	<b>2.61**</b>	-2.84	<b>0.08**</b>	-0.12	-0.22	0.14	<b>0.13***</b>	-0.30*	-1.34
<i>Oranges</i>	-1.14	-0.66	-0.19	-1.91			-0.68	-0.36	-0.75	-1.07	-1.30	-1.30	-1.19
<i>Soybean Oil</i>	-0.96	<b>0.04*</b>	-0.73	-0.78			<b>0.11**</b>	-2.25	<b>1.23***</b>	-1.12	-1.16	-2.75	-2.49
<i>Soybeans</i>	-1.45	-1.11	-2.42	-0.83			-0.57	-1.36	-0.54	-2.45	-1.28	-2.26	-3.21
<i>Soybean Meal</i>	-1.11	-1.48	-1.81	-2.05			-0.72	-1.13	-1.57	-0.76	-1.43	-3.07	-3.59
<i>Sugar</i>	-1.08	-0.45	-2.09	-0.06*	<b>4.85***</b>	-1.74	-0.92	-1.16	-1.98	-5.99	-1.82	-1.96	-2.78
<i>Wheat</i>	-0.94	-0.54	-0.82	-0.82	-4.72	-1.74	-1.35	-1.82	-0.47	-2.13	-1.32	-1.42	-3.51
<i>Wool</i>	-1.40	<b>1.28***</b>	-2.99	-0.55	0.07	-0.37	-1.05	-0.64	-0.38	<b>4.77***</b>	-2.44	-3.08	-3.86
<i>Yellow Corn</i>	-0.58	<b>0.06**</b>	-0.67	-2.05	-2.32	-2.87	-0.58	-1.76	-1.29	-1.37	-1.55	-2.65	-2.30
<i>Coal</i>	-0.78	-0.90	-1.00	<b>10.31***</b>			-0.96	-0.04	-1.78	-0.60	-1.64	<b>0.87**</b>	-3.05
<i>Heating Oil</i>	<b>0.88**</b>	<b>2.60**</b>	0.26				-1.83	0.10	-0.34		-1.78	<b>2.06**</b>	-0.73
<i>Natural Gas</i>	-0.46	-1.05	0.88				-1.16	-0.41	-1.09		-1.23	1.05	-1.11
<i>Unleaded Regular Gas</i>	<b>2.22***</b>	<b>4.15**</b>	<b>2.87**</b>				<b>0.83**</b>	0.80	<b>2.01*</b>		-1.62	<b>1.89*</b>	-0.70
<i>WTI Oil</i>	-0.35*	<b>0.32**</b>	-0.44	<b>4.60***</b>	<b>1.24**</b>	<b>7.18***</b>	-0.21*	<b>0.41**</b>	-0.22	<b>3.59***</b>	-1.00	<b>2.18***</b>	-1.89
<i>Aluminum</i>	<b>0.64***</b>	-1.03	-0.79	<b>6.02***</b>	0.82		<b>0.34***</b>	<b>1.39***</b>	<b>0.03*</b>	0.26	-0.72*	-1.67	-1.04
<i>Gold</i>	-0.82	-0.11*	<b>1.81***</b>	-1.42	-0.73	-0.86	-0.85	-1.33	-1.16	-1.49	-0.76*	<b>0.49**</b>	-1.00
<i>High Grade Copper</i>	-1.04	-0.99	-0.04*	-1.37	-0.82	-0.55	-1.81	-0.89	-4.90	-2.28	-1.38	-1.23	-0.89
<i>Nickel</i>	-0.97						-2.46				<b>0.21*</b>		
<i>Palladium</i>	-1.76	<b>3.13**</b>	-3.60	-1.40	-0.05		-1.13	-0.42	-0.79	-1.45	-0.50	-4.19	-0.18
<i>Platinum</i>	-0.39	<b>0.83**</b>	-1.33	-1.40	-0.05		-1.57	-3.46	-0.88	-1.45	-2.06	-1.05	-2.64
<i>Silver</i>	-0.17**	-1.34	<b>1.22***</b>	-0.76	-1.15	-0.87	-0.73	-1.91	-1.40	-2.63	-2.83	<b>0.02**</b>	-1.64
<i>Tin</i>	-0.95	-2.57	<b>0.23**</b>	-0.17	-1.65	-2.04	-0.35	-0.35	-1.07	-3.08	-0.36***	<b>2.99***</b>	-2.86
<i>Zinc</i>	-0.75	-0.19*	-0.33	-1.78	-0.19	-1.61	-0.96	-2.30	<b>0.31**</b>	-0.45	-1.42	<b>0.57***</b>	-2.30



Table A6: Out-of-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	svar					tbl					tms				
	Exp	eExp	lExp	Rec	lRec	Exp	eExp	lExp	Rec	lRec	Exp	eExp	lExp	Rec	lRec
<i>Butter</i>	-2.54	-2.88	-0.55	-0.57	-0.17	-1.65	-1.50	-0.93	-3.78	-0.45	-1.16	-1.54	-0.45	-2.37	
<i>Cocoa</i>	-18.70	-0.90	-25.35	-27.52	2.11**	-0.68*	1.57***	-0.76	-3.00	-2.00	-1.26	0.05*	-2.00	-1.25	
<i>Coffee Arabica</i>	-67.91	-1.59	-0.25	-6.43		-0.79	0.45*	-0.47	-4.52	-2.38	2.25***	0.91*	-2.38		
<i>Corn Oil</i>	-15.73	1.99***	-26.56	-6.43		-2.92	-1.84	-2.97	-4.52	-2.91	2.25***	0.91*	-2.38		
<i>Cotton</i>	-3.48	-5.62	-187.24	-13.25	1.10*	-0.42**	0.34**	-0.74	-1.64	-1.93	-1.36	0.27**	-1.93	-3.50	
<i>Live Cattle</i>	-5.45	-2.12	-9.51	-17.04	1.43**	-2.23	-1.83	-1.78	-3.50	-2.75	-1.71	-1.19	-2.16	-2.28	
<i>Lean Hog</i>	-3.72	-3.86	-5.72	-2.92	-1.37	-1.48	-1.71	-2.19	-3.22	-1.29	-1.33	-0.26	-1.24	-1.29	
<i>Milk</i>	-4.88	-1.37	-6.43	-4.47	-1.80	-1.61	0.77**	-0.08*	-0.76	2.48**	-1.71	-0.26	0.09**	2.48**	
<i>Oranges</i>	-11.83	-1.91	-14.13	-14.99		-2.00	-1.07	-0.63	-2.47	-2.87	-1.66	-0.84	-0.85	-2.87	
<i>Soybean Oil</i>	-7.42	0.30**	-2.09	-7.77		-1.52	-0.88	-2.57	-3.67	-1.67	-1.29	0.27*	-1.48	-1.67	
<i>Soybeans</i>	-9.69	1.19***	-19.80	-2.76		-1.16	-1.84	-1.42	-2.54	-2.68	-0.52*	-1.38	-0.53	-2.68	
<i>Soybean Meal</i>	-4.26	-1.74	-4.55	-4.07		-1.60	-1.80	-1.73	-3.38	-1.17	-1.31	-1.30	-0.95	-1.17	
<i>Sugar</i>	-2.55	-0.55	-25.76	-45.17	-0.04	-1.09	-1.08	-2.25	-4.94	-2.76	-1.18	-0.69	-1.43	-2.76	
<i>Wheat</i>	-1.66	-2.56	-18.54	-17.03	-2.53	-1.65	-0.82	-2.46	-2.91	-2.14	-1.25	-1.54	-1.72	-2.14	
<i>Wool</i>	-7.89	-3.22	-3.64	-5.78	-1.02	-1.76	0.75**	-2.58	-0.96	0.27	-1.83	-1.96	-3.75	0.27	
<i>Yellow Corn</i>	-3.65	-2.51	-6.82	-1.10	0.17	-1.55	-2.12	-1.76	-2.46	-1.91	-1.66	-1.33	-1.78	-1.91	
<i>Coal</i>	-2.01	-3.15	0.29*	-24.51		-1.84	2.16***	-2.02	-2.07	1.39	-1.16	-0.98	-0.90	1.39	
<i>Heating Oil</i>	-8.47	0.73	-0.06	-0.06		-1.84	2.63**	0.29	-0.33		-0.42	1.17*	-0.33		
<i>Natural Gas</i>	-1.12	0.12	-0.28			-2.30	0.54	-0.34			-1.10	-0.33	-1.04		
<i>Unleaded Regular Gas</i>	-43.73	-11.68	-0.06			-0.38	1.97*	0.24			-0.72	0.21	-0.24		
<i>WTI Oil</i>	-4.25	-2.20	-22.95	-8.76	0.05	-1.36	2.15***	-0.94	-2.23	-1.98	0.08**	0.38**	-1.15	-1.98	
<i>Aluminum</i>	-11.54	-0.84	-22.91	2.29***	-0.06	-0.19**	-1.37	-0.13*	-1.06	0.77*	0.22**	0.45**	-2.79	0.77*	
<i>Gold</i>	-76.78	-9.97	-6.61	-15.48	0.48	-2.70	2.53***	-0.80	-4.10	-2.37	-1.75	-0.85	-2.26	-2.37	
<i>High Grade Copper</i>	-0.11**	-3.22	1.31***	-25.57	-2.51	-1.53	0.48**	-0.58	-2.39	-2.94	-1.57	-2.09	-1.41	-2.94	
<i>Nickel</i>	-2.81					-0.96					-0.28				
<i>Palladium</i>	-3.20	0.07	-0.09	-8.42		0.27**	-4.92	0.82*		-0.41	-0.68	-3.11	-0.41		
<i>Platinum</i>	-2.17	-1.86	-22.11	-17.21	-1.34	-1.79	0.07**	-1.11	-1.49	-2.15	-2.06	-1.53	-1.60	-2.15	
<i>Silver</i>	-35.50	-1.65	-6.43	-17.21	-0.10	-3.77	0.03**	-1.43	-5.11	-2.81	-1.39	-1.75	-2.93	-2.81	
<i>Tin</i>	-12.48	-3.59	-8.99	-5.44	2.71**	-1.17	4.81***	-1.94	-4.82	-3.23	-1.55	0.00*	-0.68	-3.23	
<i>Zinc</i>	-11.37	-1.54	-7.84	-18.17	-0.14	-2.18	0.11**	-1.12	-3.80	-4.64	-1.57	-1.36	-1.03	-4.64	

Table A6: Out-of-Sample Return Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>unrate</i>				
	Exp	eExp	lExp	Rec	lRec
<i>Butter</i>	-0.90	-0.42	-1.45		
<i>Cocoa</i>	-1.25	<b>1.13**</b>	-0.01		
<i>Coffee Arabica</i>	<b>0.35**</b>	-3.21	-3.05		
<i>Corn Oil</i>	-2.04	-3.16	-0.11		
<i>Cotton</i>	-0.59	-2.97	<b>0.96**</b>		
<i>Live Cattle</i>	-1.28	-2.53	<b>1.31**</b>		
<i>Lean Hog</i>	-0.84	-0.29	-1.74		
<i>Milk</i>	-0.92	-0.26	-0.88		
<i>Oranges</i>	-1.02	-0.19	-1.37		
<i>Soybean Oil</i>	-2.20	-4.61	-1.26		
<i>Soybeans</i>	-1.26	-3.83	-1.49		
<i>Soybean Meal</i>	-1.01	-2.35	-2.73		
<i>Sugar</i>	-1.58	-2.36	-0.76		
<i>Wheat</i>	-1.18	-2.79	-2.81		
<i>Wool</i>	-1.26	<b>1.24**</b>	-1.33		
<i>Yellow Corn</i>	-1.55	-6.76	-0.76		
<i>Coal</i>	-0.20*	<b>7.26***</b>	-1.66		
<i>Heating Oil</i>	-0.62	<b>3.29**</b>	-0.78		
<i>Natural Gas</i>	-0.29	0.43	0.27		
<i>Unleaded Regular Gas</i>	-0.42	1.54	-0.32		
<i>WTI Oil</i>	-0.36*	<b>1.34**</b>	-1.35		
<i>Aluminium</i>	-1.15	-1.87	-0.79		
<i>Gold</i>	-2.12	0.04	<b>0.03*</b>		
<i>High Grade Copper</i>	-0.97	<b>0.30*</b>	-0.88		
<i>Nickel</i>	-2.05				
<i>Palladium</i>	-0.98	0.32	0.53		
<i>Platinum</i>	-1.21	-0.11	-2.07		
<i>Silver</i>	-1.84	-1.52	-0.59		
<i>Tin</i>	-0.84	<b>1.61**</b>	-0.06		
<i>Zinc</i>	-1.81	-1.52	-1.03		

Table A7: In-Sample Return Predictability and Business Cycle Stages (12 Months)

This table reports the in-sample  $R^2$ s of a regression of monthly excess returns on a constant and the lagged predictive variable across business cycle stages. We predict the next year's excess return. "de" denotes the dividend-payout ratio, " $\Delta$ indpro" the growth of industrial production, and " $\Delta$ MI" the growth of money supply M1. "uftr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "itr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	de												$\Delta$ MI											
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec						
Butter	0.01	0.13	0.48	0.00	0.19	0.91	0.30	0.16	0.25	1.43*	0.04	2.88*	0.50*	2.44***	0.25	5.67***	2.50	5.36*						
Cocoa	0.17	0.68**	0.13	0.23	2.14***	0.15	0.32	0.30	0.11	1.40*	0.02	4.59**	0.11	0.49	0.04	0.14	0.05	0.10						
Coffee Arabica	0.93**	1.11	2.41**	0.06	12.79**	14.13**	0.11	0.11	0.17	8.63***	11.00**	9.20*	0.69*	0.61	0.28	0.26	2.90	18.57*						
Corn Oil	0.86***	9.22***	4.39***	0.00	3.52***	1.21	0.05	0.13	0.07	0.33	0.03	0.42	0.19	0.15	0.05	0.08	0.37	0.23						
Cotton	2.28***	6.49***	0.22	0.08	3.76***	0.16	1.23***	1.67**	0.20	0.48	0.47	0.00	2.14***	0.16	3.07***	1.17	3.63	2.29						
Live Cattle	1.18***	3.96***	0.08	0.09	1.70**	0.00	0.90***	1.18**	0.08	0.02	0.00	0.03	0.29	0.53	0.11	4.46**	7.69**	4.52						
Lean Hog	0.54**	1.11**	0.00	3.22***	3.92***	3.19**	0.42*	0.82*	0.30	0.15	0.00	0.81	0.04	0.08	0.02	0.38	0.05	0.47						
Milk	0.04	0.03	0.95**	0.07	0.35	3.19**	0.02	0.00	0.00	0.82	0.30	1.74	0.00	0.36	0.00	3.10*	2.03	5.04*						
Oranges	0.23	0.66*	0.58	0.09	0.35	0.22	0.02	0.00	0.00	1.49*	2.52*	7.75***	0.00	0.92*	0.30	0.16	0.00	1.10						
Soybean Oil	0.55**	2.90***	0.79*	3.89***	3.49***	10.12***	0.65**	0.92*	0.13	1.15	0.00	5.06**	0.29	0.51	0.66	0.21	0.06	0.45						
Soybeans	1.03***	2.73***	0.01	0.91	23.87***	9.35***	1.45***	1.95***	0.32	1.17*	0.12	3.75*	0.13	0.01	0.39	0.00	1.00	0.75						
Soybean Meal	0.56**	0.39	0.37	0.96	20.91***	12.38***	0.28	0.12	0.31	0.14	1.10	0.85	0.28	0.00	0.68	0.52	4.25*	1.33						
Sugar	0.13	0.25	1.99***	0.08	0.46	2.89***	0.00	0.01	0.15	0.12	0.02	0.66	0.02	0.05	0.52	0.04	1.86	0.62						
Wheat	0.25	1.83***	1.83***	2.88***	0.55	2.46**	0.49**	1.42**	0.09	1.28*	0.27	5.64**	0.13	0.43	1.16*	0.04	2.18	1.18						
Wool	0.12	0.44	0.32	4.57***	0.00	5.89***	0.97***	1.11**	0.05	0.57	0.19	5.07**	0.72**	0.22	0.70	0.12	0.90	1.65						
Yellow Corn	0.00	0.63*	0.02	0.09	2.21***	0.06	0.29	0.05	0.88**	0.46	0.06	2.69*	0.32	6.10***	0.98*	0.12	0.84	1.22						
Coal	3.94***	1.48**	7.89***	2.18*	1.79	3.21	0.06	0.02	0.10	0.52	0.10	2.49	0.37	0.43	0.19	0.44	1.51	2.00						
Heating Oil	4.56***	14.04***	0.13	1.99	3.02	2.75	0.05	0.12	0.71	0.70	1.73	8.34	0.16	4.87***	1.21*	0.08	0.38	1.54						
Natural Gas	0.39	0.77	0.13	0.31	13.16**	0.82	0.30	0.02	1.61*	0.45	0.02	1.62	0.90*	8.77***	0.16	8.77**	0.29	18.57*						
Unleaded Regular Gas	2.30***	5.85***	0.25	9.32**	23.37***	1.29	0.15	1.02	0.17	1.74	0.62	2.43	0.34	2.34**	0.53	0.05	1.10	6.73						
WTI Oil	1.86***	0.17	6.75***	1.42***	4.04***	0.84	0.39*	5.37***	0.25	2.84**	1.70	9.54***	0.00	1.26*	1.40**	0.09	0.01	1.10						
Aluminium	1.72***	0.63*	2.04***	1.59**	0.31	1.86	0.10	0.02	0.26	0.10	0.77	0.37	0.38	0.13	1.53**	0.34	0.01	8.12*						
Gold	1.66***	0.25	6.00***	3.29***	2.44**	14.79***	0.00	0.54	0.35	1.43*	0.03	4.50**	2.09***	1.09*	4.01***	0.11	5.85*	0.02						
High Grade Copper	0.01	0.22	0.77**	2.50***	0.66	0.76	0.13	0.15	0.04	0.02	0.07	1.97	1.72***	0.21	6.27***	2.64*	1.19	7.27*						
Nickel	1.38**	0.00	14.80***	0.38	8.49	17.78*	0.28	0.74	1.48	0.53	0.97	5.45	0.01	2.97**	2.25*	0.09	0.02	4.01						
Palladium	0.78*	11.52***	2.72**	1.60	1.75	10.86*	0.62	0.03	2.00**	0.93*	2.15	9.03*	0.00	8.72***	0.05	0.00	0.35	0.03						
Platinum	0.05	1.03**	2.11***	3.23***	6.13***	0.10	0.20	0.18	0.21	2.61**	0.06	3.25**	0.75**	0.24	1.00*	0.47	1.17	0.12						
Silver	1.02***	0.59*	3.55***	0.50	0.01	0.23	0.25	0.22	0.37	1.00	2.62*	1.15	0.20	0.04	1.30**	0.36	0.21	0.73						
Tin	0.61***	0.08	3.53***	10.09***	0.16	15.98***	0.79**	1.15**	0.06	0.01	0.75	1.30	0.00	1.10*	0.50	0.42	1.52	0.63						
Zinc	0.42**	4.04***	1.00**	1.53***	1.46*	0.08	0.56**	1.60**	0.01	0.01	0.00	1.61	0.05	0.01	0.04	0.45	0.69	3.98						

Table A7: In-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>dfr</i>				<i>dfp</i>				<i>dp</i>						
	Exp	eExp	lExp	Rec	eRec	lRec	Rec	eRec	lExp	eExp	lExp	Rec	eRec	lRec	
<i>Butter</i>	0.05	0.00	0.17	0.39	<b>3.15*</b>	0.06	0.06	0.34	<b>12.27***</b>	0.63	0.03	0.03	0.14	<b>2.08***</b>	0.26
<i>Cocoa</i>	0.00	0.02	0.00	0.03	0.92	0.06	0.49	0.02	14.67***	0.08	0.01	0.01	0.21	<b>0.61*</b>	0.78
<i>Coffee Arabica</i>	0.25	0.14	0.59	0.28	0.15	0.63	0.13	0.00	<b>6.32*</b>	0.64	0.34	0.34	0.44	0.49	<b>9.78**</b>
<i>Corn Oil</i>	0.01	0.14	0.26	0.09	1.91	0.23	0.00	0.01	<b>1.80***</b>	0.93	0.16	0.16	<b>1.39**</b>	0.00	0.01
<i>Cotton</i>	0.01	0.01	<b>0.69*</b>	0.09	1.80	0.00	<b>3.98***</b>	<b>1.66***</b>	<b>11.12***</b>	<b>9.36***</b>	<b>1.63***</b>	<b>3.59***</b>	<b>3.59***</b>	0.26	<b>3.14***</b>
<i>Live Cattle</i>	0.29	0.52	0.04	0.08	<b>2.75*</b>	0.18	<b>6.32***</b>	<b>0.80*</b>	<b>13.86***</b>	<b>16.87***</b>	0.19	0.12	0.12	0.01	0.18
<i>Lean Hog</i>	0.01	0.03	0.00	0.14	2.20	0.28	0.83	<b>3.68***</b>	1.08	0.88	0.00	0.00	0.05	0.10	0.05
<i>Milk</i>	0.01	0.04	0.00	0.09	0.34	1.82	0.74	<b>0.72*</b>	<b>3.20***</b>	<b>6.33***</b>	<b>1.62***</b>	<b>1.97***</b>	<b>1.97***</b>	<b>3.52***</b>	<b>6.39***</b>
<i>Oranges</i>	0.03	0.08	0.24	0.15	0.45	0.10	<b>3.35***</b>	<b>1.59**</b>	1.12	2.37	0.00	0.25	0.25	0.54	1.02
<i>Soybean Oil</i>	0.04	0.02	0.10	0.25	<b>5.24**</b>	0.49	<b>4.71***</b>	0.05	<b>16.04***</b>	<b>10.73***</b>	0.03	<b>2.39***</b>	<b>1.15**</b>	<b>1.60**</b>	<b>4.72***</b>
<i>Soybeans</i>	0.04	0.19	0.15	0.01	0.80	0.04	<b>3.55***</b>	<b>3.74***</b>	<b>24.68***</b>	<b>12.85***</b>	0.00	0.16	0.04	0.38	<b>3.34**</b>
<i>Soybean Meal</i>	0.01	0.00	0.30	0.09	0.57	1.21	<b>3.45***</b>	0.23	<b>25.69***</b>	<b>9.53***</b>	0.08	0.02	0.16	0.74	2.72
<i>Sugar</i>	0.03	0.03	0.11	0.11	<b>6.65***</b>	0.02	0.46	0.10	12.43***	<b>2.84*</b>	0.11	0.04	0.04	<b>0.49*</b>	0.87
<i>Wheat</i>	0.15	0.07	0.08	0.10	0.23	0.63	<b>4.44***</b>	0.18	<b>8.81***</b>	<b>6.60***</b>	0.05	<b>0.79**</b>	<b>0.81**</b>	0.06	0.40
<i>Wool</i>	0.10	0.11	0.14	0.19	0.13	0.54	<b>7.35***</b>	<b>0.88*</b>	<b>6.19***</b>	<b>10.55***</b>	0.01	0.04	0.04	0.20	<b>2.78**</b>
<i>Yellow Corn</i>	0.11	0.23	0.00	0.25	0.04	1.11	<b>7.47***</b>	<b>1.10**</b>	<b>19.10***</b>	2.45	0.00	0.32	0.32	0.17	0.85
<i>Coal</i>	0.01	0.25	0.33	0.11	0.67	0.42	<b>2.04***</b>	0.24	<b>6.89***</b>	3.15	<b>2.96***</b>	<b>6.09***</b>	<b>1.45**</b>	<b>2.92**</b>	0.24
<i>Heating Oil</i>	0.24	0.65	0.24	0.02	<b>8.00*</b>	2.86	0.08	<b>4.14***</b>	<b>7.51*</b>	<b>18.06**</b>	<b>4.02***</b>	<b>41.76***</b>	0.19	<b>4.89*</b>	<b>15.25**</b>
<i>Natural Gas</i>	0.34	0.19	<b>2.22**</b>	1.81	0.49	<b>32.68**</b>	0.67	1.07	<b>11.10*</b>	<b>23.46**</b>	<b>5.91***</b>	<b>23.06***</b>	0.94	5.47	<b>46.12***</b>
<i>Unleaded Regular Gas</i>	0.20	0.26	0.41	0.06	1.33	3.66	0.05	<b>3.59***</b>	4.96	<b>28.67***</b>	<b>9.32***</b>	<b>36.91***</b>	0.63	0.81	<b>28.37***</b>
<i>WTI Oil</i>	0.05	0.03	0.15	0.54	<b>4.59**</b>	1.19	0.01	<b>1.96***</b>	<b>6.33***</b>	1.38	<b>1.52***</b>	<b>1.10**</b>	<b>1.60***</b>	<b>0.64*</b>	<b>2.43**</b>
<i>Aluminium</i>	0.28	0.37	0.27	0.00	<b>3.27**</b>	1.30	<b>1.88***</b>	<b>2.30***</b>	<b>6.10***</b>	0.22	0.00	0.44	0.44	<b>1.50**</b>	0.01
<i>Gold</i>	0.08	0.48	0.00	0.22	<b>4.34**</b>	0.12	0.05	0.02	<b>4.81**</b>	<b>13.65***</b>	<b>0.60***</b>	<b>5.19***</b>	<b>1.17***</b>	0.41	<b>9.78***</b>
<i>High Grade Copper</i>	0.16	0.27	0.19	0.21	1.23	0.67	<b>1.58***</b>	<b>1.85***</b>	<b>9.86***</b>	<b>2.85*</b>	<b>1.86***</b>	<b>1.17***</b>	<b>3.16***</b>	<b>2.49***</b>	<b>1.10*</b>
<i>Nickel</i>	0.61	0.46	1.08	0.00	2.32	9.01	<b>0.99*</b>	0.37	<b>9.34***</b>	4.48	0.76	<b>27.65***</b>	1.57	2.81	<b>58.07***</b>
<i>Palladium</i>	0.00	0.74	0.60	0.75	4.54	1.55	<b>7.88***</b>	0.86	<b>9.15***</b>	0.47	<b>1.16**</b>	0.28	0.93	<b>13.15***</b>	1.03
<i>Platinum</i>	0.03	0.00	0.25	0.14	1.79	0.47	0.00	0.40	0.00	<b>3.64**</b>	0.04	0.20	<b>0.71*</b>	0.79	<b>4.36***</b>
<i>Silver</i>	0.01	0.44	0.00	0.02	0.82	0.52	<b>2.33**</b>	0.05	<b>2.31***</b>	1.48	0.05	<b>2.74***</b>	0.16	<b>0.77**</b>	0.96
<i>Tin</i>	0.14	0.16	0.16	0.07	<b>4.16**</b>	0.02	0.15	0.10	<b>1.35**</b>	<b>7.89***</b>	0.22	<b>0.69*</b>	0.13	<b>2.81***</b>	<b>8.08***</b>
<i>Zinc</i>	0.01	0.08	0.11	0.06	<b>2.79*</b>	0.44	<b>0.95***</b>	<b>1.38**</b>	<b>7.40***</b>	0.72	<b>0.37**</b>	<b>0.61*</b>	<b>2.71***</b>	<b>1.41***</b>	0.12

Table A7: In-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	dy				ep				erp									
	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec
<i>Butter</i>	0.04	0.16	0.01	<b>2.91***</b>	0.71	0.52	0.01	0.01	0.01	<b>2.19***</b>	1.13	<b>2.01*</b>	0.18	0.16	0.05	<b>2.18***</b>	0.49	0.93
<i>Cocoa</i>	0.03	0.11	<b>0.62*</b>	0.53	<b>1.11*</b>	<b>1.07*</b>	0.20	0.00	<b>0.55*</b>	0.24	0.08	0.29	0.16	<b>0.80**</b>	0.00	<b>0.51*</b>	<b>3.13***</b>	0.24
<i>Coffee Arabica</i>	0.35	0.39	0.91	0.31	<b>8.35**</b>	0.00	0.00	0.13	0.00	0.29	<b>17.70***</b>	1.96	0.02	0.14	0.13	1.34	<b>6.08*</b>	0.22
<i>Corn Oil</i>	0.21	<b>1.14***</b>	<b>3.88***</b>	0.09	0.06	0.03	<b>1.14***</b>	0.53	<b>1.66***</b>	0.00	0.78	1.51	0.17	0.34	0.20	<b>1.90**</b>	0.96	1.12
<i>Cotton</i>	<b>1.62***</b>	<b>3.37***</b>	<b>0.51*</b>	0.35	0.97	<b>3.14***</b>	0.12	0.00	0.00	<b>0.66*</b>	0.06	<b>2.14**</b>	0.06	0.00	0.02	0.39	<b>1.45*</b>	0.00
<i>Live Cattle</i>	0.18	0.09	0.18	0.04	0.32	<b>1.62**</b>	0.09	<b>1.30***</b>	<b>0.56*</b>	0.15	0.17	0.00	0.00	0.10	0.01	0.46	<b>1.37**</b>	0.02
<i>Lean Hog</i>	0.00	0.10	0.00	0.11	0.13	0.09	<b>0.35**</b>	<b>1.01**</b>	0.01	<b>3.87***</b>	<b>3.05***</b>	<b>3.17***</b>	0.03	<b>0.61*</b>	0.06	0.03	0.06	0.08
<i>Milk</i>	<b>1.63***</b>	<b>2.05***</b>	<b>1.10**</b>	<b>4.96***</b>	<b>7.17***</b>	0.03	<b>2.51***</b>	<b>1.49***</b>	<b>3.96***</b>	<b>4.71***</b>	<b>8.80***</b>	1.38	0.08	0.32	0.12	<b>3.73***</b>	0.84	<b>2.33**</b>
<i>Oranges</i>	0.00	0.30	0.20	0.27	0.14	0.50	<b>1.07**</b>	<b>1.40**</b>	0.02	<b>1.07**</b>	0.00	<b>2.38*</b>	0.01	0.10	0.00	<b>1.28*</b>	0.24	1.58
<i>Soybean Oil</i>	0.02	<b>2.27***</b>	<b>1.30**</b>	<b>2.46***</b>	0.94	<b>6.53***</b>	0.09	0.12	<b>0.73*</b>	0.09	0.04	0.75	0.03	0.00	<b>0.63*</b>	<b>3.03***</b>	0.21	<b>2.11*</b>
<i>Soybeans</i>	0.00	0.23	0.06	0.76	<b>5.90***</b>	<b>4.22**</b>	<b>0.40*</b>	0.53	0.10	0.02	0.30	1.25	0.14	<b>0.65*</b>	0.14	<b>1.92**</b>	0.48	0.60
<i>Soybean Meal</i>	0.06	0.00	0.17	1.42	2.58	<b>4.16*</b>	<b>0.68**</b>	0.28	<b>0.82*</b>	0.01	1.96	<b>3.41*</b>	0.30	0.52	0.00	<b>3.06**</b>	1.78	2.17
<i>Sugar</i>	0.14	0.07	0.20	0.50	<b>2.31***</b>	0.77	0.01	0.32	0.18	<b>1.06**</b>	<b>1.07*</b>	0.56	0.20	0.22	0.27	0.01	0.45	0.02
<i>Wheat</i>	0.06	<b>0.70**</b>	<b>0.87**</b>	0.13	0.05	0.44	0.02	0.32	0.05	<b>1.59***</b>	0.20	<b>5.13***</b>	0.08	0.07	0.10	0.51	0.82	0.01
<i>Wool</i>	0.01	0.05	0.04	0.45	<b>6.49***</b>	<b>3.19**</b>	0.02	0.45	0.42	<b>1.85***</b>	<b>7.41***</b>	0.44	0.00	0.00	0.04	<b>1.49**</b>	<b>1.95**</b>	0.16
<i>Yellow Corn</i>	0.00	0.36	0.07	0.08	0.75	0.17	0.00	0.00	0.05	0.03	0.02	0.55	0.01	0.09	0.09	<b>0.57*</b>	0.12	0.23
<i>Coal</i>	<b>2.95***</b>	<b>5.88***</b>	<b>1.50**</b>	<b>2.70*</b>	<b>4.40*</b>	0.17	<b>0.48**</b>	<b>2.63***</b>	0.01	<b>8.96***</b>	<b>7.65**</b>	<b>5.11**</b>	0.00	0.10	0.06	0.18	1.00	0.15
<i>Heating Oil</i>	<b>4.07***</b>	<b>41.35***</b>	0.18	<b>4.64*</b>	<b>17.03***</b>	<b>15.93**</b>	<b>0.94*</b>	<b>14.17***</b>	0.49	<b>5.95**</b>	<b>21.06***</b>	6.73	0.01	0.01	0.01	0.08	2.60	2.12
<i>Natural Gas</i>	<b>6.13***</b>	<b>23.57***</b>	0.96	4.88	<b>42.63***</b>	<b>50.08***</b>	<b>5.13***</b>	<b>14.25***</b>	0.94	5.41	<b>52.02***</b>	<b>37.15**</b>	0.21	0.75	0.01	1.44	0.59	<b>36.69***</b>
<i>Unleaded Regular Gas</i>	<b>9.42***</b>	<b>36.59***</b>	0.67	0.62	<b>10.06**</b>	<b>29.45***</b>	<b>6.10***</b>	<b>17.02***</b>	1.24	2.58	<b>18.08***</b>	<b>16.73**</b>	0.01	0.01	0.04	0.81	0.83	4.07
<i>WTI Oil</i>	<b>1.50***</b>	<b>0.94**</b>	<b>1.66***</b>	<b>0.69*</b>	<b>6.41***</b>	<b>2.87***</b>	0.16	<b>1.76***</b>	0.02	0.04	<b>1.30*</b>	<b>6.62***</b>	0.00	0.35	0.11	0.03	0.37	0.06
<i>Aluminum</i>	0.00	0.47	<b>1.05**</b>	<b>1.51**</b>	<b>2.26*</b>	0.00	<b>0.88***</b>	0.01	<b>4.55***</b>	0.06	<b>4.16**</b>	1.60	0.04	0.10	0.05	0.01	0.41	0.21
<i>Gold</i>	<b>0.57**</b>	<b>4.76***</b>	0.00	<b>0.57*</b>	<b>10.59***</b>	<b>1.57**</b>	0.00	<b>6.68***</b>	<b>2.93***</b>	<b>5.53***</b>	<b>4.88***</b>	<b>6.13***</b>	0.03	0.40	0.06	0.33	0.99	0.32
<i>High Grade Copper</i>	<b>1.73***</b>	<b>0.99**</b>	<b>3.20***</b>	<b>3.21***</b>	<b>1.21*</b>	<b>1.48*</b>	<b>2.67***</b>	<b>1.95***</b>	<b>2.80***</b>	0.09	0.17	0.05	<b>0.28*</b>	<b>0.47*</b>	0.00	<b>1.38***</b>	<b>1.35*</b>	0.24
<i>Nickel</i>	0.83	<b>29.05***</b>	1.54	2.57	0.04	<b>57.49***</b>	<b>3.20***</b>	<b>23.61***</b>	0.46	2.97	<b>56.88***</b>	0.13	0.13	<b>3.18**</b>	0.00	0.23	0.48	9.51
<i>Palladium</i>	<b>1.00*</b>	0.42	0.88	<b>13.58***</b>	<b>27.81***</b>	1.20	0.45	<b>1.54*</b>	0.12	<b>8.40***</b>	<b>31.56***</b>	0.07	<b>0.72*</b>	<b>1.76*</b>	0.21	0.55	4.72	0.43
<i>Platinum</i>	0.03	0.27	<b>0.73*</b>	0.91	<b>4.31***</b>	<b>2.43*</b>	0.14	0.07	0.06	0.31	0.25	<b>4.39**</b>	0.26	0.60	0.00	0.21	0.02	1.08
<i>Silver</i>	0.06	<b>2.56***</b>	0.12	<b>0.98**</b>	0.02	<b>1.11*</b>	0.23	<b>4.73***</b>	<b>3.17***</b>	0.11	0.02	0.30	0.03	0.22	0.45	<b>0.54*</b>	0.61	0.14
<i>Tin</i>	0.19	<b>0.56*</b>	0.15	<b>3.00***</b>	0.38	<b>8.24***</b>	0.00	0.36	<b>0.67*</b>	<b>1.07**</b>	1.01	<b>1.14*</b>	0.15	<b>0.53*</b>	0.05	0.18	0.13	0.02
<i>Zinc</i>	<b>0.37**</b>	<b>0.60*</b>	<b>2.78***</b>	<b>1.50***</b>	<b>1.12*</b>	0.07	<b>1.38***</b>	<b>0.53*</b>	<b>2.01***</b>	0.03	0.04	0.01	0.01	0.01	0.02	0.01	0.07	0.31

Table A7: In-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	inflation						interest rate						money					
	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec
<i>Butter</i>	0.01	0.01	0.01	0.28	0.05	1.52	0.21	0.00	0.36	0.07	0.04	0.29	3.57***	11.27***	0.19	0.02	0.41	0.59
<i>Cocoa</i>	<b>0.70**</b>	<b>3.47***</b>	<b>0.75**</b>	0.06	0.00	0.20	0.05	0.01	0.18	0.62	0.00	0.46	<b>3.21***</b>	<b>2.33***</b>	<b>5.25***</b>	0.85	<b>3.36**</b>	0.39
<i>Coffee Arabica</i>	0.10	1.18	0.14	1.24	<b>17.48***</b>	4.58	0.13	0.13	<b>1.51*</b>	0.45	<b>9.71**</b>	0.25	0.05	0.13	0.55	<b>3.51*</b>	5.05	2.91
<i>Corn Oil</i>	0.04	0.00	0.03	0.00	1.24	2.21	0.00	0.02	0.01	<b>2.20**</b>	0.04	0.42	<b>3.10***</b>	<b>10.94***</b>	0.13	0.08	0.69	2.06
<i>Cotton</i>	<b>0.39**</b>	0.18	<b>1.43***</b>	<b>1.03**</b>	0.27	<b>2.60**</b>	0.00	0.21	0.14	0.85	0.57	0.17	<b>2.02***</b>	<b>10.62***</b>	<b>1.35**</b>	0.88	0.38	1.50
<i>Live Cattle</i>	<b>0.30*</b>	<b>0.54*</b>	0.26	0.09	0.63	<b>2.82***</b>	0.11	0.33	0.11	0.20	0.55	0.60	<b>6.41***</b>	<b>16.81***</b>	0.04	<b>2.69***</b>	0.92	<b>7.39***</b>
<i>Lean Hog</i>	0.08	0.15	0.01	0.41	<b>3.06***</b>	0.07	0.02	0.22	0.43	0.00	0.14	0.05	<b>3.86***</b>	<b>4.63***</b>	<b>3.03***</b>	<b>2.40**</b>	<b>12.44***</b>	0.05
<i>Milk</i>	<b>0.79***</b>	0.24	<b>2.37***</b>	0.13	1.06	<b>1.72*</b>	0.23	0.01	0.35	0.54	0.05	0.01	<b>8.04***</b>	<b>23.64***</b>	0.59	0.00	0.27	0.25
<i>Oranges</i>	0.13	<b>1.41**</b>	0.03	0.10	0.03	0.06	0.09	0.20	0.01	0.07	0.26	1.40	<b>2.91***</b>	<b>1.72***</b>	<b>4.69***</b>	1.08	0.00	<b>5.61***</b>
<i>Soybean Oil</i>	0.00	0.02	0.01	<b>3.79***</b>	0.00	<b>9.00***</b>	0.01	0.13	0.00	<b>2.24**</b>	0.70	1.98	<b>1.67***</b>	<b>7.90***</b>	0.63	0.52	0.00	1.28
<i>Soybeans</i>	0.02	0.52	0.05	0.58	<b>2.92*</b>	<b>3.23*</b>	0.00	0.00	0.17	1.17	0.63	0.47	<b>3.47***</b>	<b>7.74***</b>	0.67	0.24	0.04	0.92
<i>Soybean Meal</i>	<b>0.79***</b>	0.06	<b>1.80***</b>	0.00	<b>12.10***</b>	<b>5.36**</b>	0.08	0.67	0.66	0.97	0.02	0.40	<b>1.76***</b>	<b>2.57***</b>	<b>1.11**</b>	0.65	0.00	2.47
<i>Sugar</i>	<b>0.40**</b>	0.14	<b>1.52***</b>	0.01	0.00	0.06	0.21	0.58	0.01	0.03	0.83	0.32	0.00	<b>2.13***</b>	<b>4.30***</b>	0.70	0.44	0.86
<i>Wheat</i>	0.17	<b>0.67**</b>	0.00	<b>0.62*</b>	0.81	0.02	0.01	0.07	0.03	0.89	0.06	0.00	<b>2.36***</b>	<b>12.08***</b>	0.00	<b>1.29*</b>	0.36	1.80
<i>Wool</i>	0.11	0.02	0.45	<b>4.61***</b>	<b>2.67**</b>	<b>2.51**</b>	0.08	0.29	0.38	0.26	0.21	0.00	<b>0.79**</b>	<b>1.26**</b>	0.18	<b>3.30**</b>	1.70	<b>4.54**</b>
<i>Yellow Corn</i>	0.05	0.36	0.20	0.02	0.00	0.23	0.01	0.15	0.00	<b>1.30*</b>	1.72	0.43	<b>3.89***</b>	<b>13.31***</b>	0.01	0.01	0.31	0.15
<i>Coal</i>	0.05	0.00	0.19	<b>7.54***</b>	<b>6.32**</b>	<b>6.36**</b>	0.19	<b>1.10**</b>	0.04	0.74	0.74	0.05	<b>0.91***</b>	<b>4.21***</b>	0.03	0.02	1.01	3.15
<i>Heating Oil</i>	0.07	<b>1.59*</b>	0.40	2.79	3.26	3.13	<b>0.75*</b>	0.92	0.32	0.36	4.29	0.14	<b>8.10***</b>	<b>29.48***</b>	0.32	0.48	<b>8.83**</b>	<b>36.87***</b>
<i>Natural Gas</i>	0.07	0.34	0.02	0.05	4.50	0.16	0.06	0.01	0.28	1.07	0.02	0.08	<b>4.25***</b>	<b>16.22***</b>	0.00	<b>15.06***</b>	<b>68.12***</b>	<b>33.15**</b>
<i>Unleaded Regular Gas</i>	<b>2.75***</b>	<b>6.27***</b>	<b>1.93*</b>	0.53	6.24	0.03	<b>0.78*</b>	0.14	1.42	1.27	1.21	0.45	<b>15.88***</b>	<b>32.03***</b>	<b>3.81***</b>	0.30	<b>10.78**</b>	<b>41.48***</b>
<i>WTI Oil</i>	<b>0.38*</b>	0.02	<b>1.66***</b>	0.02	<b>1.32*</b>	0.02	0.08	0.04	0.06	0.17	1.72	1.11	0.07	<b>10.83***</b>	<b>3.37***</b>	0.74	0.18	<b>5.66**</b>
<i>Aluminium</i>	<b>1.32***</b>	<b>0.91**</b>	<b>0.93**</b>	0.13	0.18	<b>2.16*</b>	<b>1.01***</b>	<b>1.53**</b>	<b>0.58*</b>	0.09	2.18	0.06	<b>0.35*</b>	<b>1.51***</b>	0.00	<b>1.55*</b>	0.50	<b>7.60***</b>
<i>Gold</i>	<b>0.56**</b>	0.07	<b>1.71***</b>	<b>0.95**</b>	0.02	<b>3.72***</b>	0.06	0.38	0.04	0.00	2.02	2.37	0.06	<b>4.84***</b>	<b>1.98***</b>	<b>1.75**</b>	0.73	<b>2.98*</b>
<i>High Grade Copper</i>	0.10	0.01	<b>0.49*</b>	<b>1.16**</b>	<b>1.82**</b>	0.05	0.19	<b>1.22**</b>	0.00	1.24	0.03	1.74	<b>3.74***</b>	<b>18.64***</b>	0.31	<b>3.19***</b>	0.04	<b>13.77***</b>
<i>Nickel</i>	0.01	<b>2.25*</b>	0.02	3.73	0.68	13.00	<b>1.97**</b>	1.30	<b>3.19**</b>	4.99	0.84	7.65	<b>2.33***</b>	<b>26.13***</b>	0.07	0.03	3.45	<b>44.57***</b>
<i>Palladium</i>	0.01	<b>3.38**</b>	0.14	1.09	<b>12.73**</b>	4.75	0.30	0.07	0.25	0.89	3.38	0.03	<b>5.60***</b>	<b>3.53***</b>	<b>3.60***</b>	<b>15.79***</b>	<b>12.15**</b>	<b>24.05***</b>
<i>Platinum</i>	0.19	<b>0.90**</b>	0.35	<b>1.98**</b>	0.99	<b>2.31*</b>	0.06	0.15	0.02	0.00	0.63	1.46	<b>1.29***</b>	<b>5.58***</b>	0.00	1.00	0.56	<b>6.00***</b>
<i>Silver</i>	<b>0.42**</b>	0.06	<b>1.67***</b>	<b>1.11**</b>	<b>2.66**</b>	0.42	0.01	0.10	0.03	<b>1.68*</b>	0.27	0.97	<b>0.50**</b>	<b>16.16***</b>	<b>1.56**</b>	0.28	1.86	0.39
<i>Tin</i>	0.22	0.05	<b>1.13**</b>	<b>3.26***</b>	<b>1.94**</b>	<b>3.50***</b>	0.20	<b>0.86*</b>	0.11	0.17	0.08	0.65	<b>3.54***</b>	<b>10.95***</b>	0.05	<b>4.45***</b>	<b>2.57*</b>	<b>6.69***</b>
<i>Zinc</i>	<b>0.53**</b>	<b>1.53***</b>	0.00	0.05	0.40	<b>1.47*</b>	0.08	<b>0.81*</b>	0.00	1.16	<b>3.44*</b>	0.17	<b>2.20***</b>	<b>20.58***</b>	0.24	0.35	0.14	<b>3.97**</b>

Table A7: In-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	star				tbl				tms									
	Exp	eExp	lExp	Rec	eRec	lRec	Rec	eRec	lRec	Rec	eRec	lRec	Rec	eRec	lRec			
<i>Butter</i>	0.67**	1.84***	0.06	0.30	1.67*	0.25	5.18***	12.62***	0.70*	0.07	0.39	0.40	1.03***	0.01	1.32**	0.20	0.08	0.09
<i>Cocoa</i>	0.29*	1.38**	0.14	1.17**	2.66**	0.39	3.98***	3.07***	4.02***	2.88***	4.39**	2.81*0.01	0.33	0.05	0.00	6.36***	2.81*	3.63*
<i>Coffee Arabica</i>	0.22	0.10	0.16	7.67***	0.29	21.60***	3.61***	2.88***	0.69	5.30**	8.94**	0.78	8.17***	7.50***	0.10	3.69*	12.49**	5.37
<i>Corn Oil</i>	1.19***	4.90***	0.05	0.01	0.95	0.41	2.93***	12.88***	0.57	0.02	2.47*	4.75**	0.01	0.02	1.25**	0.15	8.52***	7.06**
<i>Cotton</i>	0.19	2.48***	0.61*	1.15**	3.15***	11.25***	4.30***	14.57***	0.34	2.62**	3.01*	3.01*	2.38***	0.56	1.12**	5.15***	0.63	2.67*
<i>Live Cattle</i>	2.57***	6.96***	0.19	5.14***	3.74***	8.45***	10.54***	20.49***	1.74***	2.52**	0.71	5.30**	3.06***	0.07	8.21***	0.08	0.00	1.85
<i>Lean Hog</i>	0.57**	3.05***	0.27	0.07	0.06	0.32	4.56***	7.62***	1.18**	3.02***	12.17***	0.31	0.25	0.89*	1.23**	1.25*	2.44*	5.34**
<i>Milk</i>	0.96***	4.21***	0.00	2.77***	1.85**	6.55***	8.07***	25.15***	0.43	0.28	2.20	0.08	0.08	0.25	0.00	2.69**	11.38***	5.05**
<i>Oranges</i>	0.08	0.01	0.22	1.52*	0.00	1.38	3.88***	3.30***	5.81***	1.18*	0.21	4.22**	0.56**	0.90*	1.87***	0.25	2.84*	0.36
<i>Soybean Oil</i>	0.21	1.00**	0.02	3.56***	1.56	12.30***	2.49***	9.54***	0.18	1.69**	0.21	5.03**	0.52**	0.03	0.39	3.73***	2.26	11.34***
<i>Soybeans</i>	2.36***	6.88***	0.23	2.23**	1.79	9.59***	5.48***	8.37***	2.01***	1.30*	0.38	5.92**	1.55***	0.02	3.25***	4.28***	2.30*	19.23***
<i>Soybean Meal</i>	0.22	0.36	0.09	2.04**	7.81***	9.80***	2.95***	2.25***	2.30***	1.65*	0.03	7.17**	1.16***	0.23	2.76***	3.79**	0.57	19.70***
<i>Sugar</i>	0.02	0.00	0.07	0.01	0.07	0.45	0.00	3.50***	4.42***	1.12*	0.22	5.85**	0.00	0.52	0.60	0.80	0.12	19.36***
<i>Wheat</i>	0.48**	1.12**	0.12	0.30	3.61***	3.12**	3.42***	14.60***	0.22	4.50***	0.37	8.94***	0.69**	0.06	1.55**	10.79***	0.09	23.62***
<i>Wool</i>	0.34*	0.24	0.32	3.39***	0.37	9.03***	2.46***	1.49***	1.94***	7.07***	2.99**	8.39***	2.36***	0.00	6.49***	9.12***	3.60**	6.11**
<i>Yellow Corn</i>	2.28***	5.59***	0.48	0.01	1.61*	1.49*	4.26***	12.74***	0.57	0.33	1.43	3.33*	0.12	0.57	2.70***	2.09**	5.77***	17.18***
<i>Coal</i>	0.28	0.19	0.41	0.00	0.56	0.21	0.86**	7.92***	0.22	1.61	4.62*	0.05	0.00	2.60***	0.74*	22.26***	21.81***	31.25***
<i>Heating Oil</i>	0.03	1.07	0.36	0.08	0.46	2.18	3.80***	23.45***	0.25	6.21**	22.62***	27.40***	0.53	0.94	0.00	21.68***	44.84***	4.92
<i>Natural Gas</i>	0.09	1.93*	0.00	0.20	15.17**	19.13*	3.15***	11.18***	0.00	15.67***	70.78***	30.52***	0.03	0.10	0.01	6.06*	41.77***	0.53
<i>Unleaded Regular Gas</i>	0.14	2.28**	0.01	2.14	1.42	5.68	9.36***	23.14***	3.49**	2.84	20.81***	30.40***	0.10	0.55	0.24	10.06**	34.17***	2.80
<i>WTI Oil</i>	0.16	2.70***	0.16	0.07	0.49	0.03	0.03	12.23***	3.62***	1.21*	0.53	8.89***	0.75**	0.01	0.62	1.12	1.39	3.10*
<i>Aluminium</i>	0.00	0.32	0.39	0.02	0.98	0.34	1.32***	3.65***	0.51	1.05	0.02	16.03***	1.51**	1.71**	3.19***	0.09	6.01***	10.73***
<i>Gold</i>	0.01	3.04***	0.79**	10.75***	0.75	22.03***	0.05	9.48***	2.98***	3.90***	1.37	8.09***	0.00	2.68***	1.72***	5.54***	2.04	11.85***
<i>High Grade Copper</i>	0.72***	0.87**	0.50*	0.11	2.59**	2.07**	7.23***	22.90***	0.41	5.39***	0.12	20.81***	3.22***	0.14	7.82***	4.62***	0.41	8.12***
<i>Nickel</i>	3.32**	14.71***	2.06*	2.82	0.59	11.00	4.40***	24.57***	3.09**	0.16	4.93	47.93***	2.14**	5.15***	14.30***	0.58	6.14	7.78
<i>Palladium</i>	0.22	4.76***	0.19	6.12**	1.40	11.38**	3.90***	4.62***	8.33***	17.32***	23.48***	9.26	0.00	2.29**	5.59***	3.98*	33.58***	18.52**
<i>Platinum</i>	0.00	0.00	0.00	1.05*	2.36*	1.08	2.50***	6.49***	0.50	2.27**	0.15	6.41***	1.07***	0.00	3.16***	3.22**	0.64	0.25
<i>Silver</i>	0.00	2.48***	0.38*	0.35	3.17**	3.17**	0.42*	24.86***	1.69***	2.70***	5.35*	0.07	0.01	2.34***	0.35	11.65***	13.27**	6.44***
<i>Tin</i>	0.34*	1.95***	0.11	9.31***	1.43*	28.82***	4.15***	11.02***	0.00	10.33***	2.12	17.71***	0.19	0.37	0.31	15.11***	0.04	24.10***
<i>Zinc</i>	0.61**	0.69**	0.54*	0.24	1.28	0.37	4.07***	15.56***	0.60	0.51	0.63	4.49**	1.71***	4.15***	9.24***	0.31	2.55**	0.15

Table A7: In-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>unrate</i>					
	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	0.14	4.15***	0.00	2.76*	0.28	0.63
<i>Cocoa</i>	0.15	9.91***	4.92***	0.85	24.81***	1.86
<i>Coffee Arabica</i>	6.38***	3.20***	0.01	0.40	0.13	0.52
<i>Corn Oil</i>	0.08	0.04	0.09	0.34	1.35	0.62
<i>Cotton</i>	0.67**	0.00	5.86***	2.48	2.26	0.16
<i>Live Cattle</i>	0.13	3.17***	8.47***	3.82**	8.23**	18.45***
<i>Lean Hog</i>	5.20***	3.10***	9.89***	1.49	13.95***	0.48
<i>Milk</i>	0.85**	10.23***	0.01	1.47	0.85	0.11
<i>Oranges</i>	0.01	0.82	0.08	0.64	2.70	23.45***
<i>Soybean Oil</i>	0.49*	2.38***	1.97***	0.01	7.35**	2.92
<i>Soybeans</i>	0.21	0.22	0.88*	0.46	19.64***	3.28
<i>Soybean Meal</i>	0.02	1.46**	0.10	0.08	12.36***	9.31**
<i>Sugar</i>	0.17	1.71**	1.80**	1.53	7.32**	4.99
<i>Wheat</i>	0.40	6.14***	1.72**	1.28	14.67***	0.10
<i>Wool</i>	1.22***	0.02	3.02***	0.05	3.94	0.30
<i>Yellow Corn</i>	0.77**	6.42***	2.86***	1.26	15.58***	22.98***
<i>Coal</i>	0.75**	4.94***	0.46	2.35*	0.52	14.06***
<i>Heating Oil</i>	4.27***	15.58***	0.18	0.67	0.26	25.52***
<i>Natural Gas</i>	2.99***	10.35***	3.00**	4.64	35.50***	28.76**
<i>Unleaded Regular Gas</i>	9.78***	20.38***	2.41**	0.20	0.32	32.35***
<i>WTI Oil</i>	1.74***	5.30***	1.04*	1.84	3.82*	30.74***
<i>Aluminium</i>	0.10	0.86	3.02***	0.94	2.88	14.27***
<i>Gold</i>	0.00	4.91***	6.18***	4.01**	3.69	2.98
<i>High Grade Copper</i>	0.27	9.05***	3.96***	0.05	6.08**	0.75
<i>Nickel</i>	0.32	11.23***	8.01***	0.07	0.16	25.07**
<i>Palladium</i>	1.34**	1.70*	0.17	8.82**	1.56	16.44**
<i>Platinum</i>	0.01	4.73***	2.94***	0.96	0.05	1.39
<i>Silver</i>	0.40	9.66***	3.52***	7.46***	0.08	20.65***
<i>Tin</i>	0.20	1.15*	2.81***	1.75	18.08***	0.32
<i>Zinc</i>	0.43	4.03***	6.24***	0.05	5.67*	1.04



Table A8: Out-of-Sample Return Predictability and Business Cycle Stages (12 Months)

This table reports the out-of-sample  $R^2$ s of a regression of monthly excess returns on a constant and the lagged predictive variable across business cycle stages. We predict the next year's excess return. "de" denotes the dividend-payout ratio, " $\Delta$ indpro" the growth of industrial production, and " $\Delta$ M1" the growth of money supply M1. "uftr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "itr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	$\Delta$ indpro												$\Delta$ M1					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
Butter	4.13***	4.26***	3.10***	0.09*	-0.97	-0.63	-1.20	-0.92	-0.12	10.20***	-0.13*	3.32***	-0.35	3.32***	-0.13*	3.32***	-0.35	3.32***
Cocoa	1.29***	5.29***	2.94***	-3.10	4.77***	-3.47	-1.32	1.02**	-0.17	1.31*	-0.14*	-0.64	2.87***	-0.14*	-0.64	2.87***	-0.14*	-0.64
Coffee Arabica	-0.33**	5.14***	3.47***	-0.39			-1.11	1.45***	-0.70	-0.79	1.33***	-1.24	-1.80	0.46*	-1.24	-1.80	0.46*	-1.24
Corn Oil	-2.73	4.07***	1.73***	0.49**	-6.13	0.13	0.10**	1.10**	-1.94	6.47***	-0.26	2.28	3.15***	-0.26	2.28	3.15***	-0.26	2.28
Cotton	-2.00	7.76***	1.84***	-0.61	1.25**	2.68**	-1.32	1.25***	-1.42	4.33***	-2.31	-3.45	-2.54	-2.31	-3.45	-2.54	-2.31	-3.45
Live Cattle	1.95***	6.65***	3.77***	-5.26	13.81***	0.95*	-1.45	-1.53	-1.56	-0.26	-0.60	-7.30	-1.08	-0.60	-7.30	-1.08	-0.60	-7.30
Lean Hog	0.96***	-4.76	7.13***	3.22***	-11.03	-18.78	-0.37	1.91**	-0.09*	9.55***	-2.23	-0.49	2.01***	-2.23	-0.49	2.01***	-2.23	-0.49
Milk	3.62***	0.03*	3.77***	-1.92			-1.20	-0.69	-1.00	2.66**	-1.40	-1.76	-0.15	-1.40	-1.76	-0.15	-1.40	-1.76
Oranges	-3.78	0.63**	-2.22	2.55***			0.29***	1.70***	-0.75	0.46	-0.79	0.31	4.32***	-0.79	0.31	4.32***	-0.79	0.31
Soybean Oil	-4.19	2.02***	7.77***	-5.98			-0.30*	2.21***	-0.60	0.09	-0.75	-0.71	1.71***	-0.75	-0.71	1.71***	-0.75	-0.71
Soybeans	-4.39	-3.64	5.47***	11.71***			-1.83	0.61**	-0.36	2.12*	-1.20	-1.40	1.29**	-1.20	-1.40	1.29**	-1.20	-1.40
Soybean Meal	-12.82	0.93***	-0.54	-1.25	-2.68	3.87***	-0.65	0.79**	-0.38	-0.05	-0.48	-3.33	-1.63	-0.48	-3.33	-1.63	-0.48	-3.33
Sugar	-3.79	-0.25*	6.55***	2.94***	0.64*	7.81***	-0.27*	1.05***	-1.59	-2.89	-0.31	-3.23	4.44***	-0.31	-3.23	4.44***	-0.31	-3.23
Wheat	-3.25	-2.41	-0.24*	4.90***	0.12	5.23**	-0.34	0.39**	-1.03	-7.25	0.15**	-0.83	0.97**	0.15**	-0.83	0.97**	-0.15	-0.83
Wool	-4.12	-2.93	3.53***	-1.12	3.50***	0.39	-1.35	0.25*	-0.77	0.39	-1.14	3.87***	2.70***	-1.14	3.87***	2.70***	-1.14	3.87***
Yellow Corn	-3.04	2.23***	10.69***	-13.15			-0.33	0.27**	-0.37	0.88	-2.17	0.16*	-0.60	-2.17	0.16*	-0.60	-2.17	0.16*
Coal	-5.10	21.35***	-7.37				-0.63	-1.60	-3.82		-0.59	6.96***	2.95***	-0.59	6.96***	2.95***	-0.59	6.96***
Heating Oil	-3.41	-0.76	-2.94				-1.19	0.01	-2.55		-0.92	8.92***	-1.94	-0.92	8.92***	-1.94	-0.92	8.92***
Natural Gas	-8.02	10.03***	-13.88				-1.03	0.20*	-0.99	1.29*	-0.94	1.52**	1.27**	-0.94	1.52**	1.27**	-0.94	1.52**
Unleaded Regular Gas	-1.08	4.83***	-5.66	-0.68	-0.55	-5.29	-1.03	0.20*	-0.99	1.29*	-0.08*	-1.31	0.53*	-0.08*	-1.31	0.53*	-0.08*	-1.31
WTI Oil	-4.84	-7.61	-11.75	-34.98	-0.16	21.95***	-1.92	0.26	-1.49	0.57	1.10***	-4.72	7.64***	1.10***	-4.72	7.64***	-1.10	-4.72
Aluminium	-1.21	-2.21	6.88***	13.31***	-2.52	5.19***	-1.64	1.17***	-2.00	1.65**	3.03***	-0.05	6.94***	3.03***	-0.05	6.94***	-2.09	-0.05
Gold	-0.99	1.12***	-4.22	-5.74	-1.01		-7.69				-1.84	18.61***	-5.96	-1.84	18.61***	-5.96	-1.84	18.61***
High Grade Copper	-1.71	-22.35	-5.08				0.21*	-2.31	1.49*	5.36***	0.89***	-1.98	3.69***	0.89***	-1.98	3.69***	-1.06	-1.98
Nickel	-3.17	-1.38	4.12***	-2.10	-9.66		-1.76	0.54**	0.00*	2.86***	-1.06	2.51***	2.24**	-1.06	2.51***	2.24**	-1.06	2.51***
Platinum	-2.20	1.07***	-0.38*	3.15***	-4.18	0.99*	-1.23	2.27***	-0.93	-2.93	-1.52	2.30***	2.24**	-1.52	2.30***	2.24**	-1.52	2.30***
Silver	-4.36	-6.23	7.25***	24.02***	-1.67	26.39***	-0.36	1.07**	-0.88	-2.93	-1.52	2.30***	2.24**	-1.52	2.30***	2.24**	-1.52	2.30***
Tin	-0.01***	-0.68	-2.29	-10.80	-1.40	-0.19	-0.98	0.37*	-1.73	-1.15	-2.15	-4.64	-1.27	-2.15	-4.64	-1.27	-2.15	-4.64
Zinc																		

Table A8: Out-of-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	df <sub>r</sub>				df <sub>y</sub>				dp								
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	-0.93	-0.53	-1.03	-0.87			-3.47	<b>2.24***</b>	<b>4.47***</b>	-1.13		<b>0.06***</b>	<b>7.48***</b>	<b>0.35**</b>	<b>1.12***</b>	-7.67	-2.62
<i>Cocoa</i>	-0.66	-0.67	-0.75	-1.19			-2.80	-23.30	-4.10	-2.84		-9.00	-3.78	-0.79*	-4.30	-3.69	-2.68
<i>Coffee Arabica</i>	-0.81	-0.78	-0.30	-1.47			<b>0.12**</b>	-16.78	-1.42	-0.10		-6.55	-3.69	-4.39	-13.66		
<i>Corn Oil</i>	-1.80	-0.90	-0.23	-1.47			<b>8.33***</b>	<b>4.96***</b>	-0.54	-0.15		-2.18	<b>9.26***</b>	-1.85	<b>1.92***</b>		
<i>Cotton</i>	-1.33	-0.63	-0.15	-0.91			-1.25	-0.99	-2.75	-0.15		<b>0.05***</b>	<b>8.84***</b>	-2.44	<b>1.92***</b>		
<i>Live Cattle</i>	-0.93	-0.47	-1.30	-0.53			<b>0.96***</b>	<b>3.95***</b>	<b>1.31***</b>	<b>11.86***</b>		-2.11	-3.03	-9.60	-2.25	-4.26	-2.13
<i>Lean Hog</i>	-1.44	-1.29	-2.44	-0.43			<b>2.37***</b>	<b>14.44***</b>	-6.12	-4.12		<b>0.89***</b>	-3.70	-6.87	<b>1.97***</b>	-2.87	-2.10
<i>Milk</i>	-0.65	-0.69	-1.44	-0.74			<b>3.40***</b>	<b>7.10***</b>	-0.46	<b>2.68**</b>		<b>3.19***</b>	<b>15.66***</b>	<b>2.59***</b>	<b>7.88***</b>	<b>5.83***</b>	-23.96
<i>Oranges</i>	-1.81	-0.57	-2.20	-0.99			<b>2.29***</b>	-17.35	-3.80	-29.06		-7.68	-3.96	<b>5.74***</b>	<b>0.62*</b>		
<i>Soybean Oil</i>	-1.35	-0.49	-0.13	-1.09			<b>2.03***</b>	-5.58	-5.68	-17.06		-4.27	-0.07**	-4.27	<b>1.53**</b>		
<i>Soybeans</i>	-0.85	-0.54	-1.51	-0.43			<b>7.94***</b>	<b>1.71***</b>	<b>0.08*</b>	-31.40		<b>0.92*</b>	<b>4.65***</b>	-3.66	-39.64		
<i>Soybean Meal</i>	-0.79	-0.51	-2.09	-0.45			<b>2.14***</b>	-0.30	-0.67	-0.06		<b>1.37***</b>	-0.37*	-1.70	-0.87		
<i>Sugar</i>	-0.50	-0.71	-0.62	-1.19			-2.52	-7.38	-9.30	-1.64		-3.34	<b>0.66***</b>	<b>4.73***</b>	-4.86	-1.54	0.23
<i>Wheat</i>	-0.62	-0.40	-0.86	-0.60			<b>7.27***</b>	<b>9.29***</b>	-1.92	-12.84		-3.16	<b>1.48***</b>	-0.01**	<b>1.78***</b>	-7.78	-1.85
<i>Wool</i>	-0.36	-1.26	-0.66	-1.01			<b>1.74***</b>	-2.78	<b>5.95***</b>	-2.10		-0.58**	-0.32*	-2.94	<b>6.97***</b>	<b>10.83***</b>	-9.37
<i>Yellow Corn</i>	-1.01	-1.30	-0.81	-0.20			<b>6.74***</b>	<b>9.82***</b>	<b>2.25***</b>	-1.26		-3.30	-0.43*	-3.16	<b>0.11**</b>	<b>1.23**</b>	-4.45
<i>Coal</i>	-1.21	-0.14	-0.18	-1.83			<b>11.66***</b>	<b>0.04*</b>	<b>5.67***</b>	<b>7.76**</b>		<b>0.57***</b>	<b>18.62***</b>	<b>0.59**</b>	<b>4.79**</b>		
<i>Heating Oil</i>	-1.33	1.06	-1.67				<b>10.02***</b>	<b>4.98***</b>	-12.67			-2.82	<b>60.49***</b>	-6.96			
<i>Natural Gas</i>	-0.38	-0.02	<b>1.77*</b>				<b>0.13*</b>	-0.37	0.16			<b>5.24***</b>	<b>23.77***</b>	-2.40			
<i>Unleaded Regular Gas</i>	-0.72	0.20	-3.14				<b>6.22***</b>	<b>1.59*</b>	<b>4.57**</b>			-0.42**	<b>49.59***</b>	-8.87			
<i>WTI Oil</i>	-1.12	-2.28	-0.52	-1.45			<b>7.70***</b>	<b>5.43***</b>	-7.98	-1.00		-1.85	<b>12.65***</b>	-2.51	-10.21	-25.75	-7.91
<i>Aluminium</i>	<b>0.66***</b>	<b>0.60**</b>	-0.63	-1.13			<b>2.68***</b>	-2.44	<b>4.10***</b>	<b>1.77**</b>		-6.66	-0.71	-2.38	<b>4.67***</b>	-2.79	
<i>Gold</i>	-1.00	-1.97	-0.36	-1.80			<b>8.34***</b>	-10.80	-9.12	-3.21		<b>2.29***</b>	<b>2.13***</b>	<b>9.91***</b>	<b>1.09***</b>	<b>8.07***</b>	<b>3.71***</b>
<i>High Grade Copper</i>	-0.19*	-0.74	-0.62	-1.23			<b>8.99***</b>	-4.95	<b>3.99***</b>	-13.70		<b>1.56***</b>	<b>12.60***</b>	-1.63	-4.65	-3.34	<b>4.15***</b>
<i>Nickel</i>	<b>0.51*</b>						<b>19.95***</b>					-10.82					
<i>Palladium</i>	-1.05	-0.14	0.08				<b>1.97***</b>	-5.66	<b>11.51***</b>			<b>9.27***</b>	-69.04	-13.16			
<i>Platinum</i>	-1.00	-3.04	-0.33	0.23			<b>0.40***</b>	<b>1.72***</b>	<b>2.77***</b>	-0.06		<b>2.96***</b>	<b>0.19**</b>	-8.94	-13.58	<b>20.59***</b>	
<i>Silver</i>	-0.43	-1.69	-0.18	-1.03			<b>4.31***</b>	<b>7.32***</b>	-5.92	<b>7.50***</b>		<b>1.05***</b>	<b>15.58***</b>	<b>4.61***</b>	<b>1.45***</b>	-3.58	<b>2.38**</b>
<i>Tin</i>	-0.07**	-0.06	-0.26	-1.80			<b>10.03***</b>	-1.08	<b>4.67***</b>	-46.56		-0.09***	<b>8.67***</b>	-8.52	<b>2.43***</b>	<b>1.92**</b>	<b>14.81***</b>
<i>Zinc</i>	-0.91	-1.27	-0.35	-1.47			-1.01	-1.83	-0.11*	-17.19		-3.19	<b>5.43***</b>	-0.05**	-2.46	-1.77	-2.01

Table A8: Out-of-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>dy</i>				<i>ep</i>				<i>erp</i>									
	Exp	eExp	lExp	lRec	Exp	eExp	lExp	lRec	Exp	eExp	lExp	lRec	Exp	eExp	lExp	lRec		
<i>Butter</i>	-0.01***	7.18***	0.13**	1.54***	-1.88	-7.79	-1.88	0.22*	0.22*	3.32**	3.36**	3.36**	-0.92	-1.07	-0.70	0.46**	-1.16	-0.39
<i>Cocoa</i>	-8.69	-4.52	-0.64*	-3.91	-3.30	-5.61	-3.30	0.22*	0.22*	3.32**	3.36**	3.36**	0.06**	-0.22	-0.75	-0.70	1.32**	-1.51
<i>Coffee Arabica</i>	-6.83	-4.05	-3.80	-13.59	8.49***	-5.38	8.49***	-15.65	-15.65	-3.24	2.84**	2.84**	-0.40	0.64**	-0.48	0.36	-0.60	-3.88
<i>Corn Oil</i>	-1.43	8.98***	-1.95	2.55***	-2.55	-4.87	-2.55	-0.48	-0.48	-4.01	-3.40	-3.40	-0.85	-1.76	-1.60	-1.78	-1.04	-2.80
<i>Cotton</i>	0.38***	8.79***	-2.37	1.74***	-1.88	-2.93	-1.88	5.54***	5.54***	-2.49	6.12***	6.12***	-0.86	0.60**	-1.17	-0.62	-1.44	-1.64
<i>Live Cattle</i>	-1.97	-2.14	-10.01	8.09***	-21.26	5.65***	-21.26	-0.15	-0.15	10.44***	4.19**	4.19**	-1.18	-0.17	-0.26	2.78***	0.64	0.68
<i>Lean Hog</i>	1.36***	-4.05	-7.32	1.74***	-1.88	-2.93	-1.88	5.54***	5.54***	-2.49	6.12***	6.12***	-0.86	0.60**	-1.17	-0.62	-1.44	-1.64
<i>Milk</i>	3.35***	15.12***	2.35***	8.09***	-21.26	5.65***	-21.26	-0.15	-0.15	10.44***	4.19**	4.19**	-1.18	-0.17	-0.26	2.78***	0.64	0.68
<i>Oranges</i>	-7.12	-3.75	5.98***	0.30	-4.28	0.49*	-4.28	-4.41	-4.41	-2.33	0.19	0.19	-0.95	-0.87	-1.03	-0.67	-2.45	-2.43
<i>Soybean Oil</i>	-3.62	-0.43*	4.32	2.70***	-0.01	-1.79	-0.01	-4.43	-4.43	-10.34	-2.53	-2.53	-1.70	-2.06	-0.27	-0.31	-1.00	-1.29
<i>Soybeans</i>	0.20***	2.84***	-3.76	-47.61	-2.78	-9.66	-2.78	-8.85	-8.85	-3.38	-2.52	-2.52	-1.70	-2.06	-0.27	-0.31	-1.00	-1.29
<i>Soybean Meal</i>	1.50***	-0.30	-1.73	2.63**	-19.12	8.50***	-19.12	-0.99	-0.99	0.40*	5.06***	5.06***	-0.58	-0.60	-0.19	2.87**	-0.67	-1.29
<i>Sugar</i>	-2.60	1.14***	4.30***	-5.03	-0.01	-1.79	-0.01	-0.99	-0.99	0.40*	5.06***	5.06***	-0.58	-0.60	-0.19	2.87**	-0.67	-1.29
<i>Wheat</i>	-2.47	1.41***	-0.31**	2.75***	-19.12	8.50***	-19.12	-0.99	-0.99	0.40*	5.06***	5.06***	-0.58	-0.60	-0.19	2.87**	-0.67	-1.29
<i>Wool</i>	-0.61**	0.02**	-3.01	8.97***	-4.28	0.49*	-4.28	-3.38	-3.38	2.25**	2.25**	2.25**	-0.79	-0.71	-1.26	-1.01	2.08**	-7.71
<i>Yellow Corn</i>	-3.08	0.16**	-3.04	0.21**	-4.28	0.49*	-4.28	-1.03	-1.03	-2.33	0.19	0.19	-0.95	-0.87	-1.03	-0.67	-2.45	-2.43
<i>Coal</i>	0.59***	17.77***	0.51**	1.67	-7.07	-29.16	-7.07	14.28***	14.28***	-7.73	2.29**	2.29**	-0.28*	-0.30	-0.21	-3.45	-3.69	-3.92
<i>Heating Oil</i>	-2.53	59.55***	-7.36	-10.66	-10.66	-10.66	-10.66	-9.59	-9.59	-7.73	2.29**	2.29**	-1.13	-0.76	-0.17	-3.45	-3.69	-3.92
<i>Natural Gas</i>	5.57***	24.58***	-2.36	6.73***	-7.07	-29.16	-7.07	-1.42	-1.42	-20.85	-2.29**	-2.29**	-0.61	0.44	-0.85	-3.45	-3.69	-3.92
<i>Unleaded Regular Gas</i>	-0.82*	48.68***	-9.98	-5.35	-5.35	-5.35	-5.35	-11.52	-11.52	-20.85	-2.29**	-2.29**	-1.24	-0.98	-1.21	-3.45	-3.69	-3.92
<i>WTI Oil</i>	-1.79	11.77***	-2.97	-10.16	-7.07	-29.16	-7.07	0.05**	0.05**	-7.73	2.29**	2.29**	-1.15	-2.31	-0.67	-1.68	-1.93	-6.09
<i>Aluminium</i>	-5.95	-0.29*	-2.21	4.70***	2.62***	-5.14	2.62***	-4.46	-4.46	4.80**	4.80**	4.80**	-2.50	0.18**	-1.16	-1.02	-0.72	-2.46
<i>Gold</i>	2.19***	2.14***	9.69***	-0.31*	5.29***	-3.95	5.29***	10.52***	10.52***	-7.61	3.45***	3.45***	-1.02	-1.90	-0.72	-0.98	-0.18	-2.46
<i>High Grade Copper</i>	0.86***	12.15***	-1.74	-3.95	5.29***	-3.95	5.29***	0.08**	0.08**	-4.03	-1.56	-1.56	-0.23**	-0.19	0.46**	-0.18	-1.93	-6.09
<i>Nickel</i>	-10.56	-0.29*	-2.21	4.70***	2.62***	-5.14	2.62***	-4.46	-4.46	4.80**	4.80**	4.80**	-2.50	0.18**	-1.16	-1.02	-0.72	-2.46
<i>Palladium</i>	8.60***	-66.76	-13.05	5.79***	5.29***	-3.95	5.29***	12.31***	12.31***	-4.03	-1.56	-1.56	0.78**	0.69**	4.81**	-0.48	-0.87	-1.69
<i>Platinum</i>	2.86***	-0.37*	-8.97	-12.22	19.57***	-3.74	19.57***	-10.48	-10.48	-12.62	-2.99	-2.99	-0.04**	-0.06**	-0.55	-1.22	-0.87	-1.69
<i>Silver</i>	1.15***	15.04***	4.58***	1.84***	2.92**	-3.74	2.92**	6.38***	6.38***	-2.21	-2.99	-2.99	-1.04	-1.54	-0.71	-0.88	-1.34	-4.86
<i>Tin</i>	-0.35***	7.21***	-8.55	2.84***	13.57***	1.44**	13.57***	-4.44	-4.44	1.61**	-0.33	-0.33	-1.48	-2.58	-1.16	-3.02	-1.66	-4.86
<i>Zinc</i>	-3.37	5.14***	-0.17**	-2.21	-2.21	-2.23	-2.21	-1.49	-1.49	1.41**	-2.08	-2.08	-0.91	-0.50	-0.27	-0.99	-1.59	-2.11

Table A8: Out-of-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>infI</i>				<i>ltr</i>				<i>ltr</i>			
	Exp	eExp	lExp	lRec	Exp	eExp	lExp	lRec	Exp	eExp	lExp	lRec
<i>Butter</i>	-1.03	<b>0.12**</b>	-1.23	<b>0.58**</b>	-0.37	0.65	-0.56	-0.41	-0.16**	<b>14.91***</b>	-0.13	-25.18
<i>Cocoa</i>	<b>1.97***</b>	<b>6.66***</b>	<b>1.17***</b>	<b>1.19***</b>	-1.31	-0.98	-0.76	-1.88	<b>0.30***</b>	-8.18	<b>5.56***</b>	-5.78
<i>Coffee Arabica</i>	-2.58	-0.75	-0.85	0.28			-0.76	<b>1.48**</b>	-11.39	<b>6.21***</b>	-0.17	-2.94
<i>Corn Oil</i>	-1.99	-1.31	-3.53	<b>1.62***</b>	-3.42	<b>5.15***</b>	-0.26	-0.34	<b>4.35***</b>	<b>13.72***</b>	<b>1.51***</b>	-4.39
<i>Cotton</i>	-1.03	-1.07	-2.32	<b>1.62***</b>	-1.07	<b>1.65**</b>	-0.73	-0.54	<b>13.61***</b>	<b>5.35***</b>	-5.57	-25.02
<i>Live Cattle</i>	<b>1.31***</b>	<b>1.40***</b>	-0.57	-0.20*	1.02**	-2.10	-0.48	-2.02	-1.32	<b>1.79***</b>	-3.08	<b>8.27***</b>
<i>Lean Hog</i>	-0.87	-0.74	<b>1.70***</b>	<b>1.93***</b>	<b>1.02**</b>	-2.04	-1.45	-1.49	-7.73	-15.09	-4.72	-20.15
<i>Milk</i>	<b>1.56***</b>	-1.03	<b>1.30***</b>	<b>1.16**</b>	-0.43	-2.04	<b>0.22**</b>	-0.86	<b>12.31***</b>	<b>25.75***</b>	-0.47	-118.89
<i>Oranges</i>	-1.61	<b>1.80***</b>	-0.31	-6.55			-0.48	-0.07	<b>1.83***</b>	-4.30	<b>3.71***</b>	-1.68**
<i>Soybean Oil</i>	-1.73	-1.07	-6.02	<b>4.78***</b>			<b>0.07**</b>	-0.15	<b>6.45***</b>	<b>4.15***</b>	-7.25	<b>1.68**</b>
<i>Soybeans</i>	-2.72	-0.12	-3.19	<b>1.32**</b>			-0.81	-0.13	<b>9.49***</b>	<b>0.20**</b>	-1.26	<b>7.46***</b>
<i>Soybean Meal</i>	-1.62	-3.00	-3.37	-4.46			-1.07	<b>0.08*</b>	<b>5.24***</b>	-9.49	-0.92	<b>1.21*</b>
<i>Sugar</i>	-0.55	<b>1.30***</b>	<b>7.96***</b>	-1.43	-0.28	-0.25	-0.72	-1.19	-3.33	-2.58	-1.77	-3.61
<i>Wheat</i>	-1.88	<b>1.09***</b>	-3.69	<b>1.35***</b>	-1.18	-1.05	-0.38	-0.63	<b>9.89***</b>	<b>9.02***</b>	-3.77	<b>5.99***</b>
<i>Wool</i>	-2.83	-0.81	-3.61	<b>5.02***</b>	-0.57	<b>6.69***</b>	-0.41	-0.24	<b>0.65***</b>	-7.54	-4.40	<b>7.99***</b>
<i>Yellow Corn</i>	-1.09	<b>1.17***</b>	-3.12	-1.21	4.61	-1.81	-1.16	-2.06	<b>6.99***</b>	<b>8.06***</b>	<b>1.30***</b>	-13.73
<i>Coal</i>	<b>0.04**</b>	<b>0.41**</b>	<b>0.57**</b>	-19.22			-1.14	-0.31	<b>11.84***</b>	<b>14.95***</b>	<b>7.25***</b>	-24.60
<i>Heating Oil</i>	-0.92	-0.58	0.20				-0.44	0.24	<b>3.09***</b>	<b>43.38***</b>	-2.16	
<i>Natural Gas</i>	-1.50	-1.21	-2.52				-1.38	0.06	<b>2.78***</b>	<b>16.79***</b>	-1.56	
<i>Unleaded Regular Gas</i>	<b>1.41**</b>	<b>6.86***</b>	<b>4.80**</b>				-0.46	-1.18	<b>3.92***</b>	<b>39.76***</b>	-5.12	
<i>WTI Oil</i>	<b>3.20***</b>	<b>1.31***</b>	<b>5.96***</b>	-2.33	0.39	-2.43	-0.66	-1.13	<b>7.70***</b>	<b>34.70***</b>	-4.73	-2.42
<i>Aluminium</i>	-1.09	-1.67	-1.15	-2.27	-1.56	-1.56	<b>1.03***</b>	<b>1.48***</b>		-0.34*	-1.95	-0.38
<i>Gold</i>	<b>1.49***</b>	-0.14*	<b>16.58***</b>	<b>3.78***</b>	-0.36	<b>6.19***</b>	-0.88	-1.67	<b>12.58***</b>	-0.89	<b>4.67***</b>	-4.42
<i>High Grade Copper</i>	-1.14	<b>1.50***</b>	-1.04	<b>0.41**</b>	-1.91	-0.50	-0.90	-0.96	<b>11.70***</b>	<b>31.81***</b>	-0.61	-1.05
<i>Nickel</i>	<b>0.23*</b>						<b>1.86***</b>		<b>16.51***</b>			
<i>Palladium</i>	<b>0.48**</b>	-16.05	-15.98				-0.66	-1.50	<b>11.50***</b>	-48.95	-0.78	-52.46
<i>Platinum</i>	-0.31*	<b>0.64**</b>	<b>2.42***</b>	<b>0.61*</b>	-0.20		-1.08	-1.85	-2.04	<b>6.11***</b>	<b>6.73***</b>	-30.12
<i>Silver</i>	<b>0.63***</b>	<b>2.47***</b>	<b>7.42***</b>	<b>1.24***</b>	<b>2.97***</b>	<b>0.83*</b>	-0.69	-1.97	-0.91	<b>33.42***</b>	<b>2.17***</b>	<b>22.40***</b>
<i>Tin</i>	-0.70	-1.05	<b>1.98***</b>	<b>9.00***</b>	-2.43	<b>7.34***</b>	-0.76	-0.37	<b>12.88***</b>	<b>18.47***</b>	<b>1.09***</b>	
<i>Zinc</i>	-0.68	<b>0.44**</b>	-2.06	-2.49	-1.68	-1.34	-1.11	-0.81	<b>4.55***</b>	<b>18.66***</b>	-1.40	-0.67

Table A8: Out-of-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	svar				tbl				tms									
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	-18.01	-3.71	-19.53	-18.09	2.50**	0.19	-5.44	12.33***	-2.05	-13.04	-1.86	0.01*	-1.66	0.01*	-1.66	1.23*		
<i>Cocoa</i>	-0.21**	2.36***	-84.96	-41.91	1.12*	-0.35	-4.02	6.19***	5.75***	4.83***	-6.06	1.19**	-11.12	1.19**	-11.12	4.24***		
<i>Coffee Arabica</i>	-1.75	-22.17	-0.18	1.21*			-1.94	12.13***	1.99**					7.26***	-6.03			
<i>Corn Oil</i>	-6.40	4.70***	-2.56	-8.39	-0.52	19.17***	2.20***	10.72***	-0.73	-4.85	-3.06	4.55***	8.22***	4.55***	8.22***	-3.99		
<i>Cotton</i>	-17.96	5.90***	0.74**	-66.72	5.22***	10.20***	0.85***	14.37***	-3.42	-28.13	0.43***	8.49***	-9.47	8.49***	-9.47	-10.35		
<i>Live Cattle</i>	-18.96	3.10***	-188.85	-10.24	-0.68	-16.74	-5.69	0.98**	-9.88	8.15***	0.59***	6.02***	-8.52	6.02***	-8.52	4.89***		
<i>Lean Hog</i>	-12.74	-0.90	-24.98	-10.59	2.08**	-1.02	4.41***	23.57***	-1.74	-7.62	-0.25**	1.55***	4.36***	1.55***	4.36***	5.38***		
<i>Milk</i>	-0.18**	-0.22	-6.42	-0.87			-9.54	3.98***	3.57***	-28.81	-1.38	2.56***	3.03***	2.56***	3.03***	-10.54		
<i>Oranges</i>	-2.58	-2.49	-66.43	-11.99	5.88***		4.63***	5.10***	-3.28	-8.14	3.38***	0.09*	-7.11	0.09*	-7.11	-5.20		
<i>Soybean Oil</i>	-10.53	3.79***	-45.46	-11.99			4.63***	3.96***	-0.11*	-7.44	0.07**	-0.71	-2.85	-0.71	-2.85	-7.34		
<i>Soybeans</i>	-67.89	-11.03	-63.73	-11.19	-0.03	-0.18	-1.88	1.96***	-0.64	-5.84	-2.36	1.64***	-0.65	1.64***	-0.65	-5.72		
<i>Soybean Meal</i>	-2.58	-2.49	-66.43	-11.99	5.88***		4.63***	5.10***	-3.28	-8.14	3.38***	0.09*	-7.11	0.09*	-7.11	-5.20		
<i>Wheat</i>	-9.16	-5.18	-18.05	-29.18	5.51***	-4.13	7.56***	14.04***	-1.80	-15.56	3.21***	6.13***	-6.09	6.13***	-6.09	-4.31		
<i>Wool</i>	-39.66	-0.21	-16.54	-10.96	0.52	3.59**	-6.67	-3.19	-2.66	4.93***	-3.62	1.77	1.00***	1.77	1.00***	2.39**		
<i>Yellow Corn</i>	-6.37	4.28***	1.82***	-42.39	2.25**	-17.10	4.31***	11.63***	0.99***	-17.15	3.62***	1.48***	-5.01	1.48***	-5.01	-7.19		
<i>Coal</i>	0.08**	0.23*	-95.21	-9.36			-0.13**	16.93***	0.86**	-19.67	-3.60	5.78***	9.08***	5.78***	9.08***	42.69***		
<i>Heating Oil</i>	-48.50	-8.26	-0.66				-3.07	36.34***	-0.59		1.36***	-3.67	0.73*	-3.67	0.73*			
<i>Natural Gas</i>	0.00	-7.18	-0.11				-3.30	11.54***	-1.27		-2.53	-0.99	-2.31	-0.99	-2.31			
<i>Unleaded Regular Gas</i>	-50.11	-2.22	-0.08				5.36***	31.86***	6.62***		-2.46	-2.76	1.93*	-2.76	1.93*			
<i>WTI Oil</i>	-9.34	-1.50	-168.06	-14.47	0.02	-4.54	0.75***	25.99***	-2.55	-16.31	2.48***	-4.77	-0.31	-4.77	-0.31	-6.06		
<i>Aluminium</i>	-110.27	-6.55	-568.31	-1.08	0.00		7.71***	4.11***	0.38**	-1.33	6.02***	8.17***	1.22***	8.17***	1.22***	13.82***		
<i>Gold</i>	-187.68	-8.10	-2.88	10.67***	0.62*	20.52***	2.24***	4.22***	6.33***	-13.91	-1.23	2.69***	-1.25	2.69***	-1.25	-17.12		
<i>High Grade Copper</i>	-15.67	-1.32	-86.77	-52.92	-2.13	-12.47	15.97***	32.85***	0.69**	-18.73	1.99***	5.93***	5.04***	5.93***	5.04***	-10.20		
<i>Nickel</i>	2.04**						4.61***				-0.11							
<i>Palladium</i>	-47.98	-9.03	0.00				12.83***	-52.72	13.56***	-57.08	-0.96	-7.24	6.35***	-7.24	6.35***	-14.32		
<i>Platinum</i>	-79.13	2.98***	-11.02	-2.28	-1.91		1.68***	12.62***	5.07***	-57.08	-6.51	1.97***	-2.30	1.97***	-2.30	0.00		
<i>Silver</i>	-16.40	-11.56	-77.00	-19.69	-2.54	2.57**	-1.95	43.45***	2.54***	-33.50	2.14***	3.52***	-1.84	3.52***	-1.84	0.00		
<i>Tin</i>	-4.66	1.04***	-62.96	7.76***	-0.18	33.76***	4.02***	18.13***	2.09***	-21.58	-3.24	1.26***	-4.69	1.26***	-4.69	-32.99		
<i>Zinc</i>	-34.32	-3.61	-27.08	-34.46	-0.40	-5.53	4.54***	22.33***	4.84***	-6.10	-0.32*	0.68**	9.12***	0.68**	9.12***	-3.19		

Table A8: Out-of-Sample Return Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>unrate</i>			
	Exp	eExp	lExp	lRec
<i>Butter</i>	<b>0.27***</b>	<b>5.22***</b>	<b>1.37**</b>	
<i>Cocoa</i>	-2.27	<b>10.70***</b>	<b>7.72***</b>	
<i>Coffee Arabica</i>	<b>8.40***</b>	-2.54	-1.93	
<i>Corn Oil</i>	-5.16	-9.23	-4.81	
<i>Cotton</i>	<b>0.81***</b>	-4.06	-6.38	
<i>Live Cattle</i>	-1.03	<b>1.43**</b>	<b>5.56***</b>	
<i>Lean Hog</i>	-2.34	<b>2.00**</b>	<b>4.59***</b>	
<i>Milk</i>	-1.40	<b>9.82***</b>	<b>3.63***</b>	
<i>Oranges</i>	-3.14	-0.51	-0.84	
<i>Soybean Oil</i>	-6.62	-13.09	-13.91	
<i>Soybeans</i>	-3.51	-5.20	-11.10	
<i>Soybean Meal</i>	-4.64	-0.75	-13.08	
<i>Sugar</i>	<b>5.90***</b>	<b>1.05**</b>	-2.00	
<i>Wheat</i>	<b>0.96***</b>	<b>12.09***</b>	-7.94	
<i>Wool</i>	-6.35	<b>0.59*</b>	-3.33	
<i>Yellow Corn</i>	<b>3.32***</b>	-1.19	-5.02	
<i>Coal</i>	-3.54	<b>12.33***</b>	<b>3.78***</b>	
<i>Heating Oil</i>	<b>3.15***</b>	<b>34.80***</b>	-1.74	
<i>Natural Gas</i>	-0.32	<b>14.03***</b>	1.54	
<i>Unleaded Regular Gas</i>	<b>2.14***</b>	<b>32.24***</b>	-22.79	
<i>WTI Oil</i>	<b>2.87***</b>	<b>21.08***</b>	-1.99	
<i>Aluminum</i>	<b>1.56***</b>	-8.12	-0.01	
<i>Gold</i>	-10.73	<b>6.46***</b>	<b>4.41***</b>	
<i>High Grade Copper</i>	<b>6.71***</b>	<b>16.00***</b>	<b>0.22*</b>	
<i>Nickel</i>	<b>1.24**</b>			
<i>Palladium</i>	-7.46	<b>24.48***</b>	-7.05	
<i>Platinum</i>	-9.86	<b>6.36***</b>	<b>0.29*</b>	
<i>Silver</i>	-7.18	<b>19.42***</b>	<b>2.97***</b>	
<i>Tin</i>	-0.68	<b>6.69***</b>	<b>1.87***</b>	
<i>Zinc</i>	<b>1.81***</b>	<b>6.68***</b>	<b>4.27***</b>	

Table A9: In-Sample Volatility Predictability and Business Cycle Stages (1 Month)

This table reports the in-sample  $\Delta R^2$ 's of a regression of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable across business cycle stages. We predict the next month's volatility. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔMI" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "inft" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, and "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	$\Delta indpro$												$\Delta MI$											
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec						
Butter	0.02	-0.02	0.12	0.01	-0.25	0.35	-0.03	-0.05	-0.04	-0.16	-0.35	-0.49	<b>0.37***</b>	<b>0.35**</b>	<b>0.39***</b>	<b>0.61*</b>	-0.51	<b>2.15*</b>						
Cocoa	<b>0.65***</b>	<b>1.03***</b>	<b>0.87***</b>	-0.06	<b>0.98**</b>	-0.13	-0.02	-0.14	0.17	<b>0.54*</b>	0.04	-0.07	0.07	0.08	0.33	0.41	-0.83	<b>4.00*</b>						
Coffee Arabica	<b>0.43**</b>	0.00	<b>0.81**</b>	-0.57	0.66	-0.99	-0.06	-0.09	0.21	-0.96	-1.82	-2.26	-0.07	-0.11	-0.21	0.03	-1.64	1.33						
Corn Oil	-0.06	-0.16	-0.17	-0.13	<b>2.44**</b>	-0.65	-0.05	<b>0.34*</b>	<b>1.06***</b>	<b>0.78*</b>	<b>1.12*</b>	<b>1.18*</b>	-0.07	-0.12	-0.14	-0.41	0.22	-0.96						
Cotton	-0.05	-0.07	-0.01	-0.06	-0.06	-0.01	-0.03	0.03	-0.11	-0.22	0.91	-0.49	0.03	-0.15	-0.17	-0.27	-0.57	-0.88						
Live Cattle	-0.04	-0.02	-0.16	0.02	-0.10	0.04	<b>0.87***</b>	<b>1.07**</b>	0.14	0.50	0.22	0.72	0.23	<b>0.59*</b>	0.02	0.25	-0.84	-0.15						
Lean Hog	-0.01	<b>0.63**</b>	<b>1.07***</b>	-0.14	-0.23	-0.32	-0.07	-0.12	-0.03	-0.21	-0.35	-0.65	0.16	-0.31	0.23	0.45	-0.25	-0.39						
Milk	-0.02	0.00	0.00	<b>0.43**</b>	0.23	<b>1.00*</b>	-0.04	-0.07	<b>1.02***</b>	0.30	<b>0.80*</b>	<b>0.80*</b>	<b>0.16**</b>	-0.09	<b>0.55**</b>	-0.28	-0.51	-0.23						
Oranges	<b>0.37***</b>	0.13	<b>0.61**</b>	-0.23	-0.23	-0.13	-0.05	-0.11	-0.07	-0.08	-0.51	0.32	0.00	-0.15	0.17	0.67	-0.23	-0.04						
Soybean Oil	-0.02	-0.10	0.20	<b>0.39*</b>	<b>0.95*</b>	-0.05	-0.04	<b>0.27*</b>	<b>1.04***</b>	-0.08	<b>1.15**</b>	-0.49	-0.05	-0.11	-0.19	-0.29	-0.71	-0.04						
Soybeans	0.06	-0.13	<b>0.36*</b>	-0.20	0.18	-0.39	0.07	<b>0.41**</b>	-0.09	-0.21	0.10	-0.51	-0.05	-0.02	-0.16	-0.36	-0.81	-1.09						
Soybean Meal	<b>0.16*</b>	0.16	0.07	-0.21	-0.29	-0.86	0.00	<b>0.44*</b>	<b>0.27*</b>	-0.25	1.05	-0.46	-0.08	0.05	-0.16	-0.43	-1.17	-1.22						
Sugar	<b>0.10**</b>	<b>0.14**</b>	<b>0.10*</b>	<b>0.16**</b>	<b>0.45**</b>	0.01	-0.01	-0.06	0.00	-0.09	0.12	-0.24	<b>0.11**</b>	0.07	-0.07	-0.10	-0.48	-0.58						
Wheat	-0.02	-0.08	0.01	0.11	-0.19	<b>0.92***</b>	<b>0.32**</b>	<b>1.32***</b>	-0.12	-0.17	<b>1.14*</b>	-0.48	-0.08	<b>0.29*</b>	0.21	-0.17	-0.51	-0.69						
Wool	0.02	0.20	<b>1.15***</b>	<b>2.54***</b>	<b>1.34**</b>	<b>5.97***</b>	0.13	0.04	-0.12	-0.17	<b>1.14*</b>	-0.48	-0.08	0.13	-0.18	-0.18	1.69	-0.21						
Yellow Corn	0.00	<b>0.65**</b>	-0.08	<b>0.37*</b>	0.56	<b>0.70*</b>	0.13	0.04	0.28	<b>0.55*</b>	-0.70	-0.26	-0.10	-0.03	0.09	<b>1.34*</b>	-1.00	-0.72						
Coal	<b>3.04***</b>	<b>4.32***</b>	<b>2.09***</b>	<b>2.47**</b>	0.92	<b>5.62**</b>	-0.12	-0.25	-0.24	0.68	-0.90	-0.30	-0.07	<b>1.08**</b>	-0.21	-0.50	-1.08	-1.36						
Heating Oil	0.14	-0.29	0.20	1.07	0.97	0.99	<b>0.47**</b>	<b>1.29**</b>	-0.22	-0.47	-1.27	0.11	0.07	0.42	-0.28	0.09	-1.28	0.50						
Natural Gas	<b>0.49**</b>	-0.35	<b>2.33***</b>	-0.64	<b>8.70**</b>	0.72	<b>0.37*</b>	-0.03	<b>1.63**</b>	-0.62	1.37	<b>5.01**</b>	<b>0.45*</b>	-0.18	<b>1.10**</b>	-0.37	-1.63	-0.73						
Unleaded Regular Gas	<b>1.39**</b>	-0.46	<b>0.97*</b>	<b>15.50***</b>	<b>10.24*</b>	<b>17.89**</b>	0.11	-0.11	-0.42	-1.23	4.03	-2.43	<b>0.51*</b>	-0.22	0.14	-1.23	-3.21	-2.66						
WTI Oil	-0.02	-0.01	0.02	<b>0.13*</b>	0.01	0.12	-0.02	0.00	<b>0.11*</b>	-0.09	-0.07	-0.26	0.02	0.03	0.07	0.29	0.17	<b>2.04**</b>						
Aluminium	<b>0.14**</b>	-0.01	<b>0.14*</b>	-0.12	0.10	-0.24	-0.01	0.06	-0.05	-0.04	0.11	-0.13	-0.04	0.03	-0.04	<b>0.57*</b>	-0.75	0.54						
Gold	<b>0.29***</b>	<b>0.10*</b>	<b>0.82***</b>	<b>0.11*</b>	<b>0.44**</b>	-0.02	-0.01	0.05	-0.03	-0.07	-0.17	-0.18	0.00	-0.06	-0.04	-0.13	-0.53	0.39						
High Grade Copper	<b>0.09*</b>	0.00	0.10	-0.08	<b>0.89**</b>	-0.13	<b>0.33***</b>	<b>0.97***</b>	-0.56	-0.06	<b>1.03*</b>	-0.34	-0.05	<b>0.37*</b>	-0.09	<b>1.04**</b>	1.10	<b>1.17*</b>						
Nickel	<b>1.24**</b>	<b>10.26***</b>	-0.30	<b>10.85**</b>	2.33	7.82	-0.29	-0.51	-0.56	<b>14.06***</b>	<b>9.71*</b>	-1.04	<b>0.63*</b>	<b>4.03***</b>	-0.60	<b>5.37*</b>	-4.76	-0.23						
Palladium	0.14	-0.16	<b>1.14*</b>	-0.33	-2.31	-0.65	-0.03	0.43	-0.46	<b>2.56*</b>	<b>13.27**</b>	0.88	-0.12	0.00	<b>1.72**</b>	-0.83	<b>5.97*</b>	-2.31						
Platinum	-0.05	-0.05	-0.07	-0.05	-0.13	0.05	-0.04	-0.11	-0.03	0.00	0.63	0.01	<b>0.23**</b>	-0.17	0.26	-0.03	0.72	-0.88						
Silver	<b>0.59***</b>	<b>0.32**</b>	<b>1.48***</b>	0.04	<b>1.05***</b>	-0.19	-0.04	-0.09	-0.06	-0.18	0.06	-0.41	<b>0.23**</b>	<b>0.43**</b>	-0.04	-0.31	0.47	-1.06						
Tin	0.01	-0.08	<b>1.20***</b>	0.05	0.00	0.15	<b>0.21**</b>	0.04	0.00	<b>0.45*</b>	0.31	-0.22	0.00	-0.17	<b>2.34***</b>	-0.63	<b>3.95**</b>							
Zinc	<b>0.19***</b>	-0.03	<b>0.73***</b>	-0.12	<b>0.57*</b>	-0.03	-0.03	-0.07	-0.09	0.16	-0.62	-0.31	-0.06	<b>0.91**</b>	-0.06	0.17	-0.56	0.73						

Table A9: In-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	df <sub>r</sub>				df <sub>y</sub>				df <sub>p</sub>								
	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec
<i>Butter</i>	-0.02	-0.09	0.04	0.17	-0.38	0.07	0.02	<b>0.95***</b>	-0.05	-0.13	-0.23	<b>0.40***</b>	-0.05	<b>1.00***</b>	<b>0.34*</b>	<b>0.76*</b>	-0.09
<i>Cocoa</i>	-0.08	-0.16	-0.16	-0.28	-0.55	-0.19	-0.01	-0.15	<b>2.08***</b>	-0.21	<b>0.92*</b>	<b>0.15*</b>	0.15	0.17	-0.10	-0.03	-0.23
<i>Coffee Arabica</i>	-0.11	-0.19	-0.06	1.04	0.84	0.18	-0.08	-0.20	0.02	-0.62	-1.16	-0.03	-0.21	-0.09	0.62	0.06	-0.25
<i>Corn Oil</i>	0.01	0.23	-0.15	-0.17	-0.37	0.39	<b>0.49***</b>	<b>0.78**</b>	0.03	-0.04	-0.16	<b>0.58***</b>	<b>0.45*</b>	0.26	-0.25	0.06	-0.63
<i>Cotton</i>	-0.07	-0.13	<b>0.59**</b>	-0.30	0.08	0.18	<b>1.19***</b>	<b>0.32*</b>	<b>1.26***</b>	<b>1.25**</b>	<b>1.09*</b>	-0.03	-0.04	-0.09	-0.09	-0.29	-0.26
<i>Live Cattle</i>	-0.09	-0.19	0.04	0.20	-0.43	<b>2.00*</b>	<b>1.19***</b>	<b>1.03**</b>	<b>0.93**</b>	<b>1.95***</b>	<b>4.03***</b>	<b>0.56***</b>	<b>0.47**</b>	<b>0.49**</b>	<b>3.16***</b>	<b>1.79***</b>	<b>4.13***</b>
<i>Lean Hog</i>	0.02	0.02	-0.16	-0.28	0.11	-0.78	<b>0.70***</b>	<b>0.98***</b>	-0.18	-0.10	-0.16	0.02	0.02	<b>1.57***</b>	-0.14	0.40	-0.31
<i>Milk</i>	<b>0.12**</b>	0.14	0.09	-0.18	0.63	0.53	<b>0.09*</b>	0.11	0.05	0.22	0.08	-0.04	-0.07	-0.08	-0.13	-0.24	-0.31
<i>Oranges</i>	<b>0.13*</b>	-0.14	<b>0.44**</b>	-0.15	0.43	-0.49	<b>0.44***</b>	<b>0.61**</b>	<b>0.23*</b>	0.14	-0.52	<b>0.81***</b>	<b>0.50**</b>	<b>1.02***</b>	<b>1.29***</b>	-0.11	<b>2.78**</b>
<i>Soybean Oil</i>	-0.06	-0.07	-0.16	0.04	-0.41	-0.44	<b>0.19**</b>	<b>0.50***</b>	0.05	0.02	0.00	-0.05	-0.08	-0.11	0.14	<b>0.72*</b>	0.21
<i>Soybeans</i>	<b>0.31**</b>	<b>0.74**</b>	0.10	<b>0.61*</b>	-0.44	0.08	<b>0.37***</b>	<b>1.03***</b>	-0.13	-0.23	-0.42	-0.06	0.04	0.08	0.05	0.78	-0.16
<i>Soybean Meal</i>	0.09	0.14	-0.08	<b>0.63*</b>	-0.40	-0.47	-0.05	-0.09	-0.15	-0.22	-1.05	-0.06	0.25	-0.09	-0.33	-0.06	-0.68
<i>Sugar</i>	0.03	0.01	-0.05	<b>0.23*</b>	<b>0.55*</b>	0.09	-0.02	0.01	-0.05	-0.07	-0.01	<b>0.08**</b>	0.03	<b>0.12*</b>	-0.02	-0.06	-0.03
<i>Wheat</i>	<b>0.11*</b>	0.07	-0.06	-0.19	0.44	-0.47	<b>0.96***</b>	<b>2.29***</b>	0.17	0.04	-0.37	-0.04	-0.08	-0.07	-0.06	0.31	-0.20
<i>Wool</i>	<b>0.79***</b>	<b>1.57***</b>	<b>0.36*</b>	<b>3.54***</b>	0.60	<b>3.65***</b>	-0.03	-0.03	-0.14	0.32	-0.19	<b>0.55***</b>	0.18	<b>0.73***</b>	<b>0.43*</b>	<b>5.59***</b>	0.02
<i>Yellow Corn</i>	0.12	0.04	-0.16	<b>1.52**</b>	-0.25	0.90	<b>0.75***</b>	<b>1.22***</b>	<b>0.89**</b>	<b>0.60*</b>	<b>1.55*</b>	-0.03	0.14	-0.11	0.09	-0.25	0.15
<i>Coal</i>	-0.12	-0.26	-0.22	-0.47	-0.72	0.47	-0.11	-0.26	-0.18	<b>1.84**</b>	-0.93	<b>2.90***</b>	<b>1.95***</b>	<b>3.49***</b>	<b>0.88*</b>	<b>5.20**</b>	2.45
<i>Heating Oil</i>	-0.14	-0.18	-0.16	-0.09	-0.97	0.26	-0.09	-0.23	0.50	0.57	-0.96	<b>0.65**</b>	<b>1.07**</b>	0.00	-0.27	-1.13	0.27
<i>Natural Gas</i>	-0.13	-0.04	0.19	<b>3.93***</b>	0.98	1.35	0.26	-0.25	<b>0.87*</b>	-0.47	-1.03	<b>3.64***</b>	<b>3.96***</b>	<b>3.22***</b>	0.68	1.31	2.97
<i>Unleaded Regular Gas</i>	<b>0.87**</b>	-0.44	0.23	-1.16	-0.38	-2.17	<b>0.68*</b>	<b>3.75***</b>	0.18	-0.20	4.10	<b>3.93***</b>	<b>5.78***</b>	<b>2.06**</b>	0.01	-1.66	0.41
<i>WTI Oil</i>	<b>0.06**</b>	-0.02	-0.05	-0.11	-0.09	0.19	<b>0.06*</b>	<b>0.21**</b>	<b>0.19**</b>	-0.09	-0.03	<b>0.17***</b>	-0.04	<b>0.37***</b>	-0.04	-0.09	-0.11
<i>Aluminum</i>	-0.03	0.06	-0.05	<b>0.26*</b>	-0.09	-0.23	-0.03	0.03	-0.04	-0.10	-0.24	<b>0.07*</b>	-0.02	0.07	<b>0.86***</b>	<b>2.22**</b>	<b>1.49***</b>
<i>Gold</i>	0.04	<b>0.18*</b>	0.01	0.21	-0.09	0.47	-0.01	-0.01	-0.04	-0.07	0.36	<b>0.10**</b>	0.02	<b>0.10**</b>	<b>0.19**</b>	<b>0.27*</b>	<b>0.50**</b>
<i>High Grade Copper</i>	0.06	-0.11	-0.03	-0.07	-0.50	-0.17	-0.03	<b>0.22*</b>	0.03	0.11	-0.48	0.01	0.05	-0.05	0.04	0.12	<b>0.43*</b>
<i>Nickel</i>	<b>0.74*</b>	-0.29	<b>1.09*</b>	-2.12	-3.55	0.21	0.11	<b>2.20**</b>	0.14	-0.07	-4.12	0.17	<b>8.83***</b>	0.78	0.03	-4.52	8.44
<i>Palladium</i>	-0.12	-0.36	-0.34	-1.02	3.74	0.30	0.15	<b>0.83*</b>	0.48	1.05	-0.56	<b>0.72**</b>	<b>0.85*</b>	<b>1.26*</b>	-0.08	2.49	-2.39
<i>Platinum</i>	-0.05	0.14	-0.11	-0.03	-0.41	-0.66	-0.05	-0.13	<b>0.25*</b>	0.31	0.37	0.05	-0.03	-0.05	0.18	0.42	0.35
<i>Silver</i>	-0.05	-0.04	-0.11	-0.20	0.23	-0.35	0.04	-0.01	-0.09	-0.18	0.32	<b>0.43***</b>	<b>0.19*</b>	<b>0.85***</b>	<b>0.32**</b>	<b>0.69**</b>	<b>0.88**</b>
<i>Tin</i>	-0.04	-0.11	0.00	-0.19	-0.49	0.43	0.00	0.11	-0.01	<b>1.46***</b>	0.26	-0.04	-0.08	0.04	-0.08	0.03	0.01
<i>Zinc</i>	<b>0.24**</b>	0.16	<b>0.18*</b>	0.11	-0.30	0.37	-0.03	-0.10	-0.09	0.44	0.94	0.02	-0.05	<b>0.34**</b>	0.14	<b>0.80**</b>	0.03



Table A9: In-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>d<sub>1y</sub></i>				<i>ep</i>				<i>erp</i>							
	Exp	eExp	lExp	lRec	Rec	eRec	lRec	lExp	Exp	eExp	lExp	lRec	Rec	eRec	lRec	
<i>Butter</i>	0.36***	-0.07	1.00***	0.34*	0.71**	-0.02	0.29***	0.04	0.87***	0.67**	0.76*	0.01	0.02	-0.06	-0.12	-0.16
<i>Cocoa</i>	0.15*	0.11	0.18	-0.07	0.02	-0.23	-0.05	-0.04	-0.11	-0.09	-0.11	-0.05	-0.05	-0.11	0.22*	0.05
<i>Coffee Arabica</i>	-0.06	-0.21	-0.14	0.29	-0.14	-1.50	-0.10	-0.20	-0.24	0.56	1.41	0.09	0.29*	0.29	-0.32	-1.18
<i>Corn Oil</i>	0.61***	0.53**	0.24	-0.25	-0.06	-0.56	0.63***	0.37*	0.64**	-0.19	-0.63	-0.05	-0.02	-0.16	-0.22	-0.26
<i>Cotton</i>	-0.03	-0.05	-0.09	-0.11	-0.25	-0.24	-0.03	-0.09	0.05	-0.12	-0.14	-0.05	-0.05	-0.08	0.06	0.97**
<i>Live Cattle</i>	0.62***	0.54**	0.54**	2.58***	1.77***	3.37***	0.50***	0.08	0.93***	1.39***	0.70*	0.09	0.03	-0.04	0.59**	-0.27
<i>Lean Hog</i>	0.01	0.03	1.55***	-0.10	0.57*	-0.30	0.19**	-0.03	0.66**	-0.13	0.24	-0.02	-0.06	-0.12	0.41*	0.32
<i>Milk</i>	-0.04	-0.07	-0.09	-0.13	-0.24	-0.31	-0.02	-0.02	0.00	0.16	0.10	0.50	0.03	0.07	-0.15	-0.31
<i>Oranges</i>	0.93***	0.73**	1.13***	1.67***	0.95*	3.90***	0.30**	0.03	0.60**	0.59*	0.54	0.35***	1.06***	0.13	0.24	-0.52
<i>Soybean Oil</i>	-0.05	-0.09	-0.11	0.39*	0.93*	0.50	0.01	-0.03	-0.14	-0.13	-0.17	0.01	-0.04	-0.14	1.08***	0.40
<i>Soybeans</i>	-0.06	0.04	0.12	0.06	0.93*	-0.29	-0.01	0.09	-0.09	-0.14	-0.07	0.13	0.00	0.12	-0.21	-0.07
<i>Soybean Meal</i>	-0.06	0.26	-0.10	-0.31	0.00	-0.77	0.16*	0.85**	-0.15	-0.37	-0.70	-0.08	-0.15	-0.09	-0.34	-1.01
<i>Sugar</i>	0.08**	0.04	0.10*	-0.01	-0.04	-0.03	-0.01	-0.04	0.03	0.02	0.03	-0.02	0.00	0.03	0.20**	0.16*
<i>Wheat</i>	-0.04	-0.08	-0.07	-0.02	0.32	-0.21	-0.04	-0.10	-0.10	0.17*	0.35	-0.04	-0.09	-0.10	0.37**	-0.18
<i>Wool</i>	0.46***	0.05	0.67***	0.27	5.97***	-0.20	0.40***	0.82***	0.09	3.95***	1.76**	0.26**	0.74**	0.06	0.15	-0.22
<i>Yellow Corn</i>	-0.04	0.11	-0.11	-0.08	-0.29	-0.12	-0.06	-0.10	-0.12	-0.13	-0.17	0.01	-0.09	-0.08	1.40***	0.05
<i>Coal</i>	2.68***	1.60***	3.41***	1.21*	5.18**	2.97*	0.67***	-0.22	2.34***	3.58***	2.11*	0.18	0.64*	-0.21	0.43	-0.97
<i>Heating Oil</i>	0.60**	1.10*	-0.04	-0.32	-1.07	0.43	0.27*	1.01**	-0.20	1.01	-1.28	-0.09	-0.26	-0.19	-0.33	-0.83
<i>Natural Gas</i>	3.92***	4.50***	3.22***	1.59	0.54	5.40**	2.06***	3.88***	1.56**	0.09	7.56*	0.29*	1.25**	-0.29	5.40***	1.18
<i>Unleaded Regular Gas</i>	3.96***	5.84***	2.17**	0.47	-1.15	1.42	1.85***	3.36***	1.29*	12.38***	1.27	-0.23	-0.40	-0.43	1.37	-0.24
<i>WTI Oil</i>	0.15***	-0.04	0.34***	-0.04	-0.08	-0.12	0.20***	0.03	0.36**	0.03	-0.08	0.02	-0.06	0.00	-0.04	0.05
<i>Aluminium</i>	0.07*	0.01	0.07	1.01***	2.12**	1.79**	-0.02	-0.08	-0.02	0.57**	0.86*	-0.02	-0.07	-0.04	0.21*	-0.35
<i>Gold</i>	0.08**	0.01	0.19**	0.16**	0.38**	0.40**	-0.02	-0.04	-0.04	-0.03	0.02	0.00	-0.01	-0.04	-0.02	0.36**
<i>High Grade Copper</i>	0.00	0.02	-0.05	0.04	0.24	0.41*	-0.04	-0.08	-0.05	-0.01	-0.22	0.00	-0.02	-0.01	-0.08	0.40
<i>Nickel</i>	0.18	8.24***	0.70	-0.06	-4.73	6.46	-0.29	0.32	0.80	15.25***	-2.77	-0.28	-0.40	-0.55	-2.14	6.45
<i>Palladium</i>	0.75**	0.67	1.45**	-0.40	1.26	-2.41	0.27	0.05	0.49	0.50	1.40	-0.20	0.06	-0.02	0.31	6.40*
<i>Platinum</i>	0.02	-0.06	-0.07	-0.03	0.31	-0.01	0.05	0.10	-0.08	0.46*	1.08*	0.19**	0.08	0.04	1.48***	0.04
<i>Silver</i>	0.38***	0.15*	0.81***	0.27**	0.81**	0.64**	0.00	-0.07	0.09	0.01	-0.08	0.06	-0.01	-0.02	-0.04	0.18
<i>Tin</i>	-0.04	-0.05	0.05	-0.06	0.15	0.06	-0.03	-0.08	-0.04	0.07	-0.20	-0.02	0.29**	-0.07	0.31**	0.44*
<i>Zinc</i>	0.02	-0.05	0.39**	0.15	0.63*	0.08	-0.02	-0.02	-0.01	0.02	-0.09	-0.01	-0.05	0.17*	-0.12	-0.15

Table A9: In-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	infl				ltr				Hty			
	Exp	eExp	lExp	lRec	Exp	eExp	lExp	lRec	Exp	eExp	lExp	lRec
<i>Butter</i>	0.08*	0.34**	-0.05	0.27*	-0.22	1.19**	0.02	0.65**	-0.03	-0.07	-0.06	-0.16
<i>Cocoa</i>	0.03	0.12	-0.11	0.13	-0.22	-0.12	0.26	-0.05	0.43**	0.53**	0.32*	0.01
<i>Coffee Arabica</i>	-0.11	-0.11	-0.24	1.09	8.01**	-1.71	0.38	1.46	0.06	-0.18	1.10**	-0.42
<i>Corn Oil</i>	1.77***	1.22***	2.23***	1.50***	1.37*	2.19**	1.20***	1.62**	0.49***	0.86**	-0.10	0.77*
<i>Cotton</i>	0.62***	0.39**	0.85***	-0.13	0.35	-0.26	0.13	-0.09	0.28**	-0.01	1.89***	0.16
<i>Live Cattle</i>	0.08	0.07	0.17	0.15	-0.12	-0.09	0.01	-0.23	0.07	-0.20	0.76**	0.03
<i>Lean Hog</i>	0.14*	0.24*	-0.05	-0.08	-0.11	0.33	-0.17	-0.28	-0.01	0.17	-0.09	-0.26
<i>Milk</i>	-0.01	-0.02	-0.07	-0.01	-0.25	0.93**	0.30**	-0.13	-0.02	-0.07	-0.06	-0.15
<i>Oranges</i>	-0.06	-0.13	-0.10	-0.01	-0.49	0.16	0.01	-0.11	-0.05	-0.10	-0.11	-0.18
<i>Soybean Oil</i>	0.28**	0.02	0.69**	0.15	0.73*	-0.14	-0.14	-0.14	0.12*	0.19	-0.07	0.10
<i>Soybeans</i>	0.09	-0.07	0.01	0.39*	0.45	0.24	-0.03	-0.20	-0.06	-0.13	-0.09	-0.18
<i>Soybean Meal</i>	1.27***	2.79***	-0.02	1.14**	0.38	3.07**	-0.09	-0.25	-0.06	0.01	-0.12	-0.31
<i>Sugar</i>	-0.02	-0.04	-0.02	0.31***	0.45**	0.77**	0.08	0.19*	0.44***	0.60***	0.54***	0.33**
<i>Wheat</i>	-0.01	-0.05	0.33**	0.11	-0.05	0.58**	0.42**	0.07	0.05	-0.02	0.03	-0.06
<i>Wool</i>	-0.01	0.10	-0.08	-0.16	-0.10	-0.33	-0.14	1.05**	-0.06	-0.01	-0.12	-0.23
<i>Yellow Corn</i>	0.21**	0.44**	-0.06	-0.10	-0.22	-0.16	-0.13	-0.32	-0.05	0.22	0.10	-0.30
<i>Coal</i>	0.26*	0.41	0.25	-0.41	-0.75	-1.11	-0.24	1.25*	0.59**	0.79**	0.16	-0.45
<i>Heating Oil</i>	0.06	0.59*	-0.23	4.73***	4.49*	8.43***	-0.19	-0.37	-0.02	-0.20	-0.21	0.14
<i>Natural Gas</i>	0.29*	-0.37	1.89***	0.50	-1.99	0.33	0.57*	-0.63	2.98***	2.75**	4.07***	2.04*
<i>Unleaded Regular Gas</i>	0.13	1.60**	-0.19	-0.66	1.98	2.00	-0.47	1.04	4.17***	4.87***	2.55**	9.71***
<i>WTI Oil</i>	0.06*	0.02	0.04	0.11*	0.10	0.01	0.04	-0.06	0.07*	-0.01	0.55***	-0.05
<i>Aluminium</i>	-0.03	-0.07	-0.03	-0.11	-0.19	-0.22	-0.02	0.04	0.36***	0.51**	0.50***	0.04
<i>Gold</i>	-0.01	-0.04	-0.01	-0.02	-0.07	-0.05	-0.03	-0.10	1.41***	1.28***	1.64***	0.83***
<i>High Grade Copper</i>	0.03	0.07	-0.06	-0.03	-0.02	-0.15	-0.07	0.21	0.15**	0.75***	0.04	0.08
<i>Nickel</i>	1.57**	0.48	1.14*	6.44**	9.16*	5.63	-0.17	0.87	0.50	8.24***	0.73	16.28***
<i>Palladium</i>	1.11**	0.18	0.43	-0.64	-2.18	-1.96	0.51	-0.97	-0.02	-0.03	0.40	-0.05
<i>Platinum</i>	0.03	0.26*	-0.10	0.06	-0.21	-0.33	-0.12	0.09	0.00	-0.13	0.45**	-0.03
<i>Silver</i>	0.00	0.08	-0.09	0.25**	0.18	0.50**	-0.13	-0.21	2.25***	2.78***	1.59***	1.81***
<i>Tin</i>	0.05	-0.02	0.08	-0.06	0.64*	-0.14	-0.13	-0.08	-0.03	-0.10	0.44**	0.00
<i>Zinc</i>	-0.01	-0.05	-0.04	-0.07	0.00	-0.26	0.08	-0.13	0.20**	0.05	0.38**	-0.26

Table A9: In-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	svar						tbl						tms					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
Butter	0.04	0.18*	-0.02	0.48**	0.20	0.21	-0.01	0.14	-0.06	-0.17	-0.38	-0.49	0.01	0.31**	-0.06	-0.17	-0.37	-0.46
Cocoa	-0.04	-0.04	-0.09	1.26***	0.17	2.30***	0.20*	0.13	0.70**	-0.15	-0.27	-0.55	0.03	0.43*	0.51**	-0.09	-0.31	-0.47
Coffee Arabica	-0.02	-0.07	-0.15	-0.47	-1.81	-0.30	-0.10	-0.17	-0.16	-0.23	0.25	-1.86	0.46**	0.49*	1.64***	-0.47	-0.04	-1.79
Corn Oil	0.14	0.94***	-0.11	-0.25	0.30	-0.38	0.41**	0.64**	0.10	0.68*	0.68	0.07	-0.08	-0.01	0.40*	-0.18	-0.47	-0.28
Cotton	0.42***	0.60***	0.07	-0.05	-0.31	-0.16	0.03	-0.12	1.31***	0.11	1.15*	-0.31	0.25**	0.30*	-0.14	-0.23	0.01	-0.49
Live Cattle	0.14*	0.35*	-0.16	0.69**	-0.37	1.82***	-0.02	-0.20	0.35	0.05	0.19	-0.46	-0.03	-0.21	-0.10	-0.22	-0.51	0.44
Lean Hog	0.36**	1.05***	-0.14	0.08	-0.24	-0.21	0.02	0.29*	-0.08	-0.22	-0.31	-0.67	-0.06	-0.12	-0.17	-0.07	1.31*	-0.01
Milk	-0.04	-0.05	-0.08	-0.13	-0.11	-0.31	-0.01	0.02	-0.06	-0.16	-0.35	-0.34	-0.03	0.15	-0.08	-0.12	-0.34	-0.12
Oranges	0.11*	-0.05	0.16*	0.44*	-0.13	1.01*	-0.04	-0.14	-0.08	-0.22	-0.58	-0.45	-0.06	-0.02	0.00	0.94**	0.94	-0.15
Soybean Oil	0.08	0.89***	0.01	-0.14	-0.19	-0.38	-0.03	-0.06	-0.13	0.13	-0.12	0.45	0.21**	0.46**	-0.09	-0.09	-0.32	0.04
Soybeans	0.04	1.32***	0.10	0.00	-0.06	0.19	-0.05	0.06	-0.13	-0.23	-0.46	-0.61	0.11	0.49**	-0.05	0.10	0.01	-0.56
Soybean Meal	-0.02	0.12	-0.15	-0.38	-0.92	-0.93	-0.06	0.04	-0.14	-0.29	-0.99	0.24	-0.08	-0.17	-0.13	-0.34	-0.82	2.67*
Sugar	-0.02	-0.02	-0.01	-0.05	-0.10	-0.16	0.43***	0.68***	0.49***	0.61***	0.42	0.52	-0.02	-0.06	-0.02	0.31**	0.08	-0.22
Wheat	-0.04	-0.03	-0.09	0.65**	-0.09	2.67***	-0.04	-0.12	-0.04	-0.13	-0.26	-0.49	0.07	0.26*	-0.12	-0.12	-0.38	-0.29
Wool	0.16*	0.60**	-0.10	0.16	-0.32	0.13	-0.01	0.71**	-0.11	-0.12	-0.54	-0.07	0.04	1.13***	-0.12	0.23	-0.50	0.49
Yellow Corn	0.04	0.06	-0.10	0.60**	-0.39	1.38***	0.02	0.29*	-0.15	-0.24	-0.72	-0.74	0.03	-0.16	0.43*	0.07	-0.38	-0.63
Coal	-0.10	0.30	-0.18	1.10*	-0.90	0.46	0.84***	0.84**	0.40	-0.37	-0.95	-0.24	0.04	-0.26	0.25	-0.11	-0.94	2.32
Heating Oil	-0.14	1.06**	-0.21	1.05	-1.28	3.04*	-0.14	-0.26	-0.16	0.91	-1.17	2.04	0.06	-0.34	-0.24	1.39*	-0.26	2.62
Natural Gas	-0.11	0.03	-0.28	5.67***	-1.86	1.88	1.23***	2.13**	1.56**	2.63*	7.75*	-0.28	-0.09	-0.21	-0.18	1.08	7.58**	-0.79
Unleaded Regular Gas	-0.17	-0.43	-0.54	9.97***	9.51*	10.35***	0.59*	2.36**	0.30	7.68***	4.69	21.73***	1.45***	-0.51	0.44	0.33	-1.61	9.51**
WTI Oil	0.05*	0.12*	0.00	0.14	0.05	0.38	0.04	-0.05	0.51***	-0.10	-0.10	-0.31	-0.02	0.06	0.02	-0.11	-0.22	0.00
Aluminium	0.06*	-0.03	0.35**	-0.10	-0.21	-0.24	0.16**	0.09	0.13*	-0.06	-0.13	-0.05	0.05	0.62***	0.10*	-0.07	0.14	0.00
Gold	0.04*	-0.01	0.05	0.02	-0.03	0.17	0.97***	0.61***	1.56***	0.42**	0.28	0.12	-0.02	0.26**	0.01	-0.09	-0.20	-0.08
High Grade Copper	-0.02	-0.03	-0.07	1.77***	-0.20	2.33***	0.07*	0.19	-0.01	-0.06	-0.05	-0.28	-0.01	0.76***	-0.07	-0.06	-0.46	0.09
Nickel	-0.23	-0.38	-0.60	8.25**	-3.75	-2.67	0.24	6.01***	-0.16	20.82***	-3.67	24.25***	-0.24	-0.63	0.27	15.27***	-3.52	13.90**
Palladium	0.36*	0.05	0.32	-1.09	-1.93	-1.90	-0.18	0.17	-0.50	2.25*	2.98	-2.16	-0.16	-0.05	1.17*	6.14**	-1.31	2.36
Platinum	-0.05	-0.10	-0.11	0.28*	-0.25	0.02	-0.06	-0.10	0.05	0.01	-0.17	-0.09	0.18**	0.12	0.24*	-0.11	0.28	-0.19
Silver	-0.04	-0.07	-0.08	-0.03	-0.18	-0.06	1.24***	1.37***	1.03***	1.12**	0.85*	1.56*	0.15**	0.73***	-0.12	-0.17	-0.33	-0.45
Tin	0.08*	0.09	-0.09	1.78***	0.04	1.78***	-0.04	-0.10	0.63***	-0.13	-0.28	-0.26	-0.05	-0.12	0.14	0.01	-0.40	-0.08
Zinc	-0.03	-0.04	-0.04	0.75**	0.03	2.61***	0.09*	-0.12	0.25*	-0.26	-0.60	-0.44	0.00	0.47**	-0.09	0.45	0.40	0.33

Table A9: In-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>unrate</i>					
	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	-0.01	-0.15	-0.08	-0.13	-0.51	-0.78
<i>Cocoa</i>	<b>0.92***</b>	0.48	-0.26	-0.55	-1.13	-1.54
<i>Coffee Arabica</i>	0.20	-0.07	<b>3.38***</b>	-0.69	-1.31	-1.91
<i>Corn Oil</i>	<b>0.79***</b>	<b>1.48***</b>	-0.23	-0.34	-0.50	-0.99
<i>Cotton</i>	<b>0.30**</b>	0.33	<b>2.26***</b>	0.32	0.59	-0.49
<i>Live Cattle</i>	<b>1.19***</b>	<b>1.34**</b>	<b>2.12***</b>	-0.33	-0.76	-1.12
<i>Lean Hog</i>	-0.08	0.12	-0.16	0.08	-0.66	0.32
<i>Milk</i>	0.05	-0.10	-0.01	-0.28	-0.59	0.80
<i>Oranges</i>	0.07	-0.02	-0.02	-0.45	-0.74	0.14
<i>Soybean Oil</i>	<b>0.24*</b>	<b>0.78**</b>	-0.22	-0.13	-0.72	1.24
<i>Soybeans</i>	-0.08	-0.13	-0.11	-0.40	-0.61	-0.49
<i>Soybean Meal</i>	-0.10	-0.23	-0.13	-0.49	-1.34	0.41
<i>Sugar</i>	0.06	<b>0.21*</b>	0.05	-0.23	-0.44	-0.79
<i>Wheat</i>	<b>0.15*</b>	<b>0.51**</b>	0.12	0.00	-0.38	-0.78
<i>Wool</i>	0.08	0.17	-0.16	-0.10	-0.12	-0.02
<i>Yellow Corn</i>	-0.08	0.19	<b>1.41***</b>	0.20	-0.01	-1.35
<i>Coal</i>	-0.15	-0.26	0.00	-0.34	-0.54	-1.19
<i>Heating Oil</i>	<b>0.31*</b>	0.10	-0.13	0.25	-0.17	-0.40
<i>Natural Gas</i>	<b>1.67***</b>	<b>1.74**</b>	<b>2.52***</b>	0.33	-0.39	2.93
<i>Unleaded Regular Gas</i>	<b>5.07***</b>	<b>9.61***</b>	0.07	-0.38	5.80	-2.69
<i>WTI Oil</i>	-0.03	-0.07	<b>0.28**</b>	-0.14	-0.45	1.12
<i>Aluminium</i>	-0.04	-0.15	0.11	-0.23	-0.75	0.12
<i>Gold</i>	<b>0.50***</b>	<b>0.95***</b>	<b>0.73***</b>	0.15	-0.49	-0.38
<i>High Grade Copper</i>	-0.05	0.28	-0.05	0.39	-0.89	-0.60
<i>Nickel</i>	<b>1.53**</b>	<b>6.22***</b>	-0.44	-1.74	-3.80	-1.32
<i>Palladium</i>	-0.20	0.40	<b>1.68**</b>	0.39	-1.95	2.19
<i>Platinum</i>	0.04	-0.07	<b>1.87***</b>	-0.22	-0.75	-0.76
<i>Silver</i>	<b>0.67***</b>	<b>1.52***</b>	<b>0.51**</b>	0.30	-0.55	-0.70
<i>Tin</i>	-0.07	0.30	0.13	0.07	-0.51	-0.66
<i>Zinc</i>	-0.07	-0.14	-0.03	-0.32	-0.74	-0.59

Table A10: Out-of-Sample Volatility Predictability and Business Cycle Stages (1 Month)

This table reports the out-of-sample  $R^2$ 's of a regression of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable across business cycle stages. We predict the next month's volatility. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dftr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "imff" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, and "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	de						Δindpro						ΔM1					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
Butter	1.08***	5.45***	-1.97	-3.31	-2.20	-6.72	-0.42	0.37*	0.30*	-0.16	0.27**	3.91***	0.28	-0.62	-2.90	0.21		
Cocoa	0.27***	1.72***	-0.14	-4.65	-0.26	-1.48	-0.10	-0.52	1.77***	-1.57				-0.95	-1.19	-1.86		
Coffee Arabica	1.14**	-4.53	-0.97				-1.16	-1.74	-2.55					-0.40	-3.67	-2.00		
Corn Oil	-0.23	1.03**	-2.78	-15.25			-0.37	-1.76	1.70***	0.30				-1.97	2.97***	-1.84		
Cotton	-1.57	-2.38	-1.29	-5.11	-1.05	-2.22	0.18**	0.73**	-0.41	-1.36				-2.15	-0.38	-0.26		
Live Cattle	1.78***	2.52***	0.13*	-9.11	-0.91	-2.26	-0.57	0.33*	-0.05	0.33				-0.90	0.95**	0.28		
Lean Hog	0.51***	2.34***	-1.87	-2.59	-2.86	-1.89	-1.12	-0.02	-0.33	-2.68				-0.92	-0.66	0.78*		
Milk	-0.74	-1.67	-4.23	-2.67	1.75**	2.16*	-0.93	0.36**	-0.91	0.76*				-1.65	-1.63	-0.02		
Oranges	-2.01	-0.63	0.08*	-4.06			-1.43	0.21*	-1.30	-0.68				-0.74	-2.01	-0.57		
Soybean Oil	-1.01	0.33*	-2.03	-5.69			-0.49	0.81**	-1.35	-1.06				-0.56	-1.82	-1.16		
Soybeans	0.75***	3.39***	-1.83	-9.35			-0.45	0.25*	-0.34	-1.75				-0.80	-1.14	-2.68		
Soybean Meal	-0.43	0.34*	-1.57	-14.98			-0.48	-0.04	-0.25	-2.15				-1.19	-0.89	-2.80		
Sugar	-1.31	-0.30	-2.45	-3.34	0.85*	-1.54	-0.58	-0.48	-0.09	0.17				-0.98	-1.32	-0.65		
Wheat	-1.01	-0.16	-1.38	-4.48	-1.12	1.10**	-0.61	0.33*	-0.30	-0.62				-0.91	-0.58	-1.21		
Wool	-0.33	0.73**	-0.87	0.55***	1.80**	7.83***	-0.25	-1.37	-0.46	0.04				-1.14	-0.85	-0.70		
Yellow Corn	-0.52	1.51***	-1.34	-3.45	-1.49	0.63*	-0.88	-0.26	-0.23	-1.55				-1.12	1.23**	-3.07		
Coal	-0.11	0.13*	-0.41	-6.79			-0.30	0.72**	-0.20	15.65***				-1.03	0.62	-2.46		
Heating Oil	-1.66	-1.26	-2.80				-0.11	-0.12	-0.52					-1.55	0.98			
Natural Gas	-1.96		6.59**				0.08		3.90**					-0.54	0.96	0.25		
Unleaded Regular Gas	0.76**	-0.39	-0.81				-1.39	-1.15	-0.26					-0.48	-0.68	-0.88		
WTI Oil	-1.25	-0.43	-1.08	-5.04	-3.05	-0.34	-0.06	0.71**	-0.20	-0.85				-1.01	-1.60	-1.43		
Aluminium	-1.06	-3.04	-1.48	-2.13	2.09**	-1.82	-0.19	0.19*	-0.02	-2.37				-0.75	-2.20	0.50*		
Gold	1.70***	0.13*	-2.78	-3.85	-2.86	-1.92	-1.05	-0.04	-0.24	0.01				-0.37	-0.69	-0.85		
High Grade Copper	-2.14	0.23**	-1.35	-5.17			-0.33	0.06	-0.82	-0.34				-2.04				
Nickel	-0.27						-0.98							-2.19	-0.36	1.65*		
Palladium	-1.48	-3.93	1.01	-1.04*			-0.74	0.91	-1.74					0.04*	-1.67	1.79***		
Platinum	-1.04	-0.65	-1.33	-6.23	0.87*	-1.48	-0.67	0.89**	-0.27	-0.76				-0.81	-0.34	-1.52		
Silver	-2.68	0.58**	-1.37	-6.23			-0.58	0.13*	-0.71	-0.09				0.09*	-0.63	0.31		
Tin	-0.94	-0.96	0.28*	-2.88	-4.79	-1.91	-0.23	0.43*	-1.15	-0.62				-0.86	0.66*	-3.40		
Zinc	-0.08*	-5.40	-2.05	-4.01	-1.02	-1.31	-0.74	-0.58	-0.68	-0.79								

Table A10: Out-of-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>df<sub>r</sub></i>				<i>df<sub>y</sub></i>				<i>dp</i>				
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	
<i>Butter</i>	-0.86	-1.01	-0.30	-0.80	-2.05	4.03***	2.00***	-2.36	0.55***	1.65***	3.51***	1.23***	-3.82
<i>Cocoa</i>	-1.60	-5.90	-0.76	-1.05	-1.81	1.01***	1.15**	0.57*	-1.07	-3.27	-2.82	-1.11	-1.23
<i>Coffee Arabica</i>	-1.16	-1.26	-2.48	-2.32	1.94***	-0.24	1.58**		1.28	-3.29	-3.86	-8.40	
<i>Corn Oil</i>	-1.75	-0.16	-1.24	-2.50	0.53***	3.62***	-0.72	4.14	0.31**	-1.42	-1.03	-0.26	-4.18
<i>Cotton</i>	-2.16	-0.36	-3.54	-2.64	-1.57	2.92***	2.94***	0.63*	1.14***	-2.68	-1.03	1.68***	-3.75
<i>Live Cattle</i>	-1.67	-3.40	-1.54	-0.64	-4.68	3.27***	1.19**	-4.35	0.01**	-1.62	2.45***	1.68***	4.15***
<i>Lean Hog</i>	-1.10	-1.20	-0.07	-1.87	-3.05	-1.53	-2.91	-1.57	0.01**	-0.89	2.40***	-2.26	0.57*
<i>Milk</i>	-0.60	-0.70	-0.38	-3.01	-0.84	0.90**	0.37*	0.41	3.61***	-13.83	-3.61	-1.98	-16.21
<i>Oranges</i>	-0.16	-0.84	0.30*	-0.42	-0.39	1.34***	0.47**	-0.76	-1.26	-1.12	1.42***	0.43	-2.55
<i>Soybean Oil</i>	-1.89	-1.65	-2.47	-0.51	-0.24	0.09	-2.32	-0.97	-0.67	-1.48	-1.86	-2.55	-0.90
<i>Soybeans</i>	-1.09	-1.70	0.40*	-0.01	0.59***	-3.42	-0.74	-0.70	-1.91	1.28***	-0.99	-3.85	-1.24
<i>Soybean Meal</i>	-0.54	-1.32	-1.07	-15.85	-1.77	-2.49	-0.90	-1.32	-1.71	0.95**	-1.49	-3.85	-1.24
<i>Sugar</i>	0.53***	-0.56	-1.16	0.50	-0.05*	-0.21	0.44*	-0.79	-1.85	-0.71	-0.21	-1.24	-0.77
<i>Wheat</i>	-0.58	-0.77	-1.28	-2.61	0.18**	4.55***	0.20*	-3.36	-1.23	-0.54	-2.23	-1.24	0.41*
<i>Wool</i>	0.01*	-3.24	0.41*	6.54***	-0.92	-2.95	-0.52	-2.25	1.17***	2.03***	-4.75	-2.04	4.73***
<i>Yellow Corn</i>	-0.54	-0.25	-1.74	1.34*	-2.77	1.38***	2.56***	1.59**	-0.14	-1.80	-1.99	0.44**	-1.35
<i>Coal</i>	-1.89	-10.13	-2.21	-5.27	-2.11	-2.71	-6.42	10.59***	-2.12	-0.58	1.94***	1.60	
<i>Heating Oil</i>	-0.73	0.70	-2.85		-1.46	-1.01	-3.06		-3.54	1.73*	-2.43		
<i>Natural Gas</i>	0.44*		0.02		2.34***		-3.08		3.47***		3.55*		
<i>Unleaded Regular Gas</i>	-0.25	-1.81	0.95		-2.35	3.27**	-0.53		0.21**	0.99*	1.49*		
<i>WTI Oil</i>	-1.01	-4.92	-2.59	-1.64	-0.96	0.98**	-2.19	-2.24	-0.60	-2.75	-0.80	0.78**	-2.76
<i>Aluminium</i>	-0.45	-1.10	-0.75	-1.08	-1.23	3.84***	-0.41	0.90*	-0.96	-3.96	-0.46	1.78**	0.76*
<i>Gold</i>	-0.61	-1.49	-0.69	0.34	1.08***	2.07***	0.37*	-0.24	2.53***	-0.84	-0.66	0.26*	-1.86
<i>High Grade Copper</i>	-0.82	-0.81	-0.90	-4.07	-0.49	3.01***	-2.40	2.49**	-2.34	-2.65	-1.49	-1.37	-2.06
<i>Nickel</i>	-5.78				-1.01				-1.90				
<i>Palladium</i>	-1.07	0.02	-1.62			3.30**	2.26**		4.73***	3.26**	0.78	1.80**	
<i>Platinum</i>	-0.69	-0.11	-2.62	-1.54	-1.65	-3.49	1.28***	0.76*	-0.49	-2.89	-2.13	1.80**	0.46
<i>Silver</i>	-1.32	-1.35	-0.59	-1.01	-0.95	3.46***	1.30***	0.30	-2.06	-0.61	-2.17	-0.26	0.83*
<i>Tin</i>	-1.72	-2.54	-1.72	-3.29	-2.05	-1.90	-1.90	2.17**	-0.87	-1.26	-2.29	0.25**	-5.29
<i>Zinc</i>	-0.81	-2.91	-1.17	-0.65	-2.99	1.72***	0.49*	1.93**	-0.79	0.58**	0.17*	-2.37	-6.23

Table A10: Out-of-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>dy</i>					<i>ep</i>					<i>erp</i>				
	Exp	eExp	lExp	lRec	lRec	Exp	eExp	lExp	lRec	lRec	Exp	eExp	lExp	lRec	lRec
<i>Butter</i>	<b>0.24**</b>	<b>1.59***</b>	<b>3.52***</b>	<b>1.04**</b>	-7.56	-0.58	-0.74	<b>4.46***</b>	-1.46	-0.55	-0.94	-1.47	-1.05	-1.04	-0.98
<i>Cocoa</i>	-1.17	-2.60	-2.83	-1.40	-0.68	<b>0.56***</b>	-1.60	-3.57	-3.46	-2.07	-0.43	-0.86	-0.42	-1.36	-0.26
<i>Coffee Arabica</i>	-0.94	-3.08	-4.11	-7.81		<b>0.78***</b>	-2.30	-1.29				-0.04	-0.96	0.06	-0.74
<i>Corn Oil</i>	<b>0.49***</b>	-1.17	-0.48			<b>1.08***</b>	<b>0.65**</b>	<b>0.09*</b>	-2.90	-1.88	-3.16	-1.39	-0.93	-1.64	-1.09
<i>Cotton</i>	<b>1.41***</b>	-2.85	-1.21	<b>0.08*</b>	-2.65	-0.64	-1.81	-0.35	-2.02	-1.88	-3.16	-1.25	-1.31	-1.08	-1.27
<i>Live Cattle</i>	-1.52	-3.04	<b>2.53***</b>	<b>0.34**</b>	<b>2.34**</b>	<b>1.26***</b>	-0.70	<b>2.80***</b>	<b>0.17**</b>	-0.66	<b>1.04**</b>	-0.40	-0.58	-1.01	-0.29
<i>Lean Hog</i>	-0.07*	-0.70	<b>2.05***</b>	-2.53	-2.43	-1.36	<b>0.04*</b>	<b>2.45***</b>	-2.37	-0.38	-3.01	-1.20	-0.38	<b>0.72**</b>	-0.76
<i>Milk</i>	<b>4.04***</b>	-13.16	-4.82	-1.27	-3.73	-1.04	-1.75	-0.54	-2.95	-10.68	-3.53	-1.72	-4.17	-2.77	-0.49
<i>Oranges</i>	-1.15	-1.07	<b>1.74***</b>	0.50		-0.35	-0.60	<b>0.71**</b>	-0.22**			<b>0.26**</b>	<b>1.06**</b>	-0.04	-0.73
<i>Soybean Oil</i>	-1.34	-1.79	-2.09	-1.23		-1.39	-0.31	-1.07	-2.53			-0.66	<b>0.24*</b>	-1.04	<b>1.66**</b>
<i>Soybeans</i>	-2.47	<b>1.02**</b>	-0.96	-1.06		-1.40	<b>1.44***</b>	-1.54	-2.43			-0.99	-0.30	-0.48	-0.76
<i>Soybean Meal</i>	-1.69	<b>0.68**</b>	-1.48	-4.40		-2.06	<b>0.99**</b>	-1.32	-8.50			-1.21	-1.26	-1.31	-0.96
<i>Sugar</i>	-1.38	-0.57	-0.02*	-1.36	-1.51	-1.69	<b>0.46**</b>	-3.54	-1.15	0.13	-3.45	-0.61	-2.03	-0.71	-1.99
<i>Wheat</i>	-1.48	-0.24	-2.30	-1.34	-3.67	-1.11	-0.92	-2.89	-1.02	0.25	-0.07	-2.02	-2.00	-1.38	-0.85
<i>Wool</i>	<b>1.56***</b>	<b>3.44***</b>	-5.16	-2.55	-5.08	-0.32	<b>2.47***</b>	-2.83	<b>4.30***</b>	-1.24	<b>6.65**</b>	<b>0.15**</b>	<b>0.19*</b>	-0.31	-0.79
<i>Yellow Corn</i>	-0.22	-1.95	-2.02	<b>0.14*</b>	-0.18	-0.28	-0.59	-1.85	-1.11	-1.07	-0.47	-0.77	-2.53	-0.46	<b>0.92***</b>
<i>Coal</i>	-2.91	-0.95	<b>1.68***</b>	2.29		-2.01	-2.21	<b>2.44***</b>	<b>7.46**</b>			-0.63	<b>0.69**</b>	-1.06	0.70
<i>Heating Oil</i>	-3.72	<b>1.69*</b>	-2.65			-4.46	<b>3.96**</b>	-1.03				-0.44	-0.78	-0.34	
<i>Natural Gas</i>	<b>4.11***</b>		<b>3.53**</b>			<b>2.30***</b>		-0.48				-0.27	-0.35		
<i>Unleaded Regular Gas</i>	<b>0.41**</b>	0.68	<b>1.80*</b>			-1.57	<b>1.98*</b>	-1.58				-0.39	-1.01	-0.19	
<i>WTI Oil</i>	-1.09	-2.88	-1.17	<b>0.86***</b>	0.26	-2.43	-2.08	<b>1.39***</b>	<b>1.62***</b>	0.12	<b>1.18*</b>	-1.29	-2.30	-0.21	-1.13
<i>Aluminium</i>	-0.40	-4.14	-0.30	<b>2.59**</b>		<b>0.10**</b>	-2.46	-1.39	<b>1.10**</b>			-1.90	0.00	-2.83	<b>1.01**</b>
<i>Gold</i>	<b>2.51***</b>	-0.96	-0.86	0.02	<b>2.05**</b>	<b>2.41***</b>	<b>0.65**</b>	<b>0.88**</b>	-1.32	-0.54	-2.06	-1.29	-1.56	-1.06	-0.43
<i>High Grade Copper</i>	-2.21	-2.27	-1.55	-1.26	-2.05	-1.41	-3.13	-0.87	-3.44	-2.30	-3.65	-0.71	-0.28	-2.23	<b>1.52**</b>
<i>Nickel</i>	-1.95					-4.24						-0.71			
<i>Palladium</i>	<b>4.67***</b>	<b>2.47**</b>	<b>1.48*</b>			<b>5.36***</b>	<b>2.01**</b>	-1.08				-1.14	0.91	0.06	
<i>Platinum</i>	-0.92	-3.27	-2.02	<b>4.30***</b>		-0.71	-2.19	-1.97	-3.44			-0.25	-0.70	-0.07	-4.65
<i>Silver</i>	-2.52	-0.70	-2.18	-0.38	<b>0.71*</b>	-1.97	<b>0.87***</b>	-2.17	-1.73	-1.43	-0.23	-1.11	-0.77	-0.80	-0.96
<i>Tin</i>	-0.94	-0.44	-2.19	-0.39	-3.38	-1.40	-2.24	-1.19	-0.22*	-0.48	-0.51	-1.98	-0.66	-1.80	-0.21
<i>Zinc</i>	-0.91	<b>0.23*</b>	-0.20	-1.35	-5.06	<b>0.80***</b>	-0.36	-0.51	-0.88	-1.25	-4.89	-0.98	-1.05	-0.16	-1.39

Table A10: Out-of-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>infl</i>					<i>tr</i>					<i>lty</i>							
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	-0.39	<b>1.04***</b>	-0.77	-1.80	-0.33	0.38	-1.22	-0.52	-0.77	<b>1.70*</b>	<b>0.27**</b>	<b>0.93**</b>	-1.34	<b>0.93**</b>	-1.34	-3.84		
<i>Cocoa</i>	-0.30	<b>0.94***</b>	-1.22	-0.18	-3.96	-2.18	-1.35	-2.51	-0.88	-2.47	-3.38	-2.62	<b>0.12*</b>	-3.38	-2.62	-4.50		
<i>Coffee Arabica</i>	-0.06	-1.14	-1.93				0.10	0.62	<b>1.65***</b>		<b>0.47**</b>	-2.72	-3.54	-2.72	-3.54			
<i>Corn Oil</i>	-2.50	<b>1.07**</b>	<b>0.32*</b>	<b>1.55**</b>			<b>0.20**</b>	-2.33	<b>3.45***</b>	-5.05	-0.59	<b>1.38***</b>	<b>0.40**</b>	-0.59	<b>1.38***</b>	-1.30		
<i>Cotton</i>	<b>0.07**</b>	-0.70	<b>1.19***</b>	-0.84	-0.35	-1.84	-0.84	-0.01	-0.47	-2.83	-5.44	-3.20	<b>4.74***</b>	-5.44	-3.20	-4.36		
<i>Live Cattle</i>	<b>0.12**</b>	-0.56	<b>0.54**</b>	-2.51	-5.96	-0.06	-1.47	-1.81	-1.73	-3.33	-1.13	-1.87	<b>4.45***</b>	-1.13	-1.87	-4.11		
<i>Lean Hog</i>	<b>0.73***</b>	<b>1.97***</b>	<b>1.01***</b>	-0.99	-0.26	<b>1.34**</b>	-2.18	-1.86	-1.75	-2.63	<b>0.83***</b>	<b>2.54***</b>	<b>4.45***</b>	<b>0.83***</b>	<b>2.54***</b>	-12.96		
<i>Milk</i>	-0.22	<b>0.08*</b>	-0.64	-3.22	-1.62	<b>4.03**</b>	<b>0.22**</b>	-1.73	<b>0.27*</b>	-3.14	-1.13	-0.87	-2.41	-1.13	-0.87	-2.41		
<i>Oranges</i>	-0.87	-1.14	-0.75	-1.07	-0.18		-0.56	-1.47	-3.84	-2.27	<b>1.17***</b>	-4.48	-5.47	<b>1.17***</b>	-4.48	-4.87		
<i>Soybean Oil</i>	-1.08	-0.43	-0.04	<b>2.59***</b>			-1.27	-1.78	-1.76	-2.56	-0.60	-8.59	-2.60	-0.60	-8.59	-4.44		
<i>Soybeans</i>	-0.59	<b>1.12**</b>	0.06	-0.18			-0.75	-0.46	-2.08	-1.51	-1.39	-4.16	-2.54	-1.39	-4.16	-13.63		
<i>Soybean Meal</i>	<b>1.13***</b>	<b>1.50**</b>	<b>0.32*</b>	-2.91	<b>2.12**</b>	<b>1.51**</b>	-0.85	-1.41	-0.66	-0.09	-2.03	-0.52	-0.36	-2.03	-0.52	-0.77		
<i>Sugar</i>	-1.45	-0.80	-2.51	-0.60	-1.47	0.19	-0.73	-1.59	<b>0.66**</b>	-2.38	-0.27	-2.77	-0.94	-0.27	-2.77	-4.19		
<i>Wheat</i>	-0.61	-0.69	-2.23	-1.16	0.51	-1.50	-0.87	-2.98	-0.87	<b>1.07*</b>	<b>1.06***</b>	-0.79	-1.79	<b>1.06***</b>	-0.79	-1.31		
<i>Wool</i>	-0.44	-0.06	-1.75	-1.16			-0.71	-1.51	-1.62	-2.33	-2.46	-1.01	-0.07	-2.46	-1.01	-4.92		
<i>Yellow Corn</i>	<b>0.18**</b>	<b>1.82***</b>	-0.39	-2.04	0.32	-1.28												
<i>Coal</i>	-0.30	-1.31	<b>0.27*</b>	0.01			-1.39	-1.56	-2.79	0.96	<b>0.40**</b>	-2.32	-3.16	<b>0.40**</b>	-2.32	0.41		
<i>Heating Oil</i>	-3.08	0.65	-2.60				-0.54	-2.60	-2.03		-4.50	<b>2.08**</b>	-4.99	-4.50	<b>2.08**</b>	-4.99		
<i>Natural Gas</i>	-1.02		<b>4.61**</b>				<b>1.52**</b>		1.28		<b>2.76***</b>		<b>8.33***</b>	<b>2.76***</b>				
<i>Unleaded Regular Gas</i>	-2.12	-0.37	-2.36				-0.62	-0.89	-0.74		-1.43	<b>8.21***</b>	<b>3.59**</b>	-1.43	<b>8.21***</b>	-6.26		
<i>WTI Oil</i>	-0.52	<b>1.06***</b>	<b>0.69**</b>	-2.70	-1.48	<b>0.97*</b>	<b>0.62***</b>	-1.56	-0.49	-2.77	-3.44	-1.47	-2.20	-3.44	-1.47	-2.20		
<i>Aluminum</i>	-0.42	-1.21	-1.14	-1.94			-0.54	-1.08	-0.82	-0.41	-0.65	-1.96	-0.47	-0.65	-1.96	-1.95		
<i>Gold</i>	<b>0.82***</b>	0.03	<b>1.36***</b>	-1.04	-0.24	-0.35	-0.70	-1.90	-1.38	-2.96	<b>6.84***</b>	-2.27	-0.72	<b>6.84***</b>	-2.27	<b>1.31*</b>		
<i>High Grade Copper</i>	-1.87	-1.27	-1.43	-1.65	-1.11	-1.56	-0.65	-1.91	-1.78	-1.61	-1.11	-1.00	-1.21	-1.11	-1.00	-2.72		
<i>Nickel</i>	-1.60						-0.80				-0.19			-0.19				
<i>Palladium</i>	<b>1.50***</b>	1.30	-6.02				-1.06	-1.16	-0.66		-0.50	<b>2.96**</b>	-0.49	-0.50	<b>2.96**</b>	-0.49		
<i>Platinum</i>	<b>0.04*</b>	<b>1.97***</b>	<b>0.46**</b>	<b>1.25**</b>			-1.34	-1.32	-1.48	-1.17	-2.25	-4.20	<b>1.95***</b>	-2.25	-4.20	<b>1.95***</b>	-1.33	
<i>Silver</i>	-0.87	0.04	<b>0.39**</b>	-2.73	0.25	<b>0.61*</b>	-1.46	-3.31	-1.54	-4.54	-0.07*	<b>5.50***</b>	<b>0.63**</b>	-0.07*	<b>5.50***</b>	<b>0.63**</b>	-1.12	
<i>Tin</i>	-2.59	-1.14	-0.72	-2.18	0.10	-1.78	-0.88	-3.00	-4.13	-1.29	-1.76	-0.10*	-1.35	-1.76	-0.10*	-4.71		
<i>Zinc</i>	-2.30	-1.36	-1.55	-1.83	-0.30	-1.11	-0.50	-6.38	<b>1.69***</b>	-1.39	-2.56	<b>2.22***</b>	<b>1.18**</b>	-2.56	<b>2.22***</b>	<b>1.18**</b>	-8.53	



Table A10: Out-of-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	star					tbl					tms				
	Exp	eExp	lExp	lRec	Rec	Exp	eExp	lExp	lRec	Rec	Exp	eExp	lExp	lRec	Rec
<i>Butter</i>	-1.71	-4.47	-21.18	-3.31	0.54	-1.54	-3.88	<b>0.88**</b>	<b>0.23*</b>	-1.87	-4.17	-0.13	-1.05	-3.28	
<i>Cocoa</i>	-21.23	-0.76	-31.32	-1.03	-0.99	<b>3.32**</b>	-4.21	-3.38	<b>0.88**</b>	-5.96	-1.91	-2.36	-1.62	-4.49	
<i>Coffee Arabica</i>	-0.56	-0.84	-0.12	-11.84			<b>0.84**</b>	-1.27	-0.55	-2.38	-0.30	-0.35	-1.18		
<i>Corn Oil</i>	-49.04	-0.94	-1.59	-5.38	-1.16	-4.91	-1.53	<b>1.36***</b>	-1.77	-4.69	-2.06	<b>1.22**</b>	-0.93	-4.06	
<i>Cotton</i>	-3.48	-0.38	-148.58	-25.40	-0.10	<b>4.24**</b>	-3.34	-0.43	<b>2.07***</b>	-7.45	-1.24	<b>1.82***</b>	-2.82	-6.32	
<i>Live Cattle</i>	-6.62	<b>1.18***</b>	-56.03	-7.37	-0.21	-3.02	-2.41	-1.88	-1.25	-6.97	-4.95	-1.45	-1.98	-6.25	
<i>Lean Hog</i>	-10.81	<b>0.82***</b>	-0.08	-50.94	2.26	-1.57	<b>0.13**</b>	<b>1.34***</b>	<b>1.69***</b>	-2.38	-1.62	<b>0.62**</b>	0.10	-1.75	
<i>Milk</i>	-2.58	-4.21	-1.51	-10.42	-0.73		-3.35	-1.72	-0.32	-1.27	-3.07	-1.09	-1.30	<b>1.64**</b>	
<i>Oranges</i>	-1.76	-1.81	-10.42	-7.42	-1.22	-4.82	-1.22	-4.82	-5.66	-2.68	-1.48	<b>1.02**</b>	-3.69	-1.82	
<i>Soybean Oil</i>	-7.76	-2.67	-17.77	-7.42	-5.15		-2.33	-2.60	-1.79	-3.66	-1.58	<b>0.21*</b>	-1.23	-1.24	
<i>Soybeans</i>	-3.08	<b>1.96***</b>	-48.04	-5.15			-0.77	-4.34	-1.25	-9.94	-1.50	-3.20	-1.87	-1.29	
<i>Soybean Meal</i>	-38.57	<b>1.14**</b>	-18.56	-24.34	-3.18	-1.78	-2.06	<b>0.40*</b>	-0.44	<b>3.84***</b>	-1.51	-1.75	-3.52	0.50	
<i>Sugar</i>	-35.64	-1.07	-71.66	-3.18	-0.68	-1.78	-1.32	-0.34	0.05	-3.16	-0.88	-0.11	-1.94	-2.77	
<i>Wheat</i>	-10.52	-5.89	-16.90	-2.70	-1.30	-3.00	-3.20	<b>1.59***</b>	-3.74	-1.02	-1.78	-3.37	<b>0.23*</b>	-2.50	
<i>Wool</i>	-25.01	<b>0.26**</b>	-1.89	-4.86	-3.08	<b>4.03***</b>	-2.49	-0.98	-0.24	-5.00	-3.90	<b>0.19*</b>	-0.40	-0.77	
<i>Yellow Corn</i>	-2.20	-1.08	-90.60	-4.32			<b>0.68***</b>	-0.70	<b>1.24**</b>	0.19	-1.30	-0.93	<b>0.80**</b>	-3.16	
<i>Coal</i>	-2.52	-0.46	-30.14	-2.54			-3.60	-0.73	-3.39		-2.22	-3.83	-2.85		
<i>Heating Oil</i>	-0.61	-20.30	0.23				-1.59		<b>2.26*</b>		-0.66		<b>2.29*</b>		
<i>Natural Gas</i>	-0.38		0.04				-3.19	<b>4.01**</b>	<b>1.95*</b>		<b>1.29**</b>	-3.66	-0.34		
<i>Unleaded Regular Gas</i>	-0.22	-7.58	0.06				-3.18	-2.13	-2.12	-3.92	-0.82	-0.73	-1.76	-3.10	
<i>WTI Oil</i>	-9.55	-4.70	-11.39	-1.10	-0.47	-0.58									
<i>Aluminum</i>	-25.53	-2.41	-92.87	-16.90			-0.21	-2.04	-1.70	-1.50	<b>0.09*</b>	-1.11	<b>0.40*</b>	-0.01	
<i>Gold</i>	-62.72	-5.59	-82.68	-2.40	-0.20	-1.50	<b>3.70***</b>	-1.23	<b>1.04**</b>	<b>2.46**</b>	-0.05	-5.66	-1.19	-1.91	
<i>High Grade Copper</i>	-4.92	-4.58	<b>0.24**</b>	<b>3.22***</b>	-0.46	<b>6.13***</b>	-2.91	-0.04	-2.93	-2.79	-3.05	-0.60	-2.06	-2.65	
<i>Nickel</i>	-1.03						-0.93				-0.22				
<i>Palladium</i>	-136.41	-10.41	0.20				-1.04	<b>3.10**</b>	-2.21		-1.02	-1.48	<b>1.08*</b>		
<i>Platinum</i>	-2.28	-0.77	-62.74	-1.31			-2.16	-3.22	-0.89	-1.05	-1.68	-0.20	-0.19	-2.14	
<i>Silver</i>	-82.85	-5.31	-39.93	-11.73	-0.12	-1.58	<b>1.36***</b>	<b>1.38***</b>	<b>0.19*</b>	<b>1.05*</b>	-4.05	<b>0.21*</b>	-2.90	-2.12	
<i>Tin</i>	-3.29	-2.59	-1.03	-9.23	-1.15	<b>5.56***</b>	-2.87	<b>0.07**</b>	-1.85	-4.15	-3.83	-1.45	-0.23	-1.31	
<i>Zinc</i>	-57.05	-3.93	-43.62	<b>1.80***</b>	-2.25	1.05	-3.15	<b>4.27***</b>	-0.76	-3.48	-3.12	<b>0.55**</b>	-1.09	<b>1.81**</b>	

Table A10: Out-of-Sample Volatility Predictability and Business Cycle Stages (1 Month) (continued)

Commodity	<i>unrate</i>			
	Exp	eExp	lExp	lRec
<i>Butter</i>	<b>0.80***</b>	<b>4.49***</b>	<b>1.34**</b>	
<i>Cocoa</i>	-0.18	-0.03	<b>0.42*</b>	
<i>Coffee Arabica</i>	<b>0.65**</b>	-1.93	-2.54	
<i>Corn Oil</i>	<b>0.91***</b>	<b>4.00***</b>	-1.24	
<i>Cotton</i>	-0.27	<b>1.67**</b>	<b>1.66**</b>	
<i>Live Cattle</i>	-0.19	-0.17	<b>8.35***</b>	
<i>Lean Hog</i>	<b>0.47**</b>	<b>1.00**</b>	<b>1.10**</b>	
<i>Milk</i>	-1.33	0.27	<b>3.47***</b>	
<i>Oranges</i>	-2.13	-0.18	<b>1.56**</b>	
<i>Soybean Oil</i>	<b>0.30**</b>	<b>0.98**</b>	-2.60	
<i>Soybeans</i>	-1.55	-1.58	-0.70	
<i>Soybean Meal</i>	-2.73	-1.63	-2.13	
<i>Sugar</i>	-0.45	-0.07	-5.24	
<i>Wheat</i>	-0.50	-0.62	<b>0.36*</b>	
<i>Wool</i>	-1.21	-1.02	<b>0.72*</b>	
<i>Yellow Corn</i>	-0.36	0.36	<b>2.24***</b>	
<i>Coal</i>	-2.02	-1.36	-5.28	
<i>Heating Oil</i>	<b>0.17*</b>	1.18	-1.81	
<i>Natural Gas</i>	<b>0.40*</b>		<b>4.81**</b>	
<i>Unleaded Regular Gas</i>	<b>1.96***</b>	<b>11.80***</b>	-0.37	
<i>WTI Oil</i>	<b>1.89***</b>	-0.34	-1.83	
<i>Aluminum</i>	-0.82	-0.84	-0.88	
<i>Gold</i>	<b>1.03***</b>	<b>3.80***</b>	<b>0.99**</b>	
<i>High Grade Copper</i>	-2.06	<b>2.71***</b>	-2.09	
<i>Nickel</i>	-2.33			
<i>Palladium</i>	<b>1.06**</b>	-6.27	<b>2.00**</b>	
<i>Platinum</i>	-0.43	-3.74	<b>4.32***</b>	
<i>Silver</i>	-2.14	<b>4.36***</b>	<b>0.34*</b>	
<i>Tin</i>	-1.17	<b>1.69**</b>	<b>0.27*</b>	
<i>Zinc</i>	<b>0.10*</b>	<b>2.46***</b>	<b>2.53***</b>	

Table A11: In-Sample Volatility Predictability and Business Cycle Stages (12 Months)

This table reports the in-sample  $\Delta R^2$ 's of a regression of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable across business cycle stages. We predict the next year's volatility. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	de						Δindpro						ΔM1					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
Butter	0.00	0.02*	0.00	0.01	0.04	-0.05	0.00	-0.01	-0.07	-0.19	-0.21	0.00	0.02*	-0.01	0.02	-0.45	-0.37	
Cocoa	0.00	0.00	0.00	-0.01	-0.05	-0.04	0.00	0.01	-0.04	0.97***	-0.30	0.00	0.02	-0.03	-0.11	-0.43	-0.82	
Coffee Arabica	0.02*	0.03	-0.02	-0.13	-0.14	-0.78	0.00	-0.02	-0.07	3.73***	-0.66	0.01*	0.04*	0.00	-0.13	1.98***	-0.67	
Corn Oil	0.00	-0.02	-0.03	-0.05	-0.19	-0.15	-0.01	-0.01	0.06	0.52*	0.48	0.00	0.03	0.04	-0.04	0.00	-0.32	
Cotton	0.00	0.01	0.01	-0.01	-0.05	-0.04	0.00	-0.02	-0.02	0.91***	-0.07	0.01*	-0.02	-0.04	-0.07	-0.24	-0.19	
Live Cattle	0.00	-0.02	0.00	-0.01	-0.02	-0.01	0.01*	0.00	0.15**	1.07***	0.67*	0.02**	-0.03	0.12**	-0.11	-0.25	-0.61	
Lean Hog	0.00	0.01	0.00	-0.02	-0.06	-0.08	0.00	0.01	-0.02	0.23	-0.11	-0.01	-0.01	-0.02	-0.14	0.82*	-0.73	
Milk	0.00	0.00	0.00	-0.01	-0.02	-0.03	0.00	0.00	0.04**	0.02	0.01	0.00	0.00	0.00	-0.01	0.26**	0.55	
Oranges	0.00	0.00	-0.01	-0.04	-0.15	-0.16	0.00	-0.01	0.05	0.18	0.02	-0.01	-0.01	-0.01	-0.07	-0.28	-0.21	
Soybean Oil	0.00	-0.01	-0.02	-0.03	-0.12	-0.18	0.00	-0.02	0.03	0.33*	0.18	0.00	-0.01	-0.01	-0.07	-0.04	-0.35	
Soybeans	0.00	0.00	-0.02	-0.06	-0.20	-0.35	0.00	-0.01	-0.06	0.47*	-0.34	0.00	-0.02	0.00	-0.11	0.28	-0.41	
Soybean Meal	-0.01	-0.01	0.00	-0.10	-0.35	-0.27	0.00	-0.01	-0.11	0.59	-0.57	-0.01	-0.01	-0.01	-0.08	0.01	-0.21	
Sugar	0.00	0.00	0.01	0.03*	0.10	0.06	0.00	0.00	0.08**	0.52***	-0.16	0.00	0.01	-0.02	-0.07	1.07**	-0.32	
Wheat	0.00	0.00	-0.02	-0.01	-0.05	-0.07	0.00	-0.01	-0.04	0.90***	-0.15	0.01***	0.02	-0.01	-0.08	0.29	-0.46	
Wool	0.01*	-0.02	0.03*	-0.02	-0.09	0.13	0.00	-0.02	0.00	1.06***	-0.16	0.00	0.06*	0.00	-0.08	-0.14	-0.14	
Yellow Corn	0.00	0.02	-0.02	-0.01	0.00	0.22*	0.00	-0.01	-0.02	1.82***	-0.01	0.00	-0.02	-0.02	-0.10	0.15	-0.52	
Coal	0.00	-0.01	0.05	-0.01	-0.14	-0.25	0.00	-0.03	-0.02	-0.06	-0.15	-0.01	-0.02	-0.02	-0.06	0.11	-0.20	
Heating Oil	0.01	0.10*	-0.03	0.34	-0.26	-0.24	-0.01	-0.05	-0.23	-0.57	-0.21	0.00	0.03	-0.01	-0.10	-0.55	-0.28	
Natural Gas	0.04***	0.09	-0.02	-0.16	0.39	1.82	0.00	-0.03	-0.02	-0.19	-1.43	0.07***	0.35***	0.06*	-0.19	-0.24	-1.86	
Unleaded Regular Gas	-0.01	-0.01	0.03	0.20	-0.43	4.57	-0.01	-0.04	-0.06	-0.17	-0.44	-0.01	-0.02	-0.02	-0.16	-0.26	-2.40	
WTI Oil	0.00	0.01	0.03*	-0.01	-0.01	-0.02	0.00	-0.01	-0.01	0.05	-0.14	0.00	0.00	-0.01	0.12	-0.11	0.33	
Aluminum	0.00	0.00	0.00	-0.01	0.01	-0.06	0.00	0.00	-0.02	0.04	-0.19	0.00**	0.06***	0.00	0.07	-0.05	0.15	
Gold	0.00*	0.01*	0.00	0.00	0.03	0.00	0.00	0.00	0.05	-0.05	0.17	0.00	-0.02	-0.01	-0.08	1.05**	-0.31	
High Grade Copper	0.00	0.01	0.00	0.00	0.05	-0.04	0.00	-0.01	-0.01	0.71**	0.13	0.00	-0.04	0.00	-0.07	1.75***	-0.23	
Nickel	0.02	0.13*	0.37**	0.57	-1.31	-3.02	-0.02	-0.06	-0.48	-0.54	-0.02	-0.02	-0.01	-0.02	-0.44	-1.26	-3.28	
Palladium	0.04*	0.03	-0.01	-0.20	-0.31	-1.08	0.02	0.21**	-0.05	-0.22	-0.39	0.04*	0.10*	0.00	-0.21	-0.51	-1.10	
Platinum	0.00	-0.02	0.02	-0.02	-0.08	-0.03	0.02**	0.06*	-0.01	0.00	0.51**	0.00	-0.03	-0.01	0.01	0.06	-0.36	
Silver	0.00	0.00	0.02	0.05*	0.19**	0.09	0.00	0.02	0.03*	0.01	0.00	0.00	0.00	0.01	0.01	2.06***	-0.43	
Tin	0.02**	0.01	0.04	-0.01	-0.07	-0.07	0.01	-0.01	-0.02	0.00	-0.12	-0.01	-0.01	0.00	-0.04	-0.12	-0.48	
Zinc	0.00	0.00	-0.01	-0.03	-0.08	-0.07	0.00	0.04**	-0.01	0.00	0.72*	0.00	0.01	-0.01	-0.05	-0.08	-0.11	

Table A11: In-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>dfr</i>				<i>dpy</i>				<i>dpy</i>									
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	0.00	-0.01	0.00	-0.06	-0.17	-0.28	0.00	<b>0.02*</b>	0.00	-0.06	-0.27	0.00	0.00	0.04*	0.00	-0.04	-0.13	0.00
<i>Cocoa</i>	0.00	-0.02	0.00	-0.02	-0.26	-0.15	0.01	0.00	0.06	0.03	0.29	0.00	0.03	<b>0.04*</b>	0.03	0.01	0.09	0.01
<i>Coffee Arabica</i>	0.00	0.00	-0.02	-0.09	-0.24	-0.78	-0.01	-0.01	<b>0.09**</b>	-0.04	1.75	0.00	0.00	0.00	-0.01	-0.07	-0.47	-0.78
<i>Corn Oil</i>	0.00	-0.02	-0.01	-0.04	-0.02	-0.23	0.00	0.00	0.01	-0.06	0.27	0.00	0.00	0.00	-0.01	0.07	0.40	-0.08
<i>Cotton</i>	0.00	0.00	0.04	0.07	0.27	-0.07	0.00	-0.02	<b>0.09**</b>	-0.01	-0.11	0.00	0.00	-0.01	-0.02	0.01	0.05	-0.04
<i>Live Cattle</i>	0.00	-0.01	-0.02	0.09	-0.11	0.40	0.00	-0.01	0.01	-0.04	0.14	0.00	0.00	-0.01	-0.01	-0.01	-0.05	-0.04
<i>Lean Hog</i>	0.01	-0.01	<b>0.08*</b>	-0.07	<b>0.37*</b>	-0.04	-0.01	-0.01	0.00	-0.07	<b>0.52*</b>	0.01	0.01	<b>0.07**</b>	<b>0.08*</b>	<b>0.70***</b>	-0.05	-0.05
<i>Milk</i>	0.00	<b>0.02*</b>	<b>0.01*</b>	-0.04	-0.11	-0.22	0.00	-0.01	-0.01	0.00	-0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.04
<i>Oranges</i>	0.00	0.00	<b>0.02*</b>	<b>0.10*</b>	-0.15	0.22	0.00	-0.01	0.00	-0.03	-0.13	0.00	0.02	0.04	0.01	-0.03	-0.10	-0.06
<i>Soybean Oil</i>	0.00	-0.03	<b>0.05*</b>	-0.03	0.12	-0.09	<b>0.03***</b>	0.05	0.04	0.08	<b>0.49*</b>	0.03	<b>0.03***</b>	0.05	<b>0.06*</b>	<b>0.19**</b>	<b>0.72**</b>	0.29
<i>Soybeans</i>	0.00	-0.01	-0.02	-0.03	0.40	0.01	0.00	-0.02	-0.02	-0.03	0.09	0.00	<b>0.02**</b>	0.03	0.05	<b>0.17*</b>	<b>0.97**</b>	-0.29
<i>Soybean Meal</i>	<b>0.02*</b>	0.00	-0.01	-0.08	0.26	-0.32	-0.01	-0.01	-0.02	0.15	<b>1.04*</b>	0.79	0.00	0.00	0.02	<b>0.25*</b>	0.48	-0.37
<i>Sugar</i>	0.00	0.01	-0.01	0.01	-0.07	0.01	0.00	0.00	0.01	0.02	<b>0.71***</b>	0.00	0.00	0.00	0.01	0.03	0.03	0.02
<i>Wheat</i>	0.00	-0.01	0.00	-0.04	<b>0.37*</b>	0.00	<b>0.01**</b>	-0.02	-0.01	-0.04	-0.07	-0.18	<b>0.02**</b>	-0.02	0.04	<b>0.04*</b>	0.13	-0.07
<i>Wool</i>	0.00	-0.01	-0.01	-0.04	0.07	-0.20	0.00	-0.02	-0.01	-0.04	-0.14	0.30	<b>0.01*</b>	-0.01	0.03	0.03	<b>0.36*</b>	-0.05
<i>Yellow Corn</i>	0.00	-0.02	-0.02	-0.05	0.03	0.05	-0.01	-0.02	0.01	-0.05	-0.19	0.00	0.01	-0.01	0.03	0.00	0.12	0.01
<i>Coal</i>	<b>0.03**</b>	0.02	-0.01	-0.02	-0.08	0.07	<b>0.01**</b>	<b>0.09*</b>	<b>0.04*</b>	<b>0.15*</b>	0.00	0.78	0.01	<b>0.19**</b>	0.02	<b>0.67***</b>	<b>1.60***</b>	0.54
<i>Heating Oil</i>	0.00	-0.02	<b>0.21**</b>	-0.22	0.25	-0.41	0.01	0.00	-0.01	<b>0.86*</b>	0.64	0.73	-0.01	-0.02	-0.04	0.06	-0.49	-0.51
<i>Natural Gas</i>	0.01	-0.02	-0.02	-0.19	-0.48	-1.33	<b>0.02**</b>	0.05	-0.02	-0.09	-0.56	3.09	0.02	-0.02	0.04	0.17	-0.41	<b>5.30*</b>
<i>Unleaded Regular Gas</i>	-0.01	<b>0.12*</b>	-0.03	<b>0.49*</b>	-0.24	0.57	<b>0.06**</b>	0.04	-0.06	0.08	-0.31	-2.77	-0.01	-0.01	-0.06	0.13	0.04	2.78
<i>WTI Oil</i>	0.00	0.00	<b>0.07**</b>	-0.05	<b>0.45*</b>	-0.22	0.00	0.00	0.00	-0.03	-0.14	-0.12	<b>0.01*</b>	0.00	<b>0.05*</b>	0.00	-0.02	-0.02
<i>Aluminum</i>	0.00	<b>0.01*</b>	<b>0.02***</b>	-0.01	0.01	-0.22	0.00	-0.01	0.01	-0.03	-0.07	-0.18	0.00	0.00	0.01	0.06	0.01	-0.06
<i>Gold</i>	<b>0.01**</b>	-0.01	0.01	-0.04	-0.05	-0.15	<b>0.00*</b>	0.01	<b>0.02*</b>	-0.02	<b>0.28*</b>	-0.08	0.00	0.00	0.00	<b>0.06**</b>	<b>0.18**</b>	0.04
<i>High Grade Copper</i>	0.00	-0.02	0.00	-0.04	0.07	-0.17	<b>0.02**</b>	<b>0.08**</b>	0.00	-0.01	<b>0.82**</b>	-0.10	0.00	0.01	0.00	<b>0.11***</b>	<b>0.81***</b>	0.09
<i>Nickel</i>	-0.02	-0.01	-0.06	0.50	-0.85	-0.28	-0.02	-0.02	<b>0.23*</b>	-0.44	0.75	2.82	0.00	0.04	0.00	-0.34	-1.39	1.11
<i>Palladium</i>	0.02	0.01	0.04	0.13	-0.69	-0.63	-0.01	-0.03	<b>0.28**</b>	-0.19	-0.68	-1.05	0.02	-0.04	0.06	-0.13	0.07	-1.09
<i>Platinum</i>	0.00	-0.02	-0.02	-0.02	0.00	-0.29	0.00	-0.01	0.03	-0.02	<b>0.21*</b>	-0.13	0.00	-0.01	0.00	<b>0.11*</b>	<b>0.36*</b>	-0.21
<i>Silver</i>	<b>0.02**</b>	0.01	<b>0.06**</b>	-0.06	-0.14	-0.25	0.00	-0.01	<b>0.04*</b>	-0.02	<b>0.64**</b>	-0.20	0.00	0.00	0.01	<b>0.16***</b>	<b>0.49***</b>	0.16
<i>Tin</i>	0.00	-0.02	-0.02	-0.03	0.01	-0.10	<b>0.01*</b>	<b>0.04*</b>	-0.02	-0.02	-0.09	-0.14	<b>0.02*</b>	0.01	0.03	<b>0.05*</b>	<b>0.31**</b>	-0.07
<i>Zinc</i>	<b>0.00*</b>	0.01	-0.01	-0.08	-0.24	-0.11	0.00	-0.01	-0.01	-0.07	-0.22	-0.26	0.00	-0.01	0.01	<b>0.09*</b>	<b>0.64***</b>	-0.06

Table A11: In-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	dy				ep				ertp						
	Exp	eExp	lExp	lRec	Rec	eRec	lRec	lExp	Exp	eExp	lExp	lRec	Rec	eRec	lRec
Butter	0.00	<b>0.04*</b>	0.00	-0.04	0.06	-0.14	0.06	0.00	0.01	0.06	0.01	0.06	0.01	0.16	-0.09
Cocoa	<b>0.01**</b>	<b>0.04*</b>	0.03	0.01	0.02	0.08	0.02	<b>0.01**</b>	0.02	0.02	0.01	0.08	0.01	-0.01	-0.05
Coffee Arabica	0.00	0.00	-0.02	-0.07	-0.79	-0.30	-0.79	0.00	0.00	-0.59	-0.08	-0.59	-0.01	-0.13	<b>2.05**</b>
Corn Oil	0.01	-0.01	-0.01	0.10	0.05	0.39	0.05	0.01	0.00	<b>0.17*</b>	0.00	0.30	0.00	-0.01	-0.14
Cotton	0.00	-0.01	-0.02	0.02	-0.03	0.07	-0.03	0.00	-0.01	0.03	0.00	0.03	-0.04	<b>0.06**</b>	0.01
Live Cattle	0.00	-0.01	-0.01	-0.01	-0.05	-0.05	-0.05	0.00	-0.02	-0.02	0.00	-0.02	-0.04	-0.01	0.00
Lean Hog	<b>0.01*</b>	0.01	<b>0.08**</b>	<b>0.12**</b>	0.01	<b>0.75***</b>	0.01	<b>0.03**</b>	<b>0.04**</b>	<b>0.05*</b>	<b>0.15**</b>	<b>0.66***</b>	0.00	<b>0.10**</b>	<b>0.21*</b>
Milk	0.00	0.00	0.00	0.01	0.05	0.00	0.05	0.00	-0.01	0.02	0.00	0.07	0.00	-0.01	-0.04
Oranges	<b>0.01*</b>	0.03	0.01	-0.04	-0.15	-0.13	-0.15	<b>0.01*</b>	0.00	-0.12	-0.04	-0.12	0.00	0.02	<b>0.31*</b>
Soybean Oil	<b>0.03***</b>	0.05	0.06	<b>0.20**</b>	0.35	<b>0.69**</b>	0.35	<b>0.03***</b>	0.01	<b>0.11**</b>	<b>0.19**</b>	<b>0.71**</b>	0.32	-0.02	-0.11
Soybeans	<b>0.02**</b>	0.02	0.05	<b>0.17*</b>	<b>0.92**</b>	<b>0.92**</b>	-0.29	<b>0.04***</b>	<b>0.07**</b>	<b>0.10**</b>	<b>0.27**</b>	<b>1.07**</b>	0.00	0.00	-0.20
Soybean Meal	0.00	0.00	0.03	0.21	0.40	0.40	-0.40	0.01	0.00	<b>0.09**</b>	<b>0.30*</b>	0.61	-0.56	-0.01	-0.35
Sugar	0.00	0.00	0.00	0.01	0.04	0.04	0.02	0.00	-0.01	-0.01	-0.01	-0.04	-0.06	0.00	0.03
Wheat	<b>0.02**</b>	-0.02	0.04	<b>0.04*</b>	0.12	0.12	-0.07	<b>0.01*</b>	0.00	0.05	0.03	0.11	-0.07	0.00	<b>0.20*</b>
Wool	<b>0.01*</b>	-0.01	0.02	0.05	<b>0.39*</b>	<b>0.39*</b>	-0.06	0.00	-0.01	<b>0.08*</b>	<b>0.44**</b>	<b>0.44**</b>	-0.06	0.00	-0.09
Yellow Corn	0.01	-0.01	0.03	0.02	-0.02	0.10	-0.02	<b>0.01*</b>	<b>0.04*</b>	<b>0.06*</b>	<b>0.06*</b>	<b>0.43**</b>	-0.03	-0.01	-0.03
Coal	0.02	<b>0.21**</b>	0.03	<b>0.62***</b>	0.51	<b>1.53***</b>	0.51	0.01	<b>0.08*</b>	<b>0.68***</b>	<b>1.42***</b>	0.52	0.01	0.00	-0.28
Heating Oil	-0.01	-0.02	-0.05	-0.03	-0.51	-0.45	-0.51	-0.01	0.01	0.33	-0.34	-0.48	-0.01	-0.03	-0.40
Natural Gas	0.02	-0.02	0.03	0.22	<b>6.70**</b>	-0.56	<b>6.70**</b>	0.00	0.00	0.11	0.35	<b>5.39*</b>	0.00	-0.04	-1.85
Unleaded Regular Gas	-0.01	0.00	-0.05	0.09	0.10	2.53	0.10	-0.01	-0.04	0.37	0.22	5.43	-0.01	0.05	-2.32
WTI Oil	<b>0.01*</b>	0.00	<b>0.05*</b>	0.00	-0.02	-0.02	-0.02	0.00	-0.01	0.00	0.01	-0.02	0.00	0.00	0.02
Aluminium	0.00	0.00	0.01	0.05	-0.08	0.03	-0.08	<b>0.01**</b>	0.00	0.00	<b>0.01*</b>	-0.07	0.00	-0.01	-0.10
Gold	0.00	0.00	0.00	<b>0.05**</b>	0.04	<b>0.24***</b>	0.04	0.00	-0.01	<b>0.03*</b>	<b>0.03*</b>	<b>0.08**</b>	-0.03	-0.01	<b>0.15**</b>
High Grade Copper	0.00	0.02	-0.01	<b>0.11**</b>	0.08	<b>0.85***</b>	0.08	0.00	-0.02	<b>0.06*</b>	<b>0.06*</b>	<b>0.48***</b>	0.07	-0.01	-0.03
Nickel	0.00	0.04	0.00	-0.39	1.82	-1.41	1.82	<b>0.07*</b>	<b>0.10***</b>	-0.04	-0.05	-1.31	-0.02	-0.01	-0.43
Palladium	0.01	-0.04	0.03	-0.14	-0.08	-0.14	-0.08	-0.01	-0.05	0.03	0.18	0.17	-1.10	0.01	-1.00
Platinum	0.00	-0.02	-0.01	<b>0.10*</b>	-0.19	<b>0.28*</b>	-0.19	0.00	-0.01	<b>0.09*</b>	<b>0.09*</b>	<b>0.35*</b>	-0.23	0.03	-0.26
Silver	0.00	0.00	0.01	<b>0.15***</b>	0.11	<b>0.57***</b>	0.11	0.00	-0.01	0.03	0.15	<b>0.15*</b>	-0.07	0.00	-0.02
Tin	<b>0.01*</b>	0.00	0.03	<b>0.05*</b>	-0.07	<b>0.28**</b>	-0.07	0.00	-0.02	0.00	0.02	<b>0.29**</b>	-0.04	0.00	0.00
Zinc	0.00	-0.01	0.01	<b>0.07*</b>	-0.06	<b>0.61***</b>	-0.06	0.01	0.01	<b>0.12**</b>	<b>0.12**</b>	<b>0.73***</b>	-0.05	-0.01	-0.08

Table A11: In-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	infl				ltr				tly				
	Exp	eExp	lExp	Rec	eRec	lRec	Rec	eRec	lExp	eExp	Rec	eRec	lRec
<i>Butter</i>	0.00	<b>0.02*</b>	0.00	<b>0.12**</b>	-0.14	<b>0.81***</b>	0.00	-0.01	-0.01	0.00	-0.01	-0.01	-0.21
<i>Cocoa</i>	0.00	-0.01	0.00	-0.01	0.03	-0.05	0.00	0.00	0.00	-0.02	-0.12	<b>0.95*</b>	0.00
<i>Coffee Arabica</i>	0.00	-0.02	0.03	-0.10	0.06	-0.18	0.00	-0.02	-0.02	-0.02	-0.02	<b>3.26**</b>	-0.02
<i>Corn Oil</i>	<b>0.02**</b>	<b>0.05*</b>	-0.03	-0.03	0.21	-0.29	0.01	-0.01	-0.03	-0.01	-0.01	<b>0.35*</b>	<b>0.10**</b>
<i>Cotton</i>	0.00	-0.01	-0.02	-0.01	0.01	-0.04	0.00	0.01	0.02	<b>0.13*</b>	<b>0.30**</b>	0.11	0.00
<i>Live Cattle</i>	0.00	<b>0.03*</b>	0.00	0.00	-0.04	-0.05	0.00	-0.02	-0.02	0.05	0.02	<b>0.60*</b>	0.01
<i>Lean Hog</i>	0.01	0.00	-0.01	0.00	-0.07	<b>0.24**</b>	-0.01	-0.01	-0.02	0.03	0.25	0.00	-0.01
<i>Milk</i>	0.00	-0.01	-0.01	0.01	-0.04	-0.01	0.00	<b>0.02*</b>	-0.01	-0.03	-0.04	0.00	-0.01
<i>Oranges</i>	0.00	-0.01	-0.01	-0.01	-0.15	-0.12	0.00	-0.01	-0.01	<b>0.13*</b>	-0.11	<b>0.49*</b>	0.00
<i>Soybean Oil</i>	0.00	<b>0.07*</b>	-0.01	-0.01	-0.01	-0.13	0.00	-0.03	-0.02	<b>0.13*</b>	0.01	<b>3.15***</b>	0.00
<i>Soybeans</i>	0.00	-0.02	-0.01	-0.02	-0.14	-0.05	0.00	0.03	-0.02	0.08	0.03	<b>4.82***</b>	0.00
<i>Soybean Meal</i>	0.00	0.00	0.00	-0.04	-0.16	-0.22	0.00	<b>0.03*</b>	-0.02	-0.01	0.09	<b>2.42***</b>	0.00
<i>Sugar</i>	0.00	-0.01	-0.01	<b>0.10***</b>	<b>0.71***</b>	<b>0.48***</b>	0.00	-0.01	-0.01	0.02	<b>0.79***</b>	<b>1.46***</b>	0.00
<i>Wheat</i>	<b>0.00*</b>	-0.02	0.00	-0.01	0.07	-0.06	0.00	0.00	0.00	0.07	-0.03	<b>1.85***</b>	0.00
<i>Wool</i>	0.00	-0.01	0.01	-0.02	0.08	0.12	0.00	-0.02	-0.01	-0.03	-0.05	-0.11	0.00
<i>Yellow Corn</i>	0.00	0.02	0.00	-0.02	0.00	-0.08	0.00	-0.02	-0.02	-0.03	-0.20	<b>1.06**</b>	-0.01
<i>Coal</i>	0.00	-0.03	-0.01	-0.02	-0.07	-0.07	0.00	-0.02	-0.01	-0.06	0.08	<b>2.48***</b>	0.00
<i>Heating Oil</i>	<b>0.02*</b>	-0.02	-0.03	<b>1.04**</b>	<b>3.33**</b>	<b>1.31*</b>	0.00	-0.01	-0.05	-0.16	-0.54	0.01	-0.01
<i>Natural Gas</i>	0.00	-0.02	0.00	-0.13	-0.37	-0.73	0.00	-0.01	-0.02	-0.20	-0.56	-1.08	0.00
<i>Unleaded Regular Gas</i>	<b>0.03**</b>	-0.04	-0.07	<b>0.76**</b>	<b>2.95***</b>	3.25	-0.01	0.02	-0.07	-0.10	-0.40	-2.28	-0.01
<i>WTI Oil</i>	0.00	0.00	-0.01	-0.01	0.00	-0.02	0.00	0.00	0.00	-0.03	0.07	-0.16	0.01
<i>Aluminium</i>	0.00	0.01	0.00	0.01	-0.07	0.12	0.00	<b>0.02**</b>	<b>0.01**</b>	-0.03	-0.01	-0.08	0.00
<i>Gold</i>	0.00	0.00	0.00	0.00	-0.03	0.03	0.00	-0.01	<b>0.01*</b>	0.00	<b>1.03***</b>	0.18	0.00
<i>High Grade Copper</i>	0.00	-0.01	0.00	0.00	-0.04	0.00	0.00	-0.02	-0.01	<b>0.11**</b>	<b>0.69**</b>	0.07	0.00
<i>Nickel</i>	-0.02	0.00	-0.05	0.60	<b>5.76**</b>	-3.25	-0.01	-0.02	-0.05	<b>1.38**</b>	<b>5.11**</b>	-1.39	0.02
<i>Palladium</i>	0.01	-0.02	-0.05	-0.18	-0.64	-0.89	0.00	0.00	-0.04	0.05	0.00	0.29	0.00
<i>Platinum</i>	<b>0.03***</b>	-0.01	-0.01	0.01	<b>0.21*</b>	-0.25	0.00	0.00	-0.02	-0.03	0.00	-0.11	0.00
<i>Silver</i>	0.00	0.01	-0.01	<b>0.04*</b>	0.03	0.07	0.00	-0.02	-0.01	-0.04	<b>1.49***</b>	<b>0.43*</b>	0.00
<i>Tin</i>	<b>0.01*</b>	<b>0.04*</b>	0.03	-0.02	0.05	-0.01	0.00	-0.01	-0.01	-0.01	-0.15	-0.07	0.00
<i>Zinc</i>	0.00	0.02	0.00	0.01	-0.08	<b>0.25**</b>	0.00	0.00	0.00	-0.09	-0.24	-0.41	0.00

Table A11: In-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	suar				tbl				tms			
	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec
Butter	0.00	-0.01	-0.01	-0.04	-0.13	-0.08	0.00	0.00	0.01	-0.02	-0.05	-0.13
Cocoa	0.00	0.00	-0.01	0.01	0.00	-0.05	0.00	-0.01	-0.02	0.06	0.55	-0.03
Coffee Arabica	0.00	-0.02	-0.01	<b>0.66**</b>	<b>1.93**</b>	0.82	<b>0.03**</b>	<b>0.07*</b>	<b>0.09*</b>	0.14	0.00	-0.23
Corn Oil	-0.01	-0.02	-0.03	-0.02	-0.18	-0.32	0.01	0.04	-0.03	-0.06	-0.04	-0.33
Cotton	0.00	-0.01	-0.02	-0.01	-0.08	-0.03	0.01	0.01	<b>0.39***</b>	-0.02	0.05	-0.04
Live Cattle	0.00	-0.01	-0.02	0.02	-0.10	0.15	0.00	-0.01	-0.02	-0.05	-0.20	-0.21
Lean Hog	<b>0.02**</b>	<b>0.08***</b>	-0.02	-0.03	-0.09	-0.11	-0.01	-0.01	-0.02	-0.05	-0.19	0.00
Milk	0.00	-0.01	-0.01	-0.01	-0.03	-0.02	0.00	-0.01	-0.01	0.00	0.00	0.03
Oranges	0.00	-0.01	-0.01	-0.04	-0.11	-0.16	0.00	-0.01	-0.01	0.01	-0.12	0.12
Soybean Oil	0.00	-0.02	-0.02	-0.01	-0.06	-0.12	0.00	-0.02	-0.03	-0.04	-0.15	-0.20
Soybeans	0.00	0.01	-0.02	-0.06	-0.17	-0.34	0.00	0.00	-0.01	-0.06	-0.21	-0.32
Soybean Meal	-0.01	0.00	-0.02	0.01	-0.23	0.26	0.00	0.01	-0.01	-0.09	-0.36	-0.42
Sugar	0.00	-0.01	-0.01	-0.01	-0.05	-0.02	0.00	0.00	0.02	-0.01	-0.08	0.22
Wheat	0.00	-0.02	-0.02	-0.03	-0.07	-0.09	<b>0.01**</b>	0.01	-0.01	-0.04	-0.13	-0.04
Wool	0.00	-0.02	-0.01	-0.02	-0.04	<b>0.28*</b>	0.00	-0.02	-0.01	-0.04	-0.14	-0.14
Yellow Corn	0.00	-0.01	-0.02	-0.03	-0.03	-0.11	-0.01	-0.01	0.02	-0.05	-0.19	-0.18
Cool	0.00	-0.03	-0.01	-0.05	-0.12	-0.03	0.00	-0.01	-0.02	0.01	0.02	-0.28
Heating Oil	-0.01	-0.01	-0.04	-0.20	<b>1.10*</b>	-0.51	-0.01	-0.02	0.06	0.33	2.08	0.53
Natural Gas	0.00	<b>0.10*</b>	-0.02	-0.20	-1.38	-1.38	0.00	-0.01	-0.02	0.02	0.70**	3.48
Unleaded Regular Gas	-0.01	-0.04	-0.07	<b>0.48*</b>	-0.47	2.37	<b>0.03*</b>	0.02	-0.02	<b>0.70**</b>	0.54	0.06
WTI Oil	0.00	-0.01	-0.01	-0.02	-0.08	-0.08	0.00	0.02	<b>0.13***</b>	-0.04	0.10	0.06
Aluminum	<b>0.00**</b>	-0.01	<b>0.01**</b>	-0.03	-0.07	-0.05	0.00	0.00	0.00	-0.02	0.04	0.30
Gold	0.00	-0.01	0.00	-0.01	0.00	-0.03	0.00	0.00	0.00	-0.03	-0.06	-0.04
High Grade Copper	0.00	0.00	-0.01	-0.03	-0.02	-0.05	0.00	0.01	-0.01	-0.03	-0.12	0.09
Nickel	<b>0.04*</b>	<b>0.03*</b>	0.07	-0.16	0.09	2.30	0.04	<b>0.11**</b>	-0.06	0.27	-1.14	-2.77
Palladium	-0.01	0.00	-0.05	0.15	<b>1.56*</b>	0.26	0.00	-0.05	0.07	-0.19	0.35	-0.89
Platinum	<b>0.01*</b>	0.03	-0.02	-0.01	-0.08	0.00	0.00	0.00	0.01	-0.02	-0.08	-0.23
Silver	<b>0.00*</b>	0.00	0.00	-0.01	-0.02	-0.06	0.00	0.04	-0.01	0.01	-0.10	<b>0.68*</b>
Tin	0.00	-0.01	-0.01	-0.02	0.02	-0.10	0.00	-0.01	-0.01	-0.02	-0.04	-0.13
Zinc	0.00	-0.01	-0.01	-0.04	-0.07	-0.09	0.00	0.00	0.00	-0.07	-0.21	-0.10
							<b>0.01**</b>	0.01	0.00	0.01	0.03	-0.13
							0.00	-0.01	<b>0.03**</b>	0.00	0.01	0.03
							0.00	0.04	<b>0.01*</b>	0.02	-0.03	<b>0.36*</b>
							-0.01	<b>0.06**</b>	0.05	<b>1.42**</b>	-1.28	-2.02
							<b>0.15***</b>	<b>0.53***</b>	-0.03	-0.18	0.39	-0.98
							0.01	-0.01	-0.02	0.04	0.02	-0.27
							0.01	-0.01	-0.01	-0.03	0.28	-0.14
							0.00	-0.02	-0.02	-0.03	-0.13	-0.14
							<b>0.01*</b>	0.01	0.00	0.00	0.00	-0.29

Table A11: In-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>unrate</i>					
	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	0.00	0.00	0.01	-0.17	-0.43	-0.55
<i>Cocoa</i>	0.00	0.01	-0.03	<b>0.53**</b>	-0.32	1.58
<i>Coffee Arabica</i>	0.01	-0.02	0.05	-0.12	-0.41	-0.55
<i>Corn Oil</i>	0.00	<b>0.06**</b>	-0.01	0.01	-0.26	0.09
<i>Cotton</i>	<b>0.01*</b>	0.03	<b>0.22**</b>	-0.04	-0.20	-0.11
<i>Live Cattle</i>	0.00	-0.03	<b>0.08*</b>	0.06	-0.05	0.62
<i>Lean Hog</i>	-0.01	-0.03	0.02	-0.13	-0.18	0.38
<i>Milk</i>	0.00	-0.01	0.00	0.10	0.35	-0.13
<i>Oranges</i>	-0.01	-0.02	-0.01	-0.07	-0.16	0.65
<i>Soybean Oil</i>	<b>0.01*</b>	-0.03	-0.02	<b>0.16*</b>	-0.07	0.26
<i>Soybeans</i>	0.00	-0.01	-0.02	<b>0.35*</b>	0.09	-0.25
<i>Soybean Meal</i>	0.00	-0.02	-0.01	<b>0.36*</b>	0.36	-0.21
<i>Sugar</i>	0.00	0.00	-0.01	-0.08	-0.11	-0.28
<i>Wheat</i>	<b>0.02***</b>	0.01	-0.02	-0.03	-0.19	-0.23
<i>Wool</i>	0.00	-0.03	-0.02	-0.06	-0.34	-0.63
<i>Yellow Corn</i>	0.00	0.00	<b>0.06*</b>	0.05	-0.26	-0.02
<i>Coal</i>	<b>0.03**</b>	0.01	-0.02	<b>0.20*</b>	0.05	<b>0.99*</b>
<i>Heating Oil</i>	-0.01	0.00	0.00	<b>0.67*</b>	0.06	<b>1.64*</b>
<i>Natural Gas</i>	<b>0.03***</b>	0.08	0.00	-0.11	-0.34	-0.24
<i>Unleaded Regular Gas</i>	-0.01	0.02	-0.06	0.33	-0.32	1.16
<i>WTI Oil</i>	0.00	-0.01	<b>0.09**</b>	<b>0.43**</b>	0.27	<b>2.06**</b>
<i>Aluminium</i>	<b>0.01**</b>	<b>0.03**</b>	<b>0.04**</b>	<b>0.26**</b>	0.33	1.02
<i>Gold</i>	0.00	-0.01	-0.01	-0.06	-0.15	-0.35
<i>High Grade Copper</i>	0.00	-0.03	0.00	-0.07	-0.27	-0.11
<i>Nickel</i>	-0.02	0.00	<b>0.34**</b>	-0.15	-0.73	0.19
<i>Palladium</i>	<b>0.11***</b>	0.09	-0.02	-0.15	-0.45	-1.10
<i>Platinum</i>	0.00	-0.01	<b>0.23***</b>	-0.06	-0.08	-0.54
<i>Silver</i>	0.00	0.00	0.00	-0.08	-0.05	-0.30
<i>Tim</i>	0.01	0.03	0.00	-0.06	-0.15	-0.57
<i>Zinc</i>	0.00	0.00	<b>0.02*</b>	-0.10	-0.30	0.09



Table A12: Out-of-Sample Volatility Predictability and Business Cycle Stages (12 Months)

This table reports the out-of-sample  $R^2$ 's of a regression of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable across business cycle stages. We predict the next year's volatility. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔMI" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "imfl" the inflation rate, "ltr" the long-term U.S. government bond returns, "ity" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. We consider six business cycle stages. "Exp" denotes the expansion, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, "lRec" the late recession, "eExp" the early expansion, "lExp" the late expansion, "Rec" the recession, "eRec" the early recession, and "lRec" the late recession. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	de						Δindpro						ΔMI					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
Butter	-0.82	-0.30	-1.47	-2.01	-0.70	0.09	-1.40	-0.48	-0.79	-0.38	0.11*	-0.26	0.31*	-1.38	-1.18	-0.19	-1.19	-1.19
Cocoa	-1.86	-1.66	-1.55	-0.86	-0.79	-0.74	-1.07	-0.12	-0.76	-2.65	-1.58	-1.69	-1.02	-0.75	6.74***	-2.92	-2.92	-2.92
Coffee Arabica	-4.18	-0.38	-4.51	-2.63			-0.05	-0.68	-0.57		-0.18	0.27	0.20	5.49***	0.61			0.61
Corn Oil	-2.50	-2.55	-1.28	-2.63			-0.47	-1.32	-1.03	1.17*	-0.38	0.62	1.31**	-1.18	-0.08	-0.38	-0.38	-0.38
Cotton	0.21**	-1.56	-1.76	-0.80	-0.66	-1.94	-0.70	-0.57	-0.22	-0.57	-0.08	-0.74	-0.82	-0.33	0.39*	0.33*	0.33*	0.33*
Live Cattle	-1.74	-1.89	-1.00	-3.15	-0.40	-1.44	-1.22	-0.28	-0.40	-1.84	0.04*	-2.46	3.12***	0.62***	-1.72	0.07	-0.95	-0.95
Lean Hog	-0.09*	-0.26	-1.88	-0.28	-1.46	-1.57	-1.42	-0.71	-0.14	-0.64	-0.49	-1.06	0.20	-0.48	-0.77	-0.95	-0.95	-0.95
Milk	-1.56	-0.18	-3.33	-1.33	-4.20	-6.72	0.45***	0.18*	-0.22	-0.90	-1.02	-3.10	-0.43	0.62***	-0.70	-0.95	-0.95	-0.95
Oranges	-2.49	-0.38	-0.84	0.06			-0.74	0.20*	0.67**	0.23	-0.91	-0.20	-1.09	-1.54	-1.54	-1.54	-1.54	-1.54
Soybean Oil	-0.64	-1.46	-2.06	0.14			-0.87	-0.73	-2.03	-0.04	-0.91	-0.13	0.84**	-1.18	-1.18	-1.18	-1.18	-1.18
Soybeans	-2.69	1.95***	-1.68	0.05			-0.88	-0.18	-0.48	-0.22	-0.54	-0.15	1.05**	6.74***	-2.92	-2.92	-2.92	-2.92
Soybean Meal	-5.28	-1.89	-1.91	5.72**			-0.57	1.13**	-0.56	-0.49	-0.12	0.19	0.54*	5.49***	0.61			0.61
Sugar	-1.96	-1.56	-2.76	-0.86	0.51*	0.27	-0.15	-0.33	-0.20	-0.20	-0.68	-2.15	-0.47	-0.70	-0.70	-0.70	-0.70	-0.70
Wheat	-2.31	-1.84	0.34**	-1.59	-0.73	-1.12	-0.44	-0.04	-0.24	-0.06	0.62***	-1.72	0.07	-1.38	-1.18	-1.19	-1.19	-1.19
Wool	-1.04	-2.02	-7.22	-0.31	-1.03	-0.27	-0.42	0.03	-1.12	0.80*	-0.48	-0.77	-0.95	-0.75	6.74***	-2.92	-2.92	-2.92
Yellow Corn	-1.11	0.75***	-1.04	-0.55	-0.46	-0.85	-1.63	-0.18	0.25*	-0.94	-0.70	-1.54	-0.09	-0.70	-0.70	-0.70	-0.70	-0.70
Coal	-4.31	-1.23	-3.52				-0.86	-1.20	-0.67		-1.38	-1.18	-1.19	-1.38	-1.18	-1.19	-1.19	-1.19
Heating Oil	-5.10	10.80**	-10.31				-0.73	0.70	-5.30		-0.75	6.74***	-2.92	-0.75	6.74***	-2.92	-2.92	-2.92
Natural Gas	2.17***		-0.82				-1.88	-2.59	-2.59		5.49***	-0.08	-0.38	5.49***	0.61			0.61
Unleaded Regular Gas	-3.04	6.47	-3.58				-0.92	0.75	-2.95		-1.18	-0.08	-0.38	-1.18	-0.08	-0.38	-0.38	-0.38
WTI Oil	-2.12	0.04	-1.01	-0.46	-0.47	-1.14	-0.33	0.02	-0.15	0.19	-0.33	0.39*	0.33*	-0.33	0.39*	0.33*	0.33*	0.33*
Aluminum	3.01***	-2.01	-6.15	0.06			-2.01	-0.51	-0.30	0.13	1.32***	2.81***	-1.09	1.32***	2.81***	-1.09	-1.09	-1.09
Gold	-3.26	-0.54	-2.46	0.46**	0.10	0.23	-1.28	-0.46	-0.60	0.63*	-0.99	-1.18	-0.21	-0.99	-1.18	-0.21	-0.21	-0.21
High Grade Copper	-2.27	-1.15	-2.90	-1.17	-1.46	-0.47	-0.56	-0.88	-0.59	0.00	-1.37	-0.94	0.78**	-1.37	-0.94	0.78**	0.78**	0.78**
Nickel	4.76***						-0.99				-0.11			-0.11				
Palladium	-4.62	0.17	-1.22				-0.16	0.57	-2.47		-4.33	-3.07	-0.40	-4.33	-3.07	-0.40	-0.40	-0.40
Platinum	-1.07	-3.10	-2.54	0.59			-1.13	-2.02	-0.34	-4.90	-0.52	-1.32	-0.58	-0.52	-1.32	-0.58	-0.58	-0.58
Silver	-2.17	-0.91	-2.69	-0.55	0.46	-0.50	-0.27	-0.26	-0.35	0.62*	-0.98	-0.64	-0.61	-0.98	-0.64	-0.61	-0.61	-0.61
Tin	-2.63	-0.90	-0.78	-2.57	-1.35	-0.37	-0.46	-1.55	-1.30	0.46	-0.74	-1.78	-1.55	-0.74	-1.78	-1.55	-1.55	-1.55
Zinc	-1.32	-2.97	-2.61	-0.63	-0.64	-0.29	-0.68	0.26*	-0.46	-1.43	-0.99	-1.80	-0.55	-0.99	-1.80	-0.55	-0.55	-0.55

Table A12: Out-of-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	dfr				dfy				dp									
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	-0.95	-1.14	-0.58	-0.64	-0.92	-0.56	-0.66	-0.53	-0.92	-0.56	-0.66	-0.53	-3.11	-1.62	-0.41	-1.43	-2.45	-3.15
<i>Cocoa</i>	-1.12	-1.08	-2.30	0.27	-0.67	-1.10	-1.34	0.47	-2.21	-1.10	-1.34	0.47	<b>0.84***</b>	-0.61	-0.33	-0.82	<b>1.06*</b>	0.51
<i>Coffee Arabica</i>	-3.68	-1.56	-2.33	-0.74	-0.93	-2.43	-1.02	-1.47	-0.67	-2.43	-1.02	-1.47	-4.43	-4.76	-7.10	-5.89		
<i>Corn Oil</i>	-4.71	-1.11	-3.74	0.23	-0.50	-5.02	-2.84	-0.18	-0.93	-5.02	-2.84	-0.18	-2.08	-3.08	<b>0.13*</b>	-0.31	-1.23	-2.60
<i>Cotton</i>	-3.57	-0.13	-3.11	0.17	-3.54	-4.06	-2.75	-0.32	-3.54	-4.06	-2.75	-0.32	-3.36	-1.80	<b>0.01*</b>	-2.30	-1.31	-0.99
<i>Live Cattle</i>	-1.85	-0.58	-2.38	0.17	<b>1.02***</b>	-4.58	-1.70	-0.84	<b>1.02***</b>	-4.58	-1.70	-0.84	-1.51	-3.65	-0.28	-1.65	<b>1.49**</b>	-1.71
<i>Lean Hog</i>	-3.21	-2.45	-1.17	-1.85	-0.17	-0.57	-2.97	-3.16	-0.17	-0.57	-2.97	-3.16	-0.53	-9.48	-6.93	<b>0.68**</b>	-0.56	0.71
<i>Milk</i>	<b>0.03*</b>	-0.20	<b>0.13*</b>	-1.60	-2.26	-0.36	-0.27	-0.19	-2.26	-0.36	-0.27	-0.19	-5.39	-1.76	0.16	-1.39		
<i>Oranges</i>	-0.70	-1.17	-0.55	<b>2.55**</b>	-7.45	-7.17	-2.69	<b>1.46*</b>	-7.45	-7.17	-2.69	<b>1.46*</b>	-2.97	-9.18	-0.89	-1.17		
<i>Soybean Oil</i>	-1.72	-1.39	-2.07	-1.39	-0.54	-0.47	-4.53	0.03	-0.54	-0.47	-4.53	0.03	-5.07	-9.25	-0.58	-20.17		
<i>Soybeans</i>	-1.96	-1.68	-3.20	-2.30	-3.10	-2.95	-2.88	-1.81	-3.10	-2.95	-2.88	-1.81	-2.45	-2.21	<b>0.09*</b>	-0.99	-1.92	-0.95
<i>Soybean Meal</i>	-2.68	-0.55	-2.95	-13.24	-3.65	-1.95	-1.52	0.60	-3.65	-1.95	-1.52	0.60	-4.25	-2.87	-5.36	-0.22	<b>1.44**</b>	-1.74
<i>Sugar</i>	-1.00	-0.65	-1.19	<b>0.77*</b>	-2.61	-5.37	-0.77	0.06	-2.61	-5.37	-0.77	0.06	-1.92	-3.64	-1.60	0.14	<b>1.88*</b>	-3.65
<i>Wheat</i>	-3.85	-1.04	-3.64	-1.89	-2.94	-1.07	-1.25	-2.69	-2.94	-1.07	-1.25	-2.69	-2.61	-1.45	-1.62	-1.67	<b>0.57*</b>	-1.13
<i>Wool</i>	-1.48	-1.45	-3.96	-0.98	-5.00	-5.07	<b>0.44**</b>	0.06	-5.00	-5.07	<b>0.44**</b>	0.06	-2.83	-2.80	-0.85			
<i>Yellow Corn</i>	-1.76	-1.21	-3.45	-1.99	-1.39	-0.82	-2.89		-1.39	-0.82	-2.89		-4.25	-27.67	-6.36			
<i>Coal</i>	-2.24	-0.71	-1.38		-2.34	<b>1.54*</b>	-5.75		-2.34	<b>1.54*</b>	-5.75		0.10	0.58	0.58			
<i>Heating Oil</i>	-6.38	-2.87	-30.78		<b>3.50***</b>	-1.74	-0.76		<b>3.50***</b>	-1.74	-0.76		-4.89	-3.52	0.03			
<i>Natural Gas</i>	<b>1.31**</b>	-0.27	-0.27		-2.70	-1.30	-5.14	-1.32	-2.70	-1.30	-5.14	-1.32	-3.22	-4.44	<b>0.72**</b>	-0.29	-0.10	-1.44
<i>Unleaded Regular Gas</i>	-0.50	<b>3.25**</b>	-1.99		-0.41	-1.61	-1.70	-0.26	-0.41	-1.61	-1.70	-0.26	-5.10	-6.58	-1.45	0.06		
<i>WTI Oil</i>	-4.57	-2.26	-3.55	-1.65	-0.47	-1.21	-1.61	-0.36	-0.47	-1.21	-1.61	-0.36	-3.01	-4.04	-1.70	<b>0.35**</b>	<b>2.03**</b>	0.60
<i>Aluminium</i>	-1.82	-0.98	-0.62	-0.91	-2.54	-4.76	-2.98	0.18	-2.54	-4.76	-2.98	0.18	-10.44			<b>0.59**</b>	<b>5.00***</b>	-0.23
<i>Gold</i>	-3.55	-0.80	-2.56	-0.71	<b>4.49***</b>	-0.98	0.40		<b>4.49***</b>	-0.98	0.40		-2.11	-2.31	-3.30	<b>3.20**</b>		
<i>High Grade Copper</i>	-1.40	-0.81	-1.16	-0.89	-4.38	-4.32	-4.74	-1.44	-4.38	-4.32	-4.74	-1.44	-3.91	-3.37	-1.44	<b>0.88**</b>	<b>3.21***</b>	-0.56
<i>Nickel</i>	-0.97	0.03	-0.34	0.60	-5.36	-2.22	-0.66	-0.36	-5.36	-2.22	-0.66	-0.36	-0.38	-0.88	-3.35	-1.37	<b>1.77**</b>	-0.54
<i>Palladium</i>	<b>0.48**</b>	0.03	-0.34	0.60	-3.75	-3.70	-5.68	-1.40	-3.75	-3.70	-5.68	-1.40	-4.15	-5.81	-5.60	0.01	<b>0.47*</b>	-1.29
<i>Platinum</i>	-0.75	-1.83	-2.09	0.60	-0.70	-2.56	-1.97	-1.12	-0.70	-2.56	-1.97	-1.12						
<i>Silver</i>	-2.55	-0.69	-0.71	-0.51														
<i>Tin</i>	-1.41	-1.68	-1.50	-1.50														
<i>Zinc</i>	-2.24	-2.07	-2.42	-2.65														

Table A12: Out-of-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	dy						ep						erp					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	2.76	-1.39	-0.36	-0.90	-2.11	-3.38	-2.64	-2.50	-0.12	-0.98	-0.78	0.99	-0.43	-0.43	-0.33	-0.99	0.34	-0.03
<i>Cocoa</i>	<b>0.39**</b>	-0.51	-0.24	-0.97	<b>1.06*</b>	0.58	-2.09	-1.57	-0.22	-0.91	<b>1.18**</b>	-0.49	<b>0.08**</b>	-0.60	-2.59	-1.24	-1.15	-1.24
<i>Coffee Arabica</i>	-4.19	-3.78	-6.37				-5.58	-2.22	-6.80				-0.64	-2.89	<b>0.64*</b>			
<i>Corn Oil</i>	-1.92	-0.32	-0.24	-5.80			-2.18	-5.91	<b>0.34*</b>	1.06			-0.81	-1.47	<b>0.64**</b>	-1.83		
<i>Cotton</i>	-1.83	-2.42	<b>0.06*</b>	-0.36	-1.17	-2.89	-1.20	-3.22	<b>0.10*</b>	-0.11	-0.33	-3.70	-0.83	-2.75	-0.65	0.05	-0.76	-0.67
<i>Live Cattle</i>	-3.33	-1.98	<b>0.03*</b>	-2.38	-1.16	-1.69	-1.26	-4.69	<b>0.06*</b>	-0.97	-0.68	-1.98	-0.97	-2.03	-0.75	-0.90	-0.74	-0.89
<i>Lean Hog</i>	-1.50	-2.75	-0.31	-1.52	<b>2.06**</b>	-1.67	-1.13	-0.62	-0.25	<b>1.77***</b>	<b>3.60***</b>	-0.85	-1.11	-3.20	-0.45	<b>1.08***</b>	-1.15	0.10
<i>Milk</i>	-0.49	-8.93	-5.69	<b>0.67*</b>	0.45	0.36	-2.28	-1.59	-3.62	-0.97	<b>1.77*</b>	-0.03	-0.13	-2.17	-1.95	-2.78	-3.68	-0.66
<i>Oranges</i>	-0.74	-1.40	-0.15	-1.06			-0.19	-1.87	<b>0.98**</b>	-2.00			-0.13	<b>0.38**</b>	<b>0.44*</b>	0.35		
<i>Soybean Oil</i>	-4.44	-1.05	-4.56	-1.13			-2.87	-1.11	-3.03	<b>1.03*</b>			-1.10	-0.27	-1.13	-0.76		
<i>Soybeans</i>	-2.69	-8.21	-0.67	-1.21			-4.09	-4.27	<b>0.45*</b>	<b>0.76*</b>			-0.35	-1.44	-0.24	-0.34		
<i>Soybean Meal</i>	-4.05	-9.61	-0.61	-21.91			-7.44	-9.57	<b>1.06**</b>	-1.26			-0.46	-0.75	-0.87	<b>2.08*</b>		
<i>Sugar</i>	-2.66	-1.82	-0.02	-1.29	-2.19	-1.34	-1.98	-1.37	-1.12	-1.12	-2.53	-3.16	-1.16	-2.26	-0.65	-1.16	-0.31	-1.74
<i>Wheat</i>	-3.86	-2.49	-4.61	-0.56	<b>1.32**</b>	-1.97	-3.29	-3.19	-0.31	<b>0.92***</b>	<b>1.99**</b>	-1.81	-0.86	-3.02	-2.97	-1.03	-0.79	-0.83
<i>Wool</i>	-1.70	-3.33	-1.96	0.17	<b>2.20**</b>	-3.45	-1.34	-2.33	-2.80	<b>1.04**</b>	<b>3.19**</b>	-0.18	-0.52	-1.14	-1.43	-1.03	-0.66	-0.29
<i>Yellow Corn</i>	-2.37	-0.92	-1.48	-2.40	<b>0.55*</b>	-1.79	-0.26	-0.70	-1.23	<b>0.73**</b>	<b>2.37**</b>	-2.44	-1.09	-1.83	-1.51	-1.25	-1.10	-1.75
<i>Coal</i>	-2.69	-2.69	-0.92				-5.65	-1.58	-0.98				-0.84	-0.49	-0.28			
<i>Heating Oil</i>	-4.66	-22.21	-6.79				-5.55	-16.68	-11.14				-1.08	-3.40	<b>0.90*</b>			
<i>Natural Gas</i>	0.64		0.72				-0.05	0.24					-0.36		-2.36			
<i>Unleaded Regular Gas</i>	-4.97	-1.35	0.27				-3.33	-1.18	-1.83				-0.83	-2.64	<b>1.83*</b>			
<i>WTI Oil</i>	-3.17	-3.15	<b>0.55**</b>	-0.60	0.00	-1.66	-1.88	-1.97	<b>1.33***</b>	<b>1.47***</b>	-0.56	-2.64	-0.22	-4.31	-0.04	-0.41	-0.43	-1.53
<i>Aluminium</i>	-5.32	-4.25	-1.54	0.02			<b>0.24*</b>	-4.98	-2.63	<b>0.49*</b>			-0.94	-1.87	-0.87	-0.27		
<i>Gold</i>	-22.51	<b>7.66***</b>	-1.82	<b>0.38**</b>	<b>2.99***</b>	0.53	-16.16	<b>0.71**</b>	-2.05	-0.22	<b>0.83*</b>	-0.33	-7.14	-0.10	-0.57	-0.28	<b>1.41**</b>	-0.27
<i>High Grade Copper</i>	-2.53	-3.84	-1.74	<b>0.74**</b>	<b>5.49***</b>	-0.33	-1.39	-3.26	-1.41	-0.45	<b>1.92**</b>	-0.47	-1.80	-0.30	-0.98	-4.63	-0.90	-3.15
<i>Nickel</i>	-9.46						-2.16						-0.24					
<i>Palladium</i>	-1.32	-3.21	-0.86				-4.46	-1.07	0.97				-0.76	-0.10	0.14			
<i>Platinum</i>	-1.99	-1.52	-2.52	<b>2.79**</b>			-1.68	-3.00	-2.32	<b>2.95**</b>			-0.08	-1.32	-2.61	-1.08		
<i>Silver</i>	-3.79	-1.91	-1.32	<b>0.94***</b>	<b>3.66***</b>	-0.89	-4.16	-1.42	-1.21	-0.73	<b>0.51*</b>	-1.18	-0.55	-0.68	-0.63	-0.47	0.22	-0.33
<i>Tin</i>	-0.19	-0.52	-3.33	-1.51	<b>1.77**</b>	-0.64	-1.21	-3.17	-3.18	-0.74	<b>1.93**</b>	-0.28	-2.32	-1.18	-0.96	-3.17	-1.90	-2.76
<i>Zinc</i>	-3.29	-4.83	-5.10	0.03	<b>0.74*</b>	-1.34	-1.42	-2.51	-1.50	-0.39	<b>1.41**</b>	-0.32	-2.21	-2.55	-2.67	-4.01	-1.16	-5.41

Table A12: Out-of-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>inf</i>						<i>ltr</i>						<i>lty</i>					
	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec	Exp	eExp	lExp	Rec	eRec	lRec
<i>Butter</i>	-0.80	-0.76	-0.28	<b>0.13*</b>	-0.27	-1.00	-0.53	-2.86	-0.45	-1.54	-0.33	-4.10	<b>0.46*</b>	-0.33	-4.10	<b>0.46*</b>	-0.82	-0.82
<i>Cocoa</i>	-2.79	-2.12	<b>0.22**</b>	-0.40	-0.42	-0.63	-1.11	-1.44	-4.24	-5.16	-3.48	-1.91	-2.66	-5.19	-0.16	-2.92	-2.73	-2.73
<i>Coffee Arabica</i>	-1.48	-0.93	-5.36	-1.99	-1.99	-1.30	-0.71	-1.41	-0.97	-10.56	-10.56	-1.06	-3.71	<b>0.76**</b>	-5.15	-5.15	-5.15	-5.15
<i>Corn Oil</i>	-0.24	-1.10	-0.77	-1.09	0.15	-1.95	-1.38	-1.43	-0.51	-9.29	-10.52	-1.06	-3.71	<b>0.76**</b>	-5.15	-5.15	-5.15	-5.15
<i>Cotton</i>	-1.59	-1.66	-0.81	-0.69	-0.23	-1.95	-1.01	-1.45	-1.29	-10.52	-10.52	-1.06	-3.71	<b>0.76**</b>	-5.15	-5.15	-5.15	-5.15
<i>Live Cattle</i>	-0.33	-0.25	<b>1.22***</b>	-1.72	-0.19	<b>1.50**</b>	-1.36	-2.08	-1.14	-8.20	-8.20	<b>0.53***</b>	-3.64	-2.80	-0.87	-4.55	-4.55	-4.55
<i>Lean Hog</i>	-1.02	-1.47	-0.28	-1.67	-1.54	1.06	-1.10	-0.96	-1.36	-2.72	-2.72	-1.54	0.08	-0.42	-0.42	-0.64	-0.64	
<i>Milk</i>	-0.85	-0.52	<b>0.20*</b>	-0.87	-0.87	-0.93	-0.93	-0.92	-1.78	0.43	0.43	<b>0.35**</b>	-1.92	-1.09	-3.41	-3.41	-3.41	
<i>Oranges</i>	-3.80	-0.25	-0.87	-0.87	-0.27	-1.25	-2.82	-2.97	-4.96	-4.96	-4.96	-0.93	-2.17	-6.87	-3.84	-3.84	-3.84	
<i>Soybean Oil</i>	-3.74	-2.27	-1.06	-1.19	-1.19	-0.92	0.04	-1.12	-8.81	-8.81	-8.81	-1.35	-4.92	-2.62	-2.85	-2.85	-2.85	
<i>Soybeans</i>	-2.10	-1.27	-1.74	-2.45	-2.45	-1.13	-0.51	-0.89	-25.42	-25.42	-25.42	-3.81	-5.30	-1.14	3.14	3.14	3.14	
<i>Soybean Meal</i>	-0.42	-1.47	-2.00	<b>0.51**</b>	<b>5.25***</b>	<b>3.34***</b>	-0.96	-1.21	-3.43	-3.64	-3.64	-5.15	-1.21	-4.77	-1.57	-1.57	-1.57	
<i>Sugar</i>	-1.22	-0.62	-0.25	-1.60	0.05	-1.26	-1.35	-1.19	-0.57	-9.77	-9.77	-4.37	-5.25	0.11	-3.91	-3.91	-3.91	
<i>Wheat</i>	-0.79	-0.61	-0.85	-1.01	0.35	0.31	-0.70	-2.22	-1.84	-4.16	-4.16	-3.11	-4.33	-4.91	-1.91	-1.91	-1.91	
<i>Wool</i>	-1.13	-0.22	-1.38	-1.28	-0.73	-0.66	-1.53	-2.65	-2.00	-7.11	-7.11	-2.77	-1.73	-0.85	-4.04	-4.04	-4.04	
<i>Yellow Corn</i>	-1.69	-1.36	-1.20	-1.20	-1.20	-1.06	-2.53	-1.12	-1.12	-2.68	-2.68	-0.17	-2.60	-0.17	-2.60	-2.60	-2.60	
<i>Cool</i>	-0.71	<b>1.14*</b>	<b>2.47**</b>	-0.71	0.14	-0.79	-0.79	<b>1.27*</b>	0.14	-2.42	-2.42	-12.88	-17.59	-12.88	-17.59	-17.59	-17.59	
<i>Heating Oil</i>	-2.29	-1.93	-1.93	-1.93	-1.93	-0.05	-0.05	0.09	0.09	-2.36	-2.36	-4.51	-4.42	-1.76	-1.76	-1.76	-1.76	
<i>Natural Gas</i>	-1.33	-0.68	-3.56	-3.56	-3.56	-0.89	<b>2.91**</b>	-0.54	-0.54	-4.51	-4.51	-4.42	-1.76	-1.76	-1.76	-1.76	-1.76	
<i>Unleaded Regular Gas</i>	<b>0.49***</b>	-1.06	-0.58	-0.11	-0.51	0.03	-0.82	-0.97	-0.37	-5.42	-5.42	-3.61	-3.74	-0.56	-2.81	-2.81	-2.81	
<i>WTI Oil</i>	<b>0.21**</b>	-1.65	-2.63	0.31	0.31	-1.46	-1.46	-1.17	<b>0.89**</b>	-2.16	-2.16	-4.42	-4.01	-5.99	-2.55	-2.55	-2.55	
<i>Aluminium</i>	<b>1.60***</b>	<b>2.07***</b>	-0.37	<b>0.48**</b>	-0.18	<b>0.77*</b>	-0.35	-0.74	0.04	-5.22	-5.22	-0.51	-3.45	-2.90	-1.35	-1.35	-1.35	
<i>Gold</i>	-0.76	-1.22	<b>0.57***</b>	-3.04	-0.64	-1.36	-1.22	-2.60	-2.91	-0.82	-0.82	-2.18	-4.03	-0.27	-5.23	-5.23	-5.23	
<i>High Grade Copper</i>	-1.30	-1.09	-1.41	-1.41	-1.41	-1.19	-1.13	-0.72	-0.61	-2.47	-2.47	0.45	-4.03	-0.27	-5.23	-5.23	-5.23	
<i>Nickel</i>	-1.09	-0.47	-1.41	-1.41	-1.41	-1.13	-0.72	-0.61	-2.47	-2.47	-2.47	0.45	-4.03	-0.27	-5.23	-5.23	-5.23	
<i>Palladium</i>	<b>0.28**</b>	-1.51	-1.42	-0.40	-0.40	-1.83	-0.90	-1.08	-0.72	-0.72	-0.72	-4.02	-2.63	-3.72	-3.02	-3.02	-3.02	
<i>Platinum</i>	-0.82	<b>0.28**</b>	-0.74	<b>0.40**</b>	-0.01	0.03	-0.76	-0.89	-0.95	-2.80	-2.80	-5.79	-1.34	0.20	-2.70	-2.70	-2.70	
<i>Silver</i>	-1.09	<b>0.03*</b>	-0.75	-4.48	-0.27	-2.14	-1.30	-2.04	-2.77	-8.60	-8.60	-1.96	<b>0.31*</b>	-8.28	-5.04	-5.04	-5.04	
<i>Tin</i>	-0.24	-0.84	<b>0.16*</b>	-2.49	-1.44	-1.47	-1.17	-0.94	-1.64	-5.65	-5.65	-3.45	-0.95	-3.52	-2.06	-2.06	-2.06	
<i>Zinc</i>	-0.24	-0.84	<b>0.16*</b>	-2.49	-1.44	-1.47	-1.17	-0.94	-1.64	-5.65	-5.65	-3.45	-0.95	-3.52	-2.06	-2.06	-2.06	

Table A12: Out-of-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	svar				tbl				tms					
	Exp	eExp	IExp	Rec	eRec	IRec	Exp	eExp	IExp	Rec	eRec	IRec		
<i>Butter</i>	-6.13	-1.45	-2.77	-2.74	-0.19	0.07	-5.97	-2.68	<b>1.07**</b>	-0.33	-4.39	-2.51	-2.29	-1.58
<i>Cocoa</i>	-12.69	-1.74	-1.87	-0.66	-0.73	-0.44	-10.31	-1.36	-2.59	-1.86	-4.30	-1.31	-3.83	-2.26
<i>Coffee Arabica</i>	-40.42	-4.49	<b>0.36*</b>				-1.34	-0.88	-4.96		<b>2.03***</b>	<b>6.39***</b>	-5.05	
<i>Corn Oil</i>	-10.36	-2.43	-5.54	-0.14			-2.10	-5.03	-0.35	-5.99	-0.32	-0.67	-1.47	-3.71
<i>Cotton</i>	-7.19	-1.51	-52.39	-0.80	-0.90	-1.08	-1.69	-2.54	<b>0.77**</b>	-3.59	-0.24	-1.38	-0.38	-0.80
<i>Live Cattle</i>	-1.62	-0.75	-0.55	-1.20	-1.76	0.44	-2.84	-2.60	-1.18	-2.77	-6.65	-1.81	-0.93	0.38
<i>Lean Hog</i>	-2.49	<b>0.05*</b>	-0.63	-7.12	-1.03	-3.03	-0.93	-6.03	-1.12	-0.94	<b>1.35***</b>	-3.98	-1.50	-0.18
<i>Milk</i>	-3.03	-3.81	-3.93	-53.44	-0.31	-1.24	-3.37	-1.58	-0.43	-1.09	-1.20	-1.26	-0.94	-0.64
<i>Oranges</i>	-1.44	-1.96	-0.65	-2.53			-3.50	-2.67	-0.52	-1.78	-2.69	-3.78	<b>0.51**</b>	0.12
<i>Soybean Oil</i>	-29.97	-0.90	-4.85	-0.07			-0.88	-4.57	-8.96	-3.87	-1.85	-5.00	-8.36	-3.51
<i>Soybeans</i>	-1.34	<b>0.81**</b>	-116.80	-0.17			-4.72	-1.34	-1.63	-2.75	-1.98	-2.25	-2.14	-2.50
<i>Soybean Meal</i>	-5.64	-0.09	-180.40	-1.62	-0.96	<b>0.86*</b>	-7.01	-3.62	-1.69	2.75	-3.82	-4.29	-3.31	-5.05
<i>Sugar</i>	-18.07	-0.84	-0.42	-0.96	-0.34	<b>0.86*</b>	-4.33	-0.69	-1.57	-1.70	-1.66	-1.86	<b>0.84**</b>	-2.54
<i>Wheat</i>	-12.39	-1.38	-0.58	-1.78	-0.98	-0.69	-0.63	-4.91	<b>0.48*</b>	-2.94	<b>1.53***</b>	-3.87	-1.37	-2.44
<i>Wool</i>	-2.23	-0.60	-15.19	-3.33	-0.42	0.98	-3.91	-3.78	-6.20	-0.95	-3.26	-1.84	-4.15	-2.45
<i>Yellow Corn</i>	-35.26	-0.75	-12.39	-0.29	-1.40	-1.01	-3.29	-2.64	-2.35	-1.66	-6.51	-0.97	-4.13	-1.28
<i>Coal</i>	-53.06	-1.11	-4.19				-3.76	0.16	-2.14		<b>0.72***</b>	-2.11	-1.53	
<i>Heating Oil</i>	-96.33	-31.49	0.12				-2.10	-8.97	-4.83		-2.78	<b>1.77*</b>	-8.96	
<i>Natural Gas</i>	-0.60		-0.09				<b>0.85**</b>		-0.73		<b>3.48***</b>		-1.14	
<i>Unleaded Regular Gas</i>	-0.33	-24.01	-0.09				-0.02	0.30	-0.81		<b>1.15**</b>	<b>8.65***</b>	-5.57	
<i>WTI Oil</i>	-48.01	-7.05	-21.91	-0.99	-0.44	-1.46	-1.54	-2.86	-2.09	-1.30	-1.02	<b>0.19*</b>	-1.88	<b>2.72***</b>
<i>Aluminum</i>	-42.03	-0.32	-11.93	-0.86			-5.80	-3.42	-8.07	-1.55	-0.75	-1.14	-2.34	0.31
<i>Gold</i>	-12.52	-1.37	-1.12	<b>0.70***</b>	-0.32	-0.04	-3.38	-5.29	<b>0.68**</b>	-0.93	-2.63	-3.08	-1.61	-3.58
<i>High Grade Copper</i>	-6.40	-2.41	-77.68	-15.58	-0.16	-1.95	-4.41	-5.66	-0.62	-2.79	-2.24	-3.10	-3.75	0.48
<i>Nickel</i>	<b>0.30*</b>						0.20				<b>2.01**</b>			
<i>Palladium</i>	<b>0.27*</b>	-1.39	-0.15				-4.08	-1.57	0.56		-2.60	<b>1.74*</b>	-0.93	
<i>Platinum</i>	-3.17	-0.19	-5.74	-0.72			-5.65	-2.43	-2.96	-1.60	-4.50	-1.92	-3.09	<b>2.04**</b>
<i>Silver</i>	-7.26	-0.40	-65.27	<b>0.33**</b>	0.28	-0.38	-4.90	-2.70	-0.04	-0.10	-1.75	-3.70	-2.70	-2.64
<i>Tin</i>	-25.20	-1.44	-2.08	-4.80	-0.80	-0.85	-5.81	-4.27	-10.32	-3.48	-2.52	-4.16	-0.32	-2.51
<i>Zinc</i>	-0.95	-3.07	-0.80	-18.24	-0.97	-2.57	-8.17	-0.77	-1.41	-0.63	-3.73	-0.92	-0.29	<b>2.92**</b>

Table A12: Out-of-Sample Volatility Predictability and Business Cycle Stages (12 Months) (continued)

Commodity	<i>unrate</i>			
	Exp	eExp	lExp	lRec
<i>Butter</i>	-0.22	-0.04	-0.28	
<i>Cocoa</i>	-3.18	-0.82	-4.47	
<i>Coffee Arabica</i>	<b>0.74**</b>	-1.86	-2.65	
<i>Corn Oil</i>	<b>0.09*</b>	-1.51	-0.62	
<i>Cotton</i>	-0.28	-1.87	-3.67	
<i>Live Cattle</i>	-3.05	-0.46	0.00	
<i>Lean Hog</i>	-1.32	-2.44	-1.43	
<i>Milk</i>	-1.23	-1.05	-1.04	
<i>Oranges</i>	-2.61	-0.60	<b>0.67*</b>	
<i>Soybean Oil</i>	-3.37	-3.11	-1.85	
<i>Soybeans</i>	-2.26	-7.63	-2.20	
<i>Soybean Meal</i>	-3.52	-7.62	-0.99	
<i>Sugar</i>	-0.63	-6.93	-9.36	
<i>Wheat</i>	<b>1.75***</b>	-3.16	-0.70	
<i>Wool</i>	-0.99	-4.23	<b>0.67*</b>	
<i>Yellow Corn</i>	-2.25	-1.59	-0.01	
<i>Coal</i>	-0.94	-1.53	-2.08	
<i>Heating Oil</i>	-1.22	<b>6.14**</b>	-6.56	
<i>Natural Gas</i>	<b>3.07***</b>		0.27	
<i>Unleaded Regular Gas</i>	0.26	1.11	-2.69	
<i>WTI Oil</i>	-1.40	-0.57	<b>0.68*</b>	
<i>Aluminium</i>	-0.57	-0.82	-4.96	
<i>Gold</i>	-3.70	-0.42	-0.62	
<i>High Grade Copper</i>	-0.77	<b>1.19**</b>	<b>2.46***</b>	
<i>Nickel</i>	<b>2.73**</b>			
<i>Palladium</i>	-2.67	-2.79	-1.07	
<i>Platinum</i>	-0.44	-0.95	-4.10	
<i>Silver</i>	-3.03	-0.23	-0.18	
<i>Tin</i>	-0.23	-8.22	-2.86	
<i>Zinc</i>	<b>0.07*</b>	-4.02	-0.22	

Table A13: Restricted Return Predictability

This table reports the out-of-sample  $R^2$ 's of predicting monthly excess returns on a constant and the lagged predictive variable after imposing an economically motivated restriction. We predict the next month's and the next year's excess return. Statistical inferences are based on a bootstrapped distribution. Following Campbell & Thompson (2008), we impose the restriction that we set the out-of-sample slope estimate equal to zero whenever it is different to that of the in-sample estimate. All data are sampled at the monthly frequency. "de" denotes the dividend-payout ratio, " $\Delta\text{indpro}$ " the growth of industrial production, and " $\Delta M1$ " the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "swar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Horizon	de	$\Delta\text{indpro}$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	swar	tbl	tms	unrate
Butter	1 Month	-4.33*	-0.42	<b>0.60***</b>	-0.15	-1.65	-7.59***	-13.02***	-19.92**	-0.10*	-0.32	-0.64	-8.50	-0.39	-4.28	-5.00	-12.15
	12 Months	-56.02	-0.14	-0.10*	<b>0.11**</b>	-13.98	-659.74	-865.36	-327.87	<b>0.66***</b>	-0.42	-0.79	-85.35	-11.27	-20.03	-42.56	-35.34
Cocoa	1 Month	-32.21	-0.21	-0.99	<b>0.23**</b>	-5.62	-67.26*	-82.80	-49.79	-0.26	-0.53	-0.53	-10.72	-9.42	-1.58*	-8.47	-9.30
	12 Months	-115.50	<b>1.11***</b>	-2.05	-0.19	-16.09	-349.76	-352.36	-189.27	-1.55	-10.22	-0.89	-53.27	-11.54	-9.71	-67.96	-92.87
Coffee Arabica	1 Month	-4.56	-0.35	-1.52	-0.03	-6.04	-303.77	-334.46	-68.26	-0.64	-0.79	-0.55	-36.18	-1.62	-1.58	<b>0.93***</b>	-2.10**
	12 Months	-27.96	-0.10	-2.59	-0.28	-25.12	-2,541.46	-2,430.51	-116.20	-0.41	-3.34	<b>0.20**</b>	-100.11	-6.80	<b>1.17***</b>	<b>11.11***</b>	<b>1.98***</b>
Corn Oil	1 Month	-6.04	-0.09*	-0.88	-0.01*	-6.20	-96.70	-128.40	-32.83	-1.78	-2.60	-0.55	-3.39*	-6.30	-5.16	-14.01	-13.57
	12 Months	-72.90	<b>0.67***</b>	<b>0.52***</b>	-0.64	-23.86	-212.13	-218.08	-150.88	-0.53	<b>0.25**</b>	-0.61	-28.99	-10.81	-7.94	-73.19	-75.66
Cotton	1 Month	-18.50	-0.25	-0.55	-1.01	-2.54	-41.13**	-157.55	-69.43	<b>0.62***</b>	-0.75	-0.68	-16.11	-1.19	-1.56	-13.21	-2.28***
	12 Months	-44.59	-0.24	-0.86	-0.38	-2.15	-1,969.98	-1,947.59	-1,130.09	-0.42	-6.43	-0.34	-64.64	-3.89	<b>3.03***</b>	-49.42	-3.72**
Live Cattle	1 Month	-6.70	<b>0.24**</b>	-0.77	<b>0.03*</b>	-6.67	-36.36**	-45.93**	-61.77	-0.38	-3.06	-1.09	-4.22	-4.26	-2.41	-8.38	-6.43*
	12 Months	-52.39	<b>1.12***</b>	-0.12	-0.29	-24.82	-152.73	-194.00	-189.94	-0.36	-2.04	<b>0.04**</b>	-11.33	-23.33	<b>0.37***</b>	-27.76	-47.32
Lean Hog	1 Month	-5.16*	-0.64	-0.28	-0.32	-5.03	-22.62***	-15.57***	-56.84	-1.25	-0.50	-0.06*	-8.16	-2.00	-2.39	-3.52	-2.07***
	12 Months	-41.53	-0.66	-0.68	-0.08*	-21.58	-119.19	-176.18	-347.41	-0.01**	-1.57	-0.24	-82.60	-10.81	-24.71	-19.35	-54.85
Milk	1 Month	-4.93*	<b>1.00***</b>	<b>0.45***</b>	-0.64	-0.36***	-32.14**	-194.45	-55.99	-0.15*	<b>1.59***</b>	-0.05*	-6.90	<b>0.69***</b>	-2.45	-1.55	-7.46*
	12 Months	-36.64	-0.08*	-0.60	<b>0.77***</b>	-7.61	-593.00	-523.95	-283.62	<b>1.02***</b>	-1.06	-0.14	-24.66	-4.75	-3.20	-82.57	-25.70
Oranges	1 Month	-6.61	-0.54	-0.47	-1.77	-1.69	-14.29***	-9.62***	-7.82**	-0.83	-0.89	-0.44	-12.79	-1.54	-4.28	-4.97	-4.01**
	12 Months	-40.78	-0.18	-1.45	-1.18	<b>2.61***</b>	-34.61**	-19.66**	<b>5.52***</b>	-0.33	-1.51	<b>0.52***</b>	-47.54	<b>0.87***</b>	-26.28	-73.04	-26.02
Soybean Oil	1 Month	-12.74	<b>0.88***</b>	-1.22	-1.11	-3.65	-69.54	-69.79	-35.95	<b>0.43***</b>	-1.04	-0.40	-6.54	-4.46	-4.32	-13.42	-24.37
	12 Months	-126.18	<b>0.33***</b>	-1.56	-0.33	-28.02	-3,585.18	-3,655.07	-75.57	-0.67	-0.18	-0.39	-47.40	-42.79	-1.87	-85.02	-101.25
Soybeans	1 Month	-5.84*	<b>0.35***</b>	-0.54	-0.56	-3.71	-35.63**	-38.87**	-13.24**	<b>1.29***</b>	-0.78	-0.72	-4.40	-1.61	-1.18*	-5.83	-7.22*
	12 Months	-23.53	<b>0.91***</b>	-1.28	-0.30	-3.64	-284.70	-333.68	-51.57	<b>0.04**</b>	<b>0.69***</b>	-0.38	-49.36	-20.97	-2.38	-21.31	-16.93
Soybean Meal	1 Month	-10.07	-1.12	-0.55	-0.85	-1.57	-25.19**	-44.14*	-8.30**	-0.40	-1.18	-0.33	-2.15**	-1.71	-0.95**	-9.90	-1.92**
	12 Months	-49.99	-1.10	-1.96	-0.27	-20.17	-156.87	-155.86	-57.49	<b>0.11**</b>	-0.81	-0.37	-34.80	-13.18	-11.81	-85.88	-11.11

Table A13: Restricted Return Predictability (continued)

Commodity	Horizon	de	$\Delta \text{indpro}$	$\Delta MI$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	svar	tbl	tms	umrate
Sugar	1 Month	-5.47*	-0.94	-1.19	-0.76	-12.64	-241.52	-546.95	-82.48	-0.87	<b>0.06**</b>	-0.55	-8.54	-1.88	-3.82	-3.66	-4.18**
	12 Months	-124.41	-0.91	-0.79	-0.76	-47.45	-2,108.23	-1,497.37	-534.08	-1.20	<b>0.17***</b>	-0.82	-73.02	-2.07	-29.24	-11.23	-27.11
Wheat	1 Month	-9.90	-0.66	-1.19	-1.42	-4.78	-79.39*	-61.97**	-45.08	-0.26	-0.94	-0.99	-11.21	-2.08	-2.44	-5.87	-16.61
	12 Months	-98.06	<b>2.58***</b>	-1.30	-0.39	-31.94	-658.70	-649.53	-394.82	-0.49	-1.59	-0.27	-83.64	-7.84	-1.98	-26.83	-94.31
Wool	1 Month	-55.23	<b>1.82***</b>	-0.31	<b>0.67***</b>	-25.70	-42.80**	-52.23*	-27.39*	<b>2.10***</b>	<b>0.93***</b>	-2.55	-24.58	-2.89	-2.27	-2.72	-4.16*
	12 Months	-45.01	<b>0.75***</b>	-0.42	<b>0.11**</b>	-6.19	-247.28	-369.82	-134.45	<b>0.00**</b>	-2.07	-0.40	-34.82	-5.76	-6.00	-2.57	-14.79
Yellow Corn	1 Month	-7.38	-0.09*	-0.48	-0.80	-3.49	-66.05*	-63.89**	-74.35	-0.77	-1.14	-0.24	-4.01	-1.29	-1.91	-7.64	-16.48
	12 Months	-64.54	<b>0.33***</b>	<b>0.80***</b>	-0.64	-17.81	-356.76	-393.05	-628.47	-0.52	-2.12	-0.30	-71.04	-19.48	-0.15***	-22.56	-91.88
Coal	1 Month	-6.81	-1.36	-1.26	-0.29	-4.86	-160.65	-155.43	-44.23	-0.09	<b>1.04***</b>	-0.43	-16.00	<b>0.37***</b>	-0.18***	-2.12	-17.72
	12 Months	-24.75	-0.18	<b>0.42**</b>	-0.72	-85.10	-720.66	-851.49	-349.71	-0.44	<b>2.88***</b>	-0.55	-65.19	-12.19	-12.23	-15.12	-184.07
Heating Oil	1 Month	-1.83	-0.16	-0.94	<b>0.59**</b>	-9.48	-25.50*	-12.88**	-23.43	<b>0.13*</b>	-1.12	-0.74	-8.59	-0.23	-1.56	-1.07	-0.98***
	12 Months	-42.78	-0.20	-0.88	-0.36	-67.25	-153.29	-183.88	-156.14	-0.45	0.04	-0.41	-7.10	-5.61	-10.87	-9.17	-26.26
Natural Gas	1 Month	-4.18	<b>2.35***</b>	-2.43	-1.58	-2.79	-23.04	-13.99	-4.64*	-1.08	-2.51	-0.33	-12.52	-6.45	-3.41	-0.28	-1.92**
	12 Months	-33.72	-0.93	-0.14	-0.21	-33.30	-114.46	-104.52	-54.13	-0.48	-0.75	-0.62	-156.93	-0.79	-5.00	-3.74	<b>1.08***</b>
Unleaded Regular Gas	1 Month	-5.37	-1.90	-2.69	<b>0.54**</b>	-8.41	-4.59**	-19.65	-9.45	-0.14	-2.09	-1.13	-6.87	-2.10	-2.16	-0.83	-2.11**
	12 Months	-32.89	-1.71	-0.18	-0.45	-83.97	-216.60	-290.85	-94.09	-0.86	<b>3.97***</b>	-0.53	<b>10.06***</b>	-4.11	<b>0.50**</b>	-2.79	-45.94
WTI Oil	1 Month	-2.59***	<b>0.23**</b>	-1.02	-0.17	-9.71	-232.92	-246.75	-87.73	-0.41	-0.11**	<b>1.40***</b>	-19.19	-0.26*	-2.99	-3.38	-2.16***
	12 Months	-33.92	<b>0.82***</b>	-1.39	-0.46	-30.96	-668.42	-662.03	-249.03	-0.26	<b>0.61***</b>	-0.94	-48.14	-2.70	-39.62	-15.91	-26.89
Aluminium	1 Month	-15.11	-0.31	-0.53	<b>0.14**</b>	-5.18	-73.76	-56.69*	-38.50	-0.56	-0.56	-0.03*	-20.53	<b>0.70***</b>	-4.76	-0.34**	-7.45*
	12 Months	-91.40	-1.49	-1.69	-0.06*	-35.46	-698.40	-3,451.18	-164.21	-0.70	-9.98	<b>0.39***</b>	-71.45	-10.41	-27.87	<b>2.93***</b>	-30.17
Gold	1 Month	-8.16	-0.84	-1.04	-0.48	-14.27	-189.34	-261.72	-102.91	-0.80	-0.78	-0.61	-5.21	-0.22*	<b>0.06***</b>	-1.64	-70.04
	12 Months	-38.21	<b>0.68***</b>	<b>0.28**</b>	-0.53	-170.01	-715.10	-703.16	-324.97	-0.07**	-1.10	-0.64	-49.45	-11.31	<b>2.73***</b>	-7.19	-540.53
High Grade Copper	1 Month	-3.36**	-0.08*	-1.07	-0.61	-5.07	-52.94**	-54.26**	-16.48***	<b>0.76***</b>	-0.32	-0.98	-8.37	-5.31	-0.27***	-2.46	-19.08
	12 Months	-16.17	<b>0.03**</b>	<b>0.62***</b>	-0.83	-9.92	-981.72	-1,050.91	-68.13	<b>0.31***</b>	<b>0.05**</b>	-0.56	-6.85	-1.96	<b>9.19***</b>	-7.19	-46.19
Nickel	1 Month	-1.79	-0.11	-0.92	-1.29	-14.75	-181.14	-279.74	-32.42	-1.00	-0.81	-1.27	-11.87	-1.36	-2.49	-1.92	-26.64
	12 Months	-23.92	-4.72	-1.11	-1.32	<b>6.07***</b>	-1,452.39	-1,442.26	-29.39	-0.31	<b>0.28*</b>	-1.24	-4.63	<b>1.69***</b>	-16.21	-5.77	-97.05
Palladium	1 Month	-19.11	-0.87	-1.25	-0.38	-4.68	-64.49	-70.38	-29.36	-0.58	-0.21	-0.88	-21.31	-14.38	-4.34	-1.13	-40.29
	12 Months	-15.22	-3.56	-2.46	-0.04	-79.11	-3,197.18	-3,662.42	-201.04	-0.19	-0.43	-0.27	-61.95	-7.85	-1.67	-3.34	-181.47
Platinum	1 Month	-7.28	<b>0.15**</b>	-1.64	<b>0.23**</b>	-5.74	-36.15**	-38.26**	-6.01***	-0.58	-0.14*	-1.15	-14.71	-7.56	-2.14	-10.60	-7.27*
	12 Months	-24.71	-0.38	-0.52	-0.92	-43.53	-623.77	-677.37	-26.22*	-0.97	-1.51	-0.96	-44.13	-4.52	<b>3.08***</b>	-49.22	-118.77
Silver	1 Month	-7.87	-0.63	-0.95	<b>0.30**</b>	-4.62	-185.54	-267.73	-83.51	-0.59	-1.46	-0.72	-5.22	-1.78	-1.94	-3.55	-19.81
	12 Months	-37.86	-0.29	-2.40	-0.45	-19.39	-1,561.80	-1,478.33	-409.32	-0.51	-1.72	-0.49	-41.81	-4.46	-7.65	-13.83	-211.19
Tin	1 Month	-3.54***	-0.81	<b>0.43**</b>	-0.34	-8.81	-78.51	-138.53	-75.11	<b>0.50***</b>	-0.94	-0.55	-16.23	-2.91	-1.11**	-4.01	-18.86
	12 Months	-41.30	<b>0.35***</b>	<b>0.56***</b>	-0.30	-7.09	-1,226.67	-1,490.01	-175.33	-0.52	-0.76	-0.74	-78.17	-3.08	<b>6.46***</b>	-6.33	-26.37
Zinc	1 Month	-5.08**	-1.00	-0.37	-1.04	-7.23	-91.25	-162.25	-33.18*	<b>0.72***</b>	-0.67	-0.27	-11.57	-5.18	-2.20	-8.18	-14.61
	12 Months	-18.68	-0.98	-0.94	-0.82	-7.25	-1,307.80	-1,312.07	-127.85	-1.03	-0.48	-0.84	-32.51	-4.73	<b>0.19***</b>	-9.71	-71.80



Table A14: Restricted Volatility Predictability

This table reports the out-of-sample  $R^2$ 's of predicting monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable after imposing an economically motivated restriction. We predict the next month's and the next year's volatility. Statistical inferences are based on a bootstrapped distribution. Following Campbell & Thompson (2008), we impose the restriction that we set the out-of-sample slope estimate equal to zero whenever it is different to that of the in-sample estimate. All data are sampled at the monthly frequency. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency.

Commodity	Horizon	de	Δindpro	ΔM1	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	svar	tbl	tms	unrate
Butter	1 Month	-9.42	0.01	-2.18	-0.63	-9.26	-376.03	-490.25	-241.99	-0.83	<b>0.18**</b>	-0.52	-63.66	-2.02	-14.25	-4.92	-1.23
	12 Months	-77.31	-0.39	<b>0.17*</b>	-0.70	-10.08	-1,085.76	-1,209.26	-915.19	-0.55	0.05	-0.83	-171.99	-5.76	-17.09	-16.84	-60.60
Cocoa	1 Month	-8.41	-0.56	-1.31	-0.56	-5.23	-731.29	-814.25	-493.59	-0.51	-0.01	-0.73	-105.08	-0.70	-11.97	-10.96	-9.76
	12 Months	-67.18	-0.77	-2.26	-0.29	-30.61	-270.32	-266.84	-223.58	-0.56	-1.18	-0.67	-196.15	-13.50	-15.68	-45.77	-34.70
Coffee Arabica	1 Month	-0.37	-0.86	-0.41	0.08	-35.84	-244.57	-236.61	-56.40	-0.21	-0.25	-0.12	-78.47	-5.33	-9.25	-0.60	-39.90
	12 Months	-36.34	-0.80	-1.17	-0.62	-36.74	-365.36	-399.80	-178.60	-0.74	-0.76	-0.60	-25.49	-47.41	-2.62	<b>2.33***</b>	-8.80
Corn	1 Month	-92.05	-0.13	-3.34	-0.28	-0.36	-308.30	-253.18	-235.84	0.00	-2.18	-0.29	-77.04	-0.20	-5.06	-4.20	-5.45
	12 Months	-204.90	<b>0.36***</b>	-0.82	-0.96	-5.96	-226.81	-257.16	-227.05	-0.74	-1.70	-0.87	-31.16	-33.13	-15.30	-13.07	-57.68
Cotton	1 Month	-71.16	-0.49	<b>0.47**</b>	-0.71	-5.47	-145.08	-168.46	-49.40	-0.49	-0.44	-0.08	-48.15	-2.04	-8.98	-2.41	-7.96
	12 Months	-159.45	<b>0.29**</b>	<b>0.34**</b>	-0.46	-9.50	-405.05	-348.88	-282.66	-0.11	-0.29	-0.77	-287.55	-8.54	-41.01	-3.01	-15.13
Live Cattle	1 Month	-190.69	-0.73	-0.58	-0.03	-6.45	-88.68	-128.53	-186.96	-0.16	-3.89	-0.49	-136.08	-9.92	-10.33	-53.96	-48.34
	12 Months	-20.00	-0.16	-0.24	-0.61	-7.94	-734.73	-802.09	-353.04	-0.22	-2.23	-0.45	-32.42	-13.47	-5.87	-64.34	-84.35
Lean Hog	1 Month	-35.76	-0.97	-0.96	-0.72	-5.80	-628.86	-579.82	-304.53	-0.47	<b>0.36***</b>	-1.40	-38.95	-2.09	-17.80	-2.80	-4.33
	12 Months	-14.06	-1.03	-0.75	-0.49	-37.46	-212.50	-209.59	-281.05	0.00	-0.71	-0.96	-86.69	-3.54	-2.31	-5.54	-5.73
Milk	1 Month	-12.16	-0.62	-0.03	-0.54	-5.60	-786.28	-138.38	-68.65	-0.42	-1.21	-0.57	-226.83	-3.00	-5.20	-7.15	-7.47
	12 Months	-39.77	-0.83	-0.44	-0.34	-13.92	-628.86	-723.06	-536.87	-0.82	-1.08	-0.83	-244.81	-4.69	-7.22	-4.16	-5.94
Oranges	1 Month	-9.44	-1.25	-1.45	-0.61	-1.57	-12.43	-9.80	-9.68	<b>0.39***</b>	-0.79	-0.80	-27.16	-1.50	-3.43	-5.80	-11.37
	12 Months	-35.38	-0.92	-1.18	-0.29	-17.05	-65.95	-76.85	-9.40	-0.28	-1.61	-0.26	-23.87	-0.91	-10.03	-3.04	-53.09
Soybean Oil	1 Month	-6.14	-0.55	-1.22	-0.90	-7.92	-123.63	-748.81	-83.64	-0.78	-0.55	-0.84	-94.03	-1.15	-7.19	-4.28	-9.92
	12 Months	-63.28	-0.81	-0.88	-0.90	-9.59	-196.78	-249.34	-85.34	-0.68	<b>0.18**</b>	-0.72	-37.90	-18.71	-9.38	-24.54	-44.07
Soybeans	1 Month	-3.34	-0.78	-0.98	-0.71	-4.30	-276.93	-176.31	-84.45	<b>0.79***</b>	-0.42	-0.30	-44.27	-3.24	-4.75	-2.93	-24.62
	12 Months	-5.24	<b>0.08*</b>	-0.07	-0.28	-12.57	-207.55	-235.38	-72.66	-0.16	-1.38	<b>0.12*</b>	-19.80	-11.55	-2.86	-3.99	-20.24
Soybean Meal	1 Month	-1.97	-0.38	-0.95	-0.65	-3.68	-122.80	-160.29	-31.49	-0.60	<b>1.14***</b>	-0.38	-22.94	<b>0.27**</b>	-8.92	-4.02	-31.58
	12 Months	-257.35	<b>0.21**</b>	-0.07	-0.54	-11.43	-395.07	-484.53	-261.60	-0.75	-0.67	-0.17	-29.14	<b>4.19***</b>	-9.44	-25.24	-32.68

Table A14: Restricted Volatility Predictability (continued)

Commodity	Horizon	de	$\Delta \ln dpro$	$\Delta MI$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	svar	tbl	tms	unrate
Sugar	1 Month	-5.51	-0.01	<b>0.25**</b>	-0.33	-5.98	-328.80	-330.36	-61.38	-0.23	-1.85	-0.18	-31.17	-5.74	-7.79	-4.36	-8.55
	12 Months	-132.45	-0.08	-1.02	-0.89	-22.35	-1,665.31	-2,144.84	-287.61	-0.83	<b>0.26***</b>	-0.83	-200.52	-1.55	-27.12	-8.86	-56.26
Wheat	1 Month	-52.33	-1.00	<b>0.39**</b>	-0.78	-2.20	-232.52	-215.73	-85.16	-0.81	-3.92	-0.29	-15.94	-1.77	-3.08	-0.62	-3.40
	12 Months	-101.09	-0.07	-0.76	-0.87	-3.19	-666.81	-641.21	-241.23	-0.38	-2.56	-1.05	-247.23	-1.46	-19.30	-10.35	<b>2.86***</b>
Wool	1 Month	-12.79	-0.01	-1.92	<b>1.90***</b>	-3.20	-421.28	-586.82	-34.26	<b>0.36***</b>	<b>0.28***</b>	-0.90	-21.32	-1.54	-3.78	-4.00	-6.08
	12 Months	-69.43	<b>1.00***</b>	<b>0.84***</b>	-0.29	-5.39	-968.33	-842.44	-187.43	-0.16	-0.52	-0.72	-164.31	-1.83	-10.59	-7.26	-7.74
Yellow Corn	1 Month	-27.38	-1.07	-0.38	-0.06	-5.55	-116.73	-142.01	-128.02	-0.29	<b>0.43***</b>	-0.45	-45.24	-0.40	-7.29	-3.45	-19.44
	12 Months	-40.22	-2.73	-0.69	-0.20	-11.43	-754.06	-736.34	-220.30	-1.07	-0.32	0.06	-369.12	-8.68	-1.76	-88.01	-50.53
Coal	1 Month	-27.29	-0.79	-3.79	-0.75	-0.27	-2,334.74	-2,407.17	-172.71	-0.68	-0.21	-0.71	-83.64	<b>0.81***</b>	<b>2.18***</b>	-1.07	-17.40
	12 Months	-23.71	-0.31	-1.92	-1.40	-3.42	-277.31	-215.74	-135.95	-0.57	-0.90	-1.08	-38.74	-35.33	-6.17	-1.37	-32.99
Heating Oil	1 Month	-57.24	<b>0.31*</b>	-0.10	-0.17	<b>1.47***</b>	-429.44	-435.15	-61.80	-0.65	-1.70	-0.17	-25.35	-0.20	-39.29	-2.07	-1.81
	12 Months	-191.05	-0.79	-0.66	-0.35	<b>1.74***</b>	-351.43	-462.84	-74.48	-1.70	-0.21	<b>1.06***</b>	-71.95	-69.28	-31.96	-14.38	-3.21
Natural Gas	1 Month	-19.80	-0.47	-2.96	-0.56	-13.64	-221.80	-79.34	<b>1.97***</b>	<b>2.62***</b>	-2.94	-0.66	<b>0.49*</b>	<b>2.91***</b>	-6.78	<b>1.67***</b>	-5.68
	12 Months	<b>3.30***</b>	0.01	<b>2.92***</b>	-1.44	<b>7.70***</b>	0.70	-1.01	<b>4.11***</b>	-0.63	-0.36	-2.24	-10.47	<b>2.94***</b>	<b>5.35***</b>	<b>5.57***</b>	<b>1.63*</b>
Unleaded Regular Gas	1 Month	-15.52	<b>2.14***</b>	-0.37	<b>1.13***</b>	<b>4.37***</b>	-868.00	-805.62	-53.92	<b>1.69***</b>	-1.65	<b>0.23*</b>	-6.17	<b>1.83***</b>	-13.51	-0.57	-6.01
	12 Months	-20.68	-0.66	0.15	-0.40	<b>3.99***</b>	-420.00	-367.45	-24.95	-0.64	-3.12	0.02	-72.46	-54.46	-8.75	-4.31	-9.60
WTI Oil	1 Month	-41.98	-0.22	-0.76	-0.41	-4.35	-867.08	-842.69	-363.66	-1.15	-1.10	<b>0.48***</b>	-78.08	<b>0.26***</b>	-11.41	-4.46	-95.32
	12 Months	-98.86	-0.34	<b>0.63***</b>	<b>0.10*</b>	-1.73	-1,226.40	-1,054.91	-279.70	-1.00	<b>0.15**</b>	<b>0.09*</b>	-203.06	-41.79	-39.09	-8.91	-3.89
Aluminium	1 Month	-8.31	<b>0.42***</b>	<b>1.18***</b>	-0.90	-24.48	-2,165.14	-2,292.31	-462.27	-0.98	<b>0.46***</b>	-0.52	-69.55	-0.48	-4.64	-8.71	-124.55
	12 Months	-28.44	-0.90	<b>0.38***</b>	-0.65	-14.73	-46.25	-47.53	-55.87	-0.49	-6.83	-0.85	-262.87	-13.03	-86.59	-3.47	-35.66
Gold	1 Month	-9.10	<b>0.39***</b>	-1.46	-1.23	<b>3.14***</b>	-2,055.69	-2,209.92	-370.46	-1.30	<b>0.37***</b>	0.07	-57.19	-28.33	<b>1.95***</b>	-17.61	-2.00
	12 Months	-297.15	-0.96	<b>0.70***</b>	-0.41	-13.83	-1,952.87	-1,940.73	-445.08	-0.55	-0.27	-1.05	-35.28	-7.61	-2.14	-7.64	-8.88
High Grade Copper	1 Month	-12.59	-0.78	-2.02	-0.56	-1.96	-566.80	-514.03	-170.42	-0.45	-1.44	-1.06	-30.78	-6.33	-2.52	-7.79	-63.37
	12 Months	-49.84	-0.55	-3.58	-0.44	-6.85	-745.00	-607.07	-458.87	-0.22	-0.72	-0.03	-197.52	-15.53	-12.96	-4.49	-48.48
Nickel	1 Month	-4.43	<b>1.74***</b>	<b>0.53**</b>	-0.92	-1.67	-606.30	-682.05	-381.36	<b>1.47***</b>	<b>2.45***</b>	<b>1.34***</b>	-23.01	<b>2.87***</b>	-18.08	-1.58	-39.38
	12 Months	-6.73	-0.68	-0.42	-1.19	-35.61	-169.49	-137.29	-11.86	-0.35	-2.10	-0.60	-2.47	-4.25	-0.75	0.46	-109.64
Palladium	1 Month	-49.25	<b>1.90***</b>	-0.51	-1.49	<b>1.03**</b>	-310.03	-301.06	-21.04	-0.33	-0.84	-0.78	-11.88	-1.12	-2.18	<b>0.48**</b>	-0.07
	12 Months	-34.65	<b>0.23*</b>	-2.28	-1.19	-23.39	-969.33	-1,288.03	-22.41	-0.62	-1.72	-0.04	-3.34	-0.57	<b>0.92**</b>	<b>0.54*</b>	-13.33
Platinum	1 Month	-16.76	-0.34	<b>0.15*</b>	-0.27	-7.03	-150.42	-178.22	-24.97	<b>0.66***</b>	<b>0.07*</b>	-0.43	-120.95	-1.40	-6.37	-6.20	-30.74
	12 Months	-18.37	-0.53	-0.51	-0.96	-16.62	-461.00	-504.64	-219.88	-1.05	-0.27	-1.30	-258.24	-8.96	-14.60	-56.87	-36.16
Silver	1 Month	-8.70	-0.96	-0.69	-0.71	-4.06	-625.22	-712.71	-166.43	-0.58	<b>0.49***</b>	-0.60	-76.82	-28.13	-1.55	-6.24	<b>2.56***</b>
	12 Months	-28.75	-1.27	-2.57	-0.40	-12.46	-1,318.34	-1,548.13	-164.88	-0.25	-0.19	-1.39	-9.90	-3.86	-12.34	-6.51	-49.39
Tin	1 Month	-3.20	-0.89	<b>2.60***</b>	-0.75	-21.23	-694.33	-714.26	-221.53	-0.65	-1.22	-0.98	-51.60	-2.36	-11.52	-4.16	-10.97
	12 Months	-34.24	-1.10	-0.62	-0.78	-18.94	-226.25	-229.43	-404.69	-0.55	-1.36	-0.90	-374.51	-14.58	-8.71	-15.19	-72.92
Zinc	1 Month	-6.50	-0.67	-0.51	-0.43	-7.07	-769.05	-731.14	-359.84	-0.76	-0.58	-0.18	-82.85	-15.94	-8.61	-18.89	-16.24
	12 Months	-7.04	-1.11	-1.00	-0.61	-12.51	-520.88	-496.93	-143.33	-1.13	-1.41	<b>0.32**</b>	-120.64	-2.19	-14.17	-30.52	-70.24

Table A15: Summary Return and Volatility Predictability from 1950

This table reports a summary of the regression results of monthly excess returns on a constant and the lagged predictive variable (Panel (A) and (B)), and the regression results of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable (Panel (C) and (D)). In Panel (A) and (B), we report the percentage of significant in-sample and out-of-sample  $R^2$ s across the variables of predicting the next month's and next year's excess return. In Panel (C) and (D), we report the percentage of significant in-sample  $F$ -statistics of the difference between the adjusted  $R^2$ s of the unrestricted and restricted model, and out-of-sample  $R^2$ s across the variables of predicting the next month's and next year's volatility. "de" denotes the dividend–payout ratio, " $\Delta indpro$ " the growth of industrial production, and " $\Delta M1$ " the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend–price ratio, "dy" the dividend yield, "ep" the earnings–price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "tms" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. All data are sampled at the monthly frequency. The sample period is from January 1950 to December 2015.

Panel (A): Return Predictability (1 Month)				Panel (B): Return Predictability (12 Months)			
In-Sample		Out-of-Sample		In-Sample		Out-of-Sample	
dfr	50.00	dfr	20.00	lty	90.00	tbl	73.33
svar	36.67	$\Delta indpro$	16.67	ep	86.67	dfy	53.33
$\Delta indpro$	33.33	$\Delta M1$	10.00	tbl	86.67	lty	50.00
ltr	30.00	infl	10.00	dp	76.67	infl	36.67
$\Delta M1$	26.67	ltr	10.00	dy	73.33	tms	36.67
tbl	23.33	erp	6.67	tms	60.00	de	26.67
infl	16.67	svar	3.33	unrate	53.33	$\Delta M1$	26.67
tms	16.67	tms	3.33	de	50.00	dy	26.67
de	13.33	de	0.00	infl	50.00	unrate	26.67
erp	13.33	dfy	0.00	$\Delta indpro$	40.00	ep	23.33
dp	10.00	dp	0.00	dfy	33.33	dp	20.00
dy	10.00	dy	0.00	svar	33.33	erp	16.67
ep	6.67	ep	0.00	$\Delta M1$	26.67	$\Delta indpro$	13.33
dfy	3.33	lty	0.00	dfr	26.67	dfr	6.67
lty	3.33	tbl	0.00	erp	13.33	ltr	3.33
unrate	0.00	unrate	0.00	ltr	13.33	svar	0.00

Panel (C): Volatility Predictability (1 Month)				Panel (D): Volatility Predictability (12 Months)			
In-Sample		Out-of-Sample		In-Sample		Out-of-Sample	
dp	66.67	infl	43.33	de	50.00	tms	23.33
dy	66.67	dp	40.00	dfy	40.00	dfy	20.00
ep	60.00	dy	40.00	tms	40.00	ep	16.67
infl	60.00	lty	40.00	svar	36.67	dp	13.33
dfy	56.67	dfy	36.67	tbl	3.33	tbl	13.33
unrate	53.33	unrate	26.67	unrate	26.67	unrate	13.33
svar	50.00	erp	23.33	dp	23.33	de	10.00
lty	46.67	$\Delta indpro$	20.00	dy	23.33	$\Delta indpro$	10.00
tbl	46.67	ep	20.00	$\Delta indpro$	20.00	ltr	10.00
de	43.33	tbl	20.00	dfr	16.67	$\Delta M1$	6.67
tms	33.33	de	16.67	$\Delta M1$	13.33	dy	6.67
erp	30.00	$\Delta M1$	6.67	ep	13.33	infl	6.67
$\Delta M1$	26.67	ltr	6.67	erp	13.33	svar	6.67
$\Delta indpro$	20.00	svar	6.67	infl	13.33	dfr	0.00
dfr	13.33	dfr	3.33	ltr	13.33	erp	0.00
ltr	10.00	tms	3.33	lty	0.00	lty	0.00

Table A16: Return Predictability from 1950 (1 Month)

This table reports the regression results of monthly excess returns on a constant and the lagged predictive variable(s). We predict the next month's excess return. Statistical inferences are based on a bootstrapped distribution. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "swar" the stock variance, and "tbl" the 3-month Treasury bill rate. "unrate" is the unemployment rate. "MSA" and "MFC" denote the model selection approach and mean forecast combination.  $R^2$  and  $R_{\text{cons}}^2$  are the in-sample and out-of-sample  $R^2$ , respectively. We report the t-statistics in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency. The sample period is from January 1950 to December 2015.

Commodity	Statistic	de	Δindpro	ΔM1	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	swar	tbl	tms	unrate	MSA	MFC
Butter	$R^2$	<b>0.35*</b>	0.00	<b>1.40***</b>	0.03	0.14	<b>0.52**</b>	<b>0.42*</b>	0.09	<b>0.47*</b>	<b>0.82**</b>	0.01	0.10	<b>0.62**</b>	0.11	0.02	0.00	-17.55	-0.41
	$R_{\text{cons}}^2$	-1.49	-0.98	<b>0.54***</b>	-0.75	-1.35	-2.62	-2.51	-1.84	-0.71	<b>0.00**</b>	-1.93	-2.15	-1.11	-1.34	-0.77	-1.62		
	t-stat	(-1.68)	(0.02)	(-3.35)	(0.47)	(-1.05)	(-2.02)	(-1.83)	(-0.84)	(1.93)	(2.55)	(-0.32)	(-0.87)	(-2.21)	(-0.95)	(0.37)	(-0.09)		
Cocoa	$R^2$	0.11	<b>0.37*</b>	0.15	0.24	0.02	0.03	0.05	0.17	0.10	0.00	0.04	0.26	0.00	<b>0.49*</b>	0.28	0.01	-18.56	-1.49
	$R_{\text{cons}}^2$	-2.83	-1.36	-1.25	-0.96	-2.35	-1.98	-1.97	-2.83	-1.43	-2.56	-1.11	-2.19	-2.84	-0.55**	-0.42*	-1.36		
	t-stat	(0.92)	(1.72)	(-1.09)	(1.37)	(-0.43)	(-0.52)	(-0.62)	(-1.14)	(-0.90)	(0.12)	(0.59)	(-1.43)	(-1.96)	(-1.49)	(-0.32)			
Coffee Arabica	$R^2$	0.07	<b>0.56*</b>	0.01	0.34	0.00	0.00	0.00	0.05	0.00	0.12	0.13	0.01	0.00	<b>0.43*</b>	<b>1.52***</b>	0.38	-14.14**	<b>0.46**</b>
	$R_{\text{cons}}^2$	-1.77	-0.60	-2.20	-0.30	-1.65	-2.32	-2.43	-2.75	-0.81	-1.23	-1.05	-1.76	-0.87	-1.09	<b>0.85***</b>	-0.76*		
	t-stat	(0.68)	(1.94)	(0.23)	(1.51)	(0.00)	(-0.09)	(-0.11)	(-0.58)	(-0.02)	(0.88)	(-0.93)	(-0.25)	(0.05)	(-1.71)	(3.21)	(1.59)		
Corn	$R^2$	0.01	0.21	0.00	<b>1.05***</b>	0.07	0.01	0.00	0.03	0.22	0.00	<b>0.43*</b>	0.09	0.15	0.08	0.00	0.00	-18.02	-2.28
	$R_{\text{cons}}^2$	-3.77	-2.61	-0.76	-0.27*	-2.73	-1.66	-1.42	-2.22	-1.23	-0.60	-1.62	-2.49	-8.17	-2.59	-2.80	-2.63		
	t-stat	(0.32)	(1.30)	(0.02)	(2.89)	(-0.77)	(-1.05)	(-0.16)	(-0.50)	(1.32)	(-0.08)	(-1.84)	(-0.85)	(-1.10)	(-0.81)	(0.11)	(0.03)		
Cotton	$R^2$	0.01	0.11	0.08	0.00	0.12	0.01	0.00	0.04	<b>0.55**</b>	0.00	0.06	0.12	0.00	0.31	0.30	0.14	-17.22	-1.42
	$R_{\text{cons}}^2$	-3.46	-0.40	-1.23	-2.25	-1.16	-1.70	-1.85	-2.67	-0.64	-1.18	-1.00	-1.45	-0.46	-0.74*	-1.08	-1.09		
	t-stat	(0.34)	(0.92)	(-1.19)	(-0.08)	(0.97)	(-0.31)	(-0.11)	(-0.53)	(2.09)	(-0.13)	(0.71)	(-0.97)	(-0.15)	(-1.57)	(1.55)	(1.06)		
Live Cattle	$R^2$	0.16	0.00	0.10	<b>0.72**</b>	0.02	0.17	0.15	0.02	0.07	0.03	0.16	0.18	0.08	<b>0.45*</b>	<b>0.43*</b>	0.10	-17.14	-1.47*
	$R_{\text{cons}}^2$	-2.07	-1.01	-1.04	-0.08*	-2.42	-2.42	-2.42	-2.71	-0.64	-0.48	-1.62	-1.89	-1.30	-1.09	-0.67	-1.04		
	t-stat	(-1.14)	(-0.05)	(0.91)	(2.39)	(-0.42)	(-1.15)	(-1.08)	(-0.35)	(0.76)	(0.45)	(-1.13)	(-1.18)	(-0.78)	(-1.89)	(1.84)	(0.88)		
Lean Hog	$R^2$	0.04	0.00	0.00	0.12	0.01	0.07	0.09	0.02	0.07	0.08	0.04	0.04	0.08	0.09	0.06	0.02	-16.64	-2.39
	$R_{\text{cons}}^2$	-2.05	-0.79	-1.03	-0.70	-3.22	-2.77	-2.36	-3.39	-1.11	-1.11*	-0.65	-2.81	-2.24	-1.47	-1.00	-1.34		
	t-stat	(-0.55)	(0.07)	(-0.06)	(0.99)	(-0.22)	(-0.77)	(-0.84)	(-0.38)	(-0.73)	(0.81)	(-0.54)	(-0.57)	(-0.78)	(-0.83)	(0.71)	(-0.35)		
Milk	$R^2$	<b>0.41*</b>	<b>0.42*</b>	<b>1.18***</b>	<b>0.48**</b>	<b>0.82***</b>	0.19	0.13	0.00	<b>0.67**</b>	<b>2.45***</b>	<b>1.09***</b>	0.27	<b>1.41***</b>	0.16	0.02	0.00	-9.26**	<b>3.00***</b>
	$R_{\text{cons}}^2$	-2.27	<b>0.06**</b>	<b>0.28**</b>	-0.83	-0.28**	-1.60	-1.78	-2.02	<b>0.04**</b>	<b>6.33***</b>	<b>0.02**</b>	-2.80	<b>0.52***</b>	-1.70	-1.06	-1.45		
	t-stat	(-1.80)	(1.83)	(-3.07)	(1.96)	(-2.55)	(-1.24)	(-1.01)	(0.02)	(2.31)	(4.45)	(-2.96)	(-4.46)	(-3.36)	(-1.11)	(-0.42)	(0.09)		
Oranges	$R^2$	0.08	0.02	0.00	0.03	0.05	<b>0.57**</b>	<b>0.63**</b>	0.31	0.18	0.01	0.06	0.04	0.00	0.03	0.00	0.08	-12.96	-0.72
	$R_{\text{cons}}^2$	-2.37	-0.90	-1.02	-1.88	-1.37	-1.84	-2.28	-1.47	-1.84	-1.46	-0.56	-1.89	-2.41	-1.61	-1.74	-1.73		
	t-stat	(-0.77)	(-0.38)	(-0.17)	(0.46)	(-0.64)	(-2.13)	(-2.24)	(-1.56)	(-1.19)	(-0.23)	(-0.67)	(-0.54)	(-0.09)	(-0.50)	(0.04)	(-0.78)		
Soybean Oil	$R^2$	0.00	0.14	0.02	0.01	0.09	0.03	0.04	0.03	0.18	0.11	0.02	0.05	0.01	0.09	0.05	0.00	-18.64	-0.50
	$R_{\text{cons}}^2$	-3.16	-1.43	-1.48	-2.30	-2.81	-2.33	-1.92	-3.09	-1.04	-1.65	-0.41	-2.62	-5.46	-1.60	-1.69	-2.96		
	t-stat	(0.04)	(1.07)	(0.37)	(0.32)	(-0.82)	(-0.45)	(-0.57)	(-0.46)	(-1.19)	(0.92)	(-0.40)	(-0.61)	(-0.31)	(-0.83)	(0.63)	(-0.06)		
Soybeans	$R^2$	0.02	0.00	0.05	0.06	0.00	0.05	0.06	0.09	0.08	0.05	0.07	0.18	0.11	<b>0.43*</b>	<b>0.37*</b>	0.02	-16.07	-2.38
	$R_{\text{cons}}^2$	-4.05	-1.25	-1.00	-1.28	-1.38	-1.78	-1.73	-3.41	-0.58	-1.75	-0.68	-1.66	-1.56	-0.55**	-0.27**	-1.72		
	t-stat	(0.35)	(0.01)	(0.61)	(0.66)	(0.17)	(-0.63)	(-0.71)	(-0.85)	(-0.77)	(-0.63)	(-0.75)	(-1.20)	(0.93)	(-1.85)	(1.71)	(0.38)		
Soybean Meal	$R^2$	0.03	0.03	0.21	0.01	0.07	0.02	0.02	0.06	0.00	0.13	0.02	0.18	0.07	<b>0.36*</b>	0.22	0.03	-16.54	-3.23*
	$R_{\text{cons}}^2$	-4.09	-1.39	-0.92	-1.21	-1.17	-2.25	-2.21	-4.19	-0.96	-1.78	-0.81	-2.19	-2.50	-1.20	-0.10**	-1.28		
	t-stat	(0.46)	(-0.49)	(1.30)	(0.29)	(0.76)	(-0.37)	(-0.40)	(-0.67)	(-0.17)	(-1.02)	(-0.42)	(-1.20)	(0.73)	(-1.68)	(1.32)	(0.52)		
Sugar	$R^2$	0.15	0.05	0.03	0.04	0.00	0.00	0.00	0.09	0.00	0.12	0.28	0.10	0.11	0.05	0.02	0.05	-16.71*	-1.10
	$R_{\text{cons}}^2$	-2.87	-1.11	-1.26	-1.61	-1.80	-1.18	-1.36	-1.57	-1.81	-0.43	-1.05	-1.03	-0.89	-1.22	-1.26	-1.52		
	t-stat	(1.08)	(0.61)	(-0.45)	(0.53)	(-0.07)	(-0.12)	(-0.11)	(-0.86)	(0.13)	(0.98)	(1.49)	(-0.88)	(0.91)	(-0.63)	(-0.35)	(-0.65)		
Wheat	$R^2$	0.19	0.16	0.01	0.01	0.01	0.07	0.12	0.00	<b>0.66**</b>	0.05	0.02	0.09	<b>0.34*</b>	0.10	0.01	0.00	-16.87	-1.52
	$R_{\text{cons}}^2$	-2.86	-0.47	-1.39	-2.54	-1.79	-1.70	-1.62	-1.94	<b>0.15**</b>	-0.99	-1.57	-1.87	-6.46	-1.12	-1.31	-2.34		
	t-stat	(-1.23)	(1.13)	(0.22)	(-0.34)	(-0.26)	(-0.75)	(-0.98)	(0.10)	(-2.29)	(-0.60)	(-0.43)	(-0.85)	(1.65)	(-0.90)	(0.30)	(0.13)		

Table A16: Return Predictability from 1950 (1 Month) (continued)

Commodity	Statistic	de	$\Delta \text{indpro}$	$\Delta M1$	dfr	dfr	dfr	dy	ep	erp	infl	ltr	lty	soar	tbl	tms	umrate	MSA	MFC		
Wool	$R^2$	0.00	<b>1.77***</b>	<b>0.72**</b>	<b>2.55***</b>	0.00	<b>0.46**</b>	<b>0.41*</b>	0.19	0.31	<b>2.17***</b>	0.25	0.07	<b>0.86***</b>	<b>1.11***</b>	0.15					
	$R^2_{\text{cons}}$	-9.12	-0.25*	-0.46	<b>0.92***</b>	-4.00	-2.21	-2.79	-4.85	-1.48	-2.31	<b>0.98***</b>	-3.61	-1.50	-2.57	-1.59	-3.84		-17.62***	-1.72*	
	t-stat	(-0.11)	(3.77)	(2.39)	(4.55)	(-0.14)	(-1.91)	(-1.80)	(-1.80)	(1.21)	(1.56)	(-4.19)	(-1.41)	(-0.74)	(-2.62)	(2.98)	(1.07)				
Yellow Corn	$R^2$	0.22	0.05	0.00	0.04	0.03	0.03	0.03	0.19	0.00	0.30	0.19	0.24	0.00	0.18	0.00	0.00				
	$R^2_{\text{cons}}$	-2.48	<b>0.22**</b>	-1.37	-2.01	-1.77	-1.93	-2.01	-2.00	-1.61	-0.87	-0.65	-1.65	-2.69	-0.78*	-0.90	-2.39				
	t-stat	(-1.32)	(0.66)	(0.15)	(-0.53)	(-0.50)	(-0.85)	(-0.87)	(0.07)	(-0.12)	(-1.54)	(1.23)	(-1.38)	(-0.01)	(-1.19)	(-0.12)	(0.01)			-16.96*	-2.21
Coal	$R^2$	<b>0.77***</b>	0.00	0.14	<b>0.91**</b>	0.15	0.03	0.03	0.19	0.01	<b>1.57***</b>	<b>0.34*</b>	0.00	<b>0.39*</b>	0.01	0.12	0.11				
	$R^2_{\text{cons}}$	-1.96	-3.36	-1.27	-2.70	-2.07	-2.42	-2.36	-3.01	-0.41	<b>0.98***</b>	-0.74	-0.93	-1.05	-1.42	-0.53	-1.13			-18.78	-1.48
	t-stat	(-2.47)	(-0.19)	(-1.04)	(-2.69)	(-1.10)	(-0.48)	(-0.45)	(1.21)	(0.27)	(3.55)	(-1.63)	(-0.17)	(-1.75)	(0.29)	(-0.98)	(-0.93)				
Heating Oil	$R^2$	0.04	<b>0.61*</b>	0.21	<b>1.84***</b>	0.24	0.14	0.17	0.04	0.13	0.13	0.46	0.01	<b>0.67**</b>	0.02	0.21	0.09				
	$R^2_{\text{cons}}$	-1.85	-0.23	-1.52	<b>0.50***</b>	-1.94	-1.93	-1.98	-2.02	-0.64	-2.33	-0.75	-1.12	-0.53	-0.89	-0.69	-0.66*			-25.61	-0.85
	t-stat	(-0.50)	(1.90)	(-1.10)	(3.31)	(-1.19)	(-0.89)	(-0.99)	(-0.46)	(-0.88)	(0.89)	(-1.64)	(-0.27)	(-1.99)	(0.30)	(-1.12)	(-0.71)				
Natural Gas	$R^2$	0.00	<b>1.96***</b>	0.40	0.01	0.02	0.40	0.50	0.36	0.58	0.10	0.18	0.22	<b>1.04**</b>	0.14	0.00	0.22				
	$R^2_{\text{cons}}$	-2.52	<b>2.34***</b>	-5.16	-2.65	-6.08	-2.37	-1.57	-0.92	-1.36	-3.18	-0.60	-1.26	-17.20	-2.03	-1.20	-1.28			-20.60	-1.23
	t-stat	(0.10)	(2.99)	(-1.35)	(-0.19)	(-0.33)	(-1.34)	(-1.50)	(-1.28)	(-1.62)	(-0.66)	(-0.90)	(-1.00)	(2.17)	(-0.80)	(-0.00)	(-1.00)				
Unleaded Regular Gas	$R^2$	0.02	0.16	0.03	<b>2.00***</b>	0.01	0.38	0.41	0.44	0.05	0.29	<b>0.61*</b>	0.30	<b>0.48*</b>	0.11	0.06	0.14				
	$R^2_{\text{cons}}$	-2.82	-1.91	-2.91	<b>0.39**</b>	-3.21	-2.17	-2.12	-1.92	-1.53	-2.35	-1.13	-2.25	-7.04	-0.73	-0.61	-1.31			-18.56*	-0.41
	t-stat	(0.32)	(0.91)	(-0.41)	(3.20)	(-0.26)	(-1.38)	(-1.44)	(-1.48)	(-0.49)	(-1.20)	(-1.75)	(-1.22)	(-1.56)	(-0.75)	(-0.55)	(-0.83)				
WTI Oil	$R^2$	0.00	0.26	<b>0.36*</b>	<b>1.69***</b>	0.06	0.18	0.19	0.17	0.05	<b>0.78**</b>	<b>1.62***</b>	0.02	<b>1.00***</b>	0.01	0.22	0.09				
	$R^2_{\text{cons}}$	-2.16	<b>0.21**</b>	-1.08	-0.46	-2.00	-2.34	-2.31	-2.53	-0.95	-2.29	<b>1.38***</b>	-0.78*	-1.01	-0.96	-0.85	-0.99			-21.85***	1.20
	t-stat	(0.01)	(1.43)	(-1.69)	(3.68)	(-0.68)	(-1.18)	(-1.24)	(-1.16)	(-0.61)	(2.49)	(-3.60)	(-0.36)	(-2.82)	(0.28)	(-1.33)	(-0.82)				
Aluminium	$R^2$	0.07	0.23	<b>0.36*</b>	<b>1.52***</b>	0.16	0.01	0.01	0.11	0.11	<b>0.73**</b>	<b>0.88**</b>	0.04	<b>1.48***</b>	0.11	0.11	0.00				
	$R^2_{\text{cons}}$	-1.95	-0.25*	-0.67	<b>0.10**</b>	-1.66	-2.44	-2.05	-1.73	-0.71	-2.42	-0.04**	-1.90	-3.26	-1.03	-0.40*	-1.53			-17.72	-0.68
	t-stat	(0.74)	(1.36)	(-1.69)	(3.49)	(-1.11)	(0.25)	(0.34)	(-0.26)	(0.94)	(2.40)	(-2.64)	(-0.54)	(-3.38)	(-0.92)	(0.94)	(-0.15)				
Gold	$R^2$	0.00	0.13	0.07	<b>0.92***</b>	0.03	0.02	0.02	0.01	0.02	0.02	0.03	0.13	<b>0.31*</b>	0.17	0.03	0.01				
	$R^2_{\text{cons}}$	-3.03	<b>0.09**</b>	-1.23	-0.66	-0.37*	-2.50	-3.01	-2.80	-1.26	-0.36	-1.28	-0.50**	-32.95	-1.72	-2.37	-1.99			-33.98*	<b>1.30**</b>
	t-stat	(-0.06)	(-1.03)	(0.74)	(2.71)	(0.48)	(-0.36)	(-0.40)	(-0.31)	(-0.37)	(0.44)	(0.52)	(-1.03)	(1.57)	(-1.15)	(0.50)	(0.33)				
High Grade Copper	$R^2$	<b>0.36*</b>	0.03	<b>0.56**</b>	<b>0.35*</b>	0.00	0.00	0.00	0.14	0.16	0.14	0.04	0.24	0.02	0.31	0.06	0.02				
	$R^2_{\text{cons}}$	-2.10	-1.91	-1.36	-2.00	-1.89	-2.36	-2.85	-1.54	-0.78	-1.05	-1.71	-1.53	-10.52	-0.96	-1.40	-1.33			-26.21*	-3.28*
	t-stat	(1.69)	(0.51)	(-2.11)	(1.67)	(-0.16)	(0.11)	(-0.02)	(-1.05)	(-1.12)	(1.04)	(-0.56)	(-1.39)	(0.37)	(-1.57)	(0.70)	(-0.43)				
Nickel	$R^2$	0.37	<b>0.69*</b>	0.08	0.19	0.00	0.11	0.07	0.16	0.13	0.05	0.08	0.08	0.00	0.31	<b>0.65*</b>	0.01				
	$R^2_{\text{cons}}$	-3.14	-0.11	-0.97	-1.76	-1.96	-2.06	-1.85	-1.63	-1.45	-0.86	-2.30	-1.38	-0.55	-2.46	-1.26	-2.42			-18.14**	-0.62
	t-stat	(1.25)	(1.73)	(-0.60)	(0.90)	(-0.11)	(-0.68)	(-0.54)	(-1.64)	(1.30)	(-1.10)	(0.45)	(-0.58)	(0.06)	(-1.15)	(1.67)	(-0.20)				
Palladium	$R^2$	0.00	0.12	0.01	0.07	0.37	0.15	0.16	0.13	0.01	0.05	0.12	0.20	0.06	0.14	0.00	0.01				
	$R^2_{\text{cons}}$	-3.21	-1.41	-2.06	-1.87	-4.00	-2.51	-2.64	-1.60	-0.92	-1.02	-1.13	-2.78	-14.80	-2.07	-2.54	-3.17			-12.75	-1.66
	t-stat	(0.02)	(0.82)	(-0.21)	(0.66)	(-1.46)	(-0.93)	(-0.96)	(-0.87)	(-0.19)	(0.55)	(-0.81)	(-1.06)	(-0.58)	(-0.91)	(0.13)	(0.28)				
Platinum	$R^2$	0.04	<b>0.71**</b>	0.04	<b>1.01***</b>	0.02	0.04	0.05	0.12	0.00	0.00	0.01	0.06	0.00	0.01	0.05	0.03				
	$R^2_{\text{cons}}$	-1.56	-0.52	-1.83	<b>0.93***</b>	-1.22	-2.04	-2.43	-1.49	-1.08	-1.24	-0.77	-1.84	-6.97	-1.01	-0.53	-1.24			-15.36	-0.97
	t-stat	(0.57)	(2.37)	(-0.59)	(2.83)	(-0.38)	(-0.59)	(-0.60)	(-0.97)	(-0.14)	(0.00)	(-0.24)	(-0.66)	(-0.18)	(-0.30)	(-0.64)	(-0.45)				
Silver	$R^2$	0.00	0.00	0.02	<b>1.48***</b>	0.03	0.00	0.00	0.01	0.26	0.04	0.00	0.33	0.00	0.37	0.04	0.04				
	$R^2_{\text{cons}}$	-2.34	-0.55	-1.66	<b>0.15**</b>	-1.33	-2.39	-2.43	-2.25	-0.81	-0.82	-1.17	-2.52	-17.02	-1.88	-2.14	-1.61			-17.70	-3.60
	t-stat	(0.15)	(-0.15)	(0.35)	(3.45)	(0.46)	(-0.19)	(-0.05)	(-0.29)	(1.42)	(-0.53)	(-0.04)	(-1.61)	(-0.12)	(-1.71)	(0.58)	(0.57)				
Tin	$R^2$	0.01	<b>0.52**</b>	<b>0.85***</b>	<b>1.39***</b>	0.24	0.10	0.07	0.06	0.25	0.15	<b>0.68**</b>	<b>0.73**</b>	<b>0.44*</b>	<b>0.78***</b>	0.07	0.02				
	$R^2_{\text{cons}}$	-2.06	-1.00	<b>0.30***</b>	-0.52	-1.04	-2.77	-2.22	-3.44	-1.32	-2.02	-0.93	-2.08	-2.88	-0.57**	-0.87	-0.73*			-20.75	-0.11*
	t-stat	(0.29)	(2.04)	(-2.60)	(3.33)	(-1.36)	(-0.89)	(-0.77)	(-0.68)	(1.41)	(-1.07)	(-2.33)	(-2.40)	(-1.86)	(-2.49)	(0.74)	(-0.37)				
Zinc	$R^2$	0.25	<b>0.96***</b>	<b>0.40*</b>	<b>0.45*</b>	0.00	0.02	0.01	0.23	0.13	0.00	<b>0.41*</b>	0.15	0.16	0.12	0.00	0.15				
	$R^2_{\text{cons}}$	-2.06	-1.17	-0.53	-1.78	-1.33	-1.76	-1.42	-2.23	-0.47	-1.24	-0.44	-2.23	-12.25	-0.84*	-1.02	-1.67			-20.98	-2.11
	t-stat	(1.39)	(2.76)	(-1.78)	(1.90)	(-0.12)	(-0.39)	(-0.30)	(-1.34)	(1.02)	(-0.02)	(-1.80)	(-1.09)	(-1.11)	(-0.95)	(-0.06)	(1.11)				

Table A17: Return Predictability January 1950 (12 Months)

This table reports the regression results of monthly excess returns on a constant and the lagged predictive variable(s). We predict the next year's excess return. Statistical inferences are based on a bootstrapped distribution. "de" denotes the dividend-payout ratio, " $\Delta\text{indpro}$ " the growth of industrial production, and " $\Delta M1$ " the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "unrate" is the unemployment rate. "MSA" and "MFC" denote the model selection approach and mean forecast combination.  $R^2$  and  $R_{\text{cos}}^2$  are the in-sample and out-of-sample  $R^2$ , respectively. We report the t-statistics in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10%, 5%, and 1% significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency. The sample period is from January 1950 to December 2015.

Commodity	Statistic	de	$\Delta\text{indpro}$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	star	tbl	tms	unrate	MSA	MFC
Butter	$R^2$	0.00	0.17	0.67**	0.11	0.04	1.57***	1.40***	1.55***	0.59**	0.10	0.01	1.66***	0.03	2.47***	0.81**	0.55**		
	$R_{\text{cos}}^2$ t-stat	4.09*** (0.08)	0.30*** (1.14)	-0.14* (-2.30)	-0.47 (0.93)	-3.51 (-0.55)	-2.74 (-3.52)	-3.79 (-3.51)	0.42** (2.15)	-0.76 (-0.88)	-1.01 (0.30)	-6.51 (-3.62)	-5.99 (-4.44)	-7.29 (2.51)			-0.39** (2.07)	-13.13***	3.22
Cocoa	$R^2$	0.33*	0.40*	0.08	0.04	0.33	0.48*	0.56**	1.15***	0.26	1.04***	0.11	1.54***	0.07	2.04***	0.46*	0.13	9.08***	13.56**
	$R_{\text{cos}}^2$ t-stat	-7.88 (1.60)	2.52*** (1.76)	-1.51 (0.78)	-0.67 (0.55)	-1.45 (1.61)	-0.16 (-1.94)	-0.42** (-2.09)	-4.24 (-3.00)	-1.22 (-2.85)	-1.11 (0.91)	-3.28 (-3.49)	-27.91 (-4.03)	5.69*** (1.90)			7.44*** (1.00)	-2.03 (-1.00)	
Coffee Arabica	$R^2$	1.77***	0.25	0.06	0.52*	1.17***	0.01	0.01	0.80**	0.18	0.24	0.20	0.36	0.00	3.86***	0.93***	4.91***		
	$R_{\text{cos}}^2$ t-stat	-2.28 (3.44)	-0.45 (1.29)	-1.22 (0.62)	-0.49 (1.85)	-1.16 (2.79)	-5.16 (0.22)	-6.37 (-2.31)	-0.54 (-2.31)	-2.02 (1.09)	-2.62 (-1.09)	-0.98 (-1.15)	-6.35 (-1.55)	-6.90 (-0.08)	1.13*** (-5.14)	1.13*** (8.22)	11.13*** (5.83)	2.42*** (5.83)	
Corn	$R^2$	0.01	0.29	0.21	0.09	0.08	2.51***	2.60***	2.25***	0.10	1.56***	0.04	1.35***	0.08	0.71**	0.19	0.09		
	$R_{\text{cos}}^2$ t-stat	-2.98 (-0.20)	-1.26 (1.51)	-0.46 (-1.27)	-1.43 (0.86)	-3.21 (-0.80)	5.72*** (-4.48)	5.82*** (-4.56)	4.90*** (-4.23)	-1.28 (-0.87)	-0.37 (-3.51)	-1.22 (0.57)	-14.03 (-2.36)	1.97*** (-0.82)			-3.42 (-1.22)	-4.85 (-0.82)	-6.18***
Cotton	$R^2$	0.31	0.00	0.73**	0.07	0.68**	0.00	0.00	0.19	0.32	0.13	0.06	0.56**	0.04	1.79***	2.09***	0.76**		
	$R_{\text{cos}}^2$ t-stat	-8.39 (1.57)	-0.64 (-0.18)	-1.10 (2.39)	-0.85 (0.76)	-2.37 (2.30)	-2.37 (-0.15)	-1.69 (-1.22)	-0.34 (1.58)	-1.09 (-0.99)	-0.70 (0.66)	-3.31 (-2.09)	-3.31 (-3.77)	0.19*** (4.08)			0.19*** (2.43)	-0.26** (2.43)	-7.00**
Live Cattle	$R^2$	0.15	0.18	0.45*	0.66**	0.28	3.18***	3.09***	2.18***	0.31	0.32	0.34	5.21***	0.09	9.34***	4.75***	2.01***		
	$R_{\text{cos}}^2$ t-stat	-4.35 (-1.09)	-0.22* (1.19)	-1.58 (-1.88)	-0.02** (2.27)	0.47*** (-2.27)	-1.10 (-1.48)	-0.71** (-5.06)	-0.27** (-4.93)	0.25** (1.56)	0.05** (-1.58)	0.06** (-1.62)	0.06** (-0.85)	8.43*** (6.23)			7.10*** (3.99)	5.18*** (3.99)	1.18***
Lean Hog	$R^2$	0.82***	0.04	0.02	0.28	0.04	0.93**	0.91**	2.44***	0.00	0.23	0.03	1.22***	0.05	0.64**	0.17	0.50**		
	$R_{\text{cos}}^2$ t-stat	0.09*** (2.54)	-1.29 (0.55)	-1.36 (-0.43)	-0.30* (1.47)	-5.15 (-0.55)	-0.06*** (-2.70)	-5.18 (-4.41)	-1.37 (-2.68)	-1.00 (-1.33)	-1.07 (-0.51)	-6.48 (-3.10)	-9.19 (-2.24)	-3.91 (-1.16)			-3.50 (-1.98)	-14.76**	2.30**
Milk	$R^2$	0.28	0.36*	0.34	1.03***	0.04	0.23	0.14	0.68**	1.09***	0.25	0.00	4.00***	0.01	3.24***	0.00	0.54**		
	$R_{\text{cos}}^2$ t-stat	-1.95 (1.47)	-0.60 (1.69)	-0.75 (-1.62)	1.07*** (2.85)	-2.21 (-0.56)	-1.34 (-1.33)	-0.06*** (-1.06)	-2.62 (-2.31)	-1.00 (-2.93)	-0.47 (-1.40)	-0.14*** (-0.18)	-1.59 (-5.69)	-4.33 (-5.11)			2.23 (0.03)	3.22*** (2.06)	-15.89**
Oranges	$R^2$	0.23	0.08	0.01	0.00	0.05	1.95***	2.08***	1.09***	0.23	0.02	0.07	0.06	0.05	0.14	0.12	0.00		
	$R_{\text{cos}}^2$ t-stat	-4.61 (-1.33)	-0.45 (-0.77)	-1.81 (0.30)	-3.73 (-0.17)	-2.94 (-0.61)	-2.94 (-3.94)	-1.38 (-2.92)	-2.77 (-4.06)	-1.05 (-1.33)	-1.02 (-0.35)	-0.66 (-0.71)	-1.03 (-0.68)	-3.24 (-1.06)			-5.43 (0.96)	-3.13 (-0.12)	-25.73
Soybean Oil	$R^2$	0.51**	1.41***	0.03	0.26	0.03	1.23***	1.27***	2.47***	0.05	1.24***	0.02	0.48*	0.03	0.86***	0.44*	0.18		
	$R_{\text{cos}}^2$ t-stat	-2.24 (2.00)	-0.92 (3.33)	-1.06 (0.46)	-0.76 (-1.42)	-0.83* (-1.42)	-0.15*** (-3.11)	-0.53*** (-3.17)	-1.19 (-4.44)	-1.19 (-4.44)	-0.68*** (-3.13)	-1.57 (0.34)	-0.68 (-1.93)	-5.57 (-1.84)			-4.20*** (1.84)	-5.92 (1.19)	-3.74*
Soybeans	$R^2$	0.06	0.17	0.04	0.00	0.49**	1.20***	1.20***	1.52***	0.01	1.74***	0.17	1.56***	0.40*	2.59***	1.11***	0.17		
	$R_{\text{cos}}^2$ t-stat	-4.05 (0.66)	-1.45 (1.15)	-0.45 (0.54)	-0.71 (0.08)	-0.87*** (-1.96)	-0.88* (-3.08)	-1.56 (-3.07)	-2.60 (-3.47)	-0.52 (0.20)	-0.58*** (-3.71)	-0.73 (1.17)	-0.73 (-3.51)	-34.52 (-4.55)			2.41*** (2.95)	-3.04 (1.14)	-7.83
Soybean Meal	$R^2$	0.05	0.06	0.16	0.03	0.67**	0.57**	0.55**	0.34	0.03	0.85***	0.29	1.25***	0.20	2.11***	0.95***	0.05		
	$R_{\text{cos}}^2$ t-stat	-2.60 (-0.64)	-1.34 (-0.66)	-1.54 (-1.11)	-0.67 (-0.46)	-0.28** (-2.29)	-0.83* (-2.11)	-1.23 (-2.07)	-2.33 (-1.62)	-0.19* (0.50)	-0.68 (-2.58)	-2.19 (1.51)	-8.57 (-3.13)	-7.20 (-4.10)			2.58*** (2.74)	-5.63 (0.63)	-13.53
Sugar	$R^2$	0.98***	0.00	0.01	0.01	0.01	0.04	0.08	0.75***	0.22**	0.19	0.02	0.19	0.15	0.86**	0.15	0.00		
	$R_{\text{cos}}^2$ t-stat	-2.20 (2.78)	-1.47 (0.10)	-1.41 (0.30)	-1.10 (-0.22)	-0.68 (-0.26)	-3.00 (-0.53)	-3.19 (-2.42)	-2.39 (-0.78)	-1.76 (-2.53)	-1.37 (1.21)	-0.98*** (1.21)	-1.37 (0.43)	3.84*** (-1.21)			4.14*** (2.60)	-1.53 (-0.03)	-13.28*
Wheat	$R^2$	0.11	0.94***	0.00	0.28	0.41*	1.57***	1.61***	2.12***	0.02	0.47*	0.00	1.12***	0.00	2.05***	1.07***	0.15		
	$R_{\text{cos}}^2$ t-stat	-2.66 (0.95)	2.13*** (2.71)	0.07** (-0.09)	-0.54 (-1.79)	-0.58** (-3.52)	-0.81* (-4.11)	-0.96 (-3.57)	-0.45** (-4.11)	-0.96 (-4.11)	-0.67 (-1.91)	-0.46** (0.15)	-0.91 (-2.97)	-2.13 (-4.03)			1.43*** (2.90)	-0.21** (1.07)	-9.68*

Table A17: Return Predictability from 1950 (12 Months) (continued)

Commodity	Statistic	de	$\Delta \text{indpro}$	$\Delta M1$	$dfr$	$dfy$	$dp$	$dy$	$ep$	$erp$	$infl$	$ltr$	$ltq$	$svar$	$tbl$	$tms$	$unrate$	MSA	MFC
Wool	$R^2$	<b>0.76**</b>	<b>1.97***</b>	<b>0.51**</b>	<b>0.85**</b>	<b>0.42*</b>	<b>1.63***</b>	<b>1.55***</b>	<b>3.40***</b>	0.13	<b>1.10***</b>	0.20	<b>1.18***</b>	0.04	<b>3.61***</b>	<b>3.93***</b>	<b>1.44***</b>		
	$R^2_{\text{cons}}$	-4.62	-1.24	-0.39	<b>0.20**</b>	-2.33	-3.28	-3.79	-3.28	<b>0.03**</b>	-2.74	-0.54	-9.23	-3.53	-10.60	<b>1.66***</b>	-5.15	-13.77	<b>8.29**</b>
	$t - stat$	(2.44)	(3.95)	(2.00)	(2.58)	(1.82)	(-3.59)	(-3.50)	(-5.24)	(0.99)	(-2.94)	(-1.26)	(-3.05)	(0.54)	(-5.40)	(5.69)	(3.37)		
Yellow Corn	$R^2$	<b>0.64**</b>	<b>0.47*</b>	0.22	0.01	0.19	<b>1.61***</b>	<b>1.63***</b>	<b>0.48**</b>	0.01	0.14	0.17	<b>0.93***</b>	0.12	<b>0.90**</b>	0.03	0.08		
	$R^2_{\text{cons}}$	-3.16	-0.18*	<b>0.37***</b>	-1.20	-0.77	-4.64	-5.12	-5.13	-1.22	-1.11	-1.46	<b>2.34***</b>	-45.17	<b>2.74***</b>	-1.78	-3.44	-12.12**	<b>7.67***</b>
	$t - stat$	(-2.24)	(1.92)	(-1.32)	(0.26)	(-1.20)	(-3.57)	(-3.59)	(-1.94)	(-0.26)	(-1.05)	(1.16)	(-2.71)	(0.99)	(-2.66)	(0.49)	(0.77)		
Coal	$R^2$	0.18	0.02	<b>1.00***</b>	0.18	0.00	<b>1.05***</b>	<b>1.02***</b>	<b>0.51**</b>	0.01	<b>1.18***</b>	<b>0.41*</b>	0.10	0.09	<b>0.35</b>	<b>0.61**</b>			
	$R^2_{\text{cons}}$	<b>0.91***</b>	-0.60	<b>1.85***</b>	-1.25	<b>4.94***</b>	-0.66**	-0.85*	-0.50**	-0.41	<b>2.69***</b>	-0.89	<b>11.81***</b>	-11.03	<b>6.90***</b>	<b>0.03**</b>	<b>3.75***</b>	<b>0.29**</b>	<b>8.14***</b>
	$t - stat$	(-1.17)	(0.35)	(-2.81)	(1.19)	(0.17)	(-2.84)	(-2.00)	(-2.00)	(0.29)	(3.05)	(-1.80)	(-1.76)	(0.89)	(-0.81)	(-1.65)	(-2.19)		
Heating Oil	$R^2$	0.00	<b>0.61*</b>	0.10	<b>0.57*</b>	<b>0.55*</b>	<b>1.91***</b>	<b>1.86***</b>	<b>1.59***</b>	0.04	0.01	<b>0.53*</b>	<b>2.60***</b>	0.01	<b>1.07***</b>	0.29	<b>1.11***</b>		
	$R^2_{\text{cons}}$	-5.22	-0.42	-0.45	-0.62	<b>4.07***</b>	<b>2.07***</b>	<b>1.71***</b>	<b>0.71***</b>	-0.98	<b>0.62**</b>	-0.80	<b>11.57***</b>	-7.17	<b>3.40***</b>	-1.91	<b>2.01***</b>	<b>0.35***</b>	<b>9.34***</b>
	$t - stat$	(-0.01)	(1.88)	(-0.76)	(1.82)	(-1.78)	(-3.34)	(-3.30)	(-3.04)	(0.49)	(0.18)	(-1.74)	(-3.91)	(0.23)	(-2.49)	(-1.29)	(-2.53)		
Natural Gas	$R^2$	<b>0.57*</b>	<b>0.60*</b>	0.41	0.02	0.00	<b>2.48***</b>	<b>2.53***</b>	<b>3.82***</b>	0.03	0.20	0.19	<b>1.46***</b>	0.24	<b>0.94**</b>	0.00	<b>1.03**</b>		
	$R^2_{\text{cons}}$	-4.73	-0.98	-2.15	-1.52	-0.15*	<b>1.66***</b>	<b>2.04***</b>	<b>3.33***</b>	-1.60	-0.19	-1.03	-1.78	-3.24	-4.83	-5.52	-2.82	-12.40***	<b>3.70*</b>
	$t - stat$	(1.59)	(1.63)	(-1.35)	(0.26)	(1.66)	(-3.33)	(-3.37)	(-4.17)	(-0.36)	(-0.94)	(-0.92)	(-2.55)	(1.02)	(-2.03)	(0.03)	(-2.14)		
Unleaded Regular Gas	$R^2$	0.49	0.00	0.01	0.56	0.00	<b>5.43***</b>	<b>5.44***</b>	<b>6.78***</b>	0.00	<b>3.95***</b>	0.09	<b>6.78***</b>	<b>1.64***</b>	<b>4.93***</b>	0.12	<b>1.55***</b>		
	$R^2_{\text{cons}}$	-5.95	-2.20	-1.10	-0.80	<b>1.78***</b>	-0.10**	-0.41**	<b>0.06**</b>	-1.69	<b>3.55***</b>	-1.57	<b>6.49***</b>	-8.51	<b>3.35***</b>	-0.48	-1.51	-0.50***	<b>6.40***</b>
	$t - stat$	(1.56)	(0.04)	(0.26)	(1.66)	(-0.14)	(-5.31)	(-5.32)	(-5.98)	(0.11)	(-4.50)	(-0.67)	(-5.98)	(2.86)	(-5.05)	(0.76)	(-2.78)		
WTI Oil	$R^2$	0.00	0.02	0.02	0.27	0.04	<b>1.03***</b>	<b>1.07***</b>	<b>0.98***</b>	0.04	0.30	0.19	<b>0.40*</b>	0.13	0.00	<b>1.24***</b>	<b>0.99***</b>		
	$R^2_{\text{cons}}$	-4.19	-0.74	-1.06	-0.55	<b>7.50***</b>	<b>0.93***</b>	<b>0.93***</b>	-1.21	-0.83	<b>1.63***</b>	-1.17	<b>9.65***</b>	-2.54	<b>3.10***</b>	-4.43	-0.30**	-3.08	15.43
	$t - stat$	(-0.02)	(0.43)	(0.36)	(1.45)	(-0.54)	(-2.85)	(-2.90)	(-2.77)	(-0.55)	(1.54)	(-1.23)	(-1.77)	(1.01)	(-0.15)	(-3.13)	(-2.80)		
Aluminium	$R^2$	<b>4.75***</b>	<b>0.47*</b>	0.04	<b>0.90***</b>	0.18	0.09	0.09	<b>1.43***</b>	0.00	0.00	<b>0.90**</b>	<b>1.56***</b>	<b>0.83**</b>	<b>2.85***</b>	<b>1.50***</b>	0.15	-38.92***	<b>7.32**</b>
	$R^2_{\text{cons}}$	<b>2.51***</b>	-1.19	-0.79	-0.12*	-1.20	-11.23	-10.51	-0.23**	-1.12	-0.29*	-0.11*	-3.89	-10.56	<b>2.05***</b>	<b>2.83***</b>	<b>0.02***</b>		
	$t - stat$	(6.23)	(1.91)	(0.59)	(2.66)	(1.19)	(0.85)	(0.83)	(-3.36)	(0.19)	(0.18)	(-2.65)	(-3.51)	(2.55)	(-4.78)	(3.45)	(1.08)		
Gold	$R^2$	0.04	0.00	<b>0.94***</b>	0.02	0.01	0.13	0.17	0.24	0.32	<b>0.81***</b>	0.05	<b>0.49**</b>	0.12	<b>0.49**</b>	0.02	0.01		
	$R^2_{\text{cons}}$	<b>1.08***</b>	-0.23*	<b>0.96***</b>	-0.63	<b>12.53***</b>	-0.35**	<b>0.46***</b>	-1.89	-0.12*	<b>0.26***</b>	-1.41	<b>11.50***</b>	-75.62	<b>2.50***</b>	-4.46	-5.89	<b>16.14**</b>	<b>12.76*</b>
	$t - stat$	(0.58)	(-0.05)	(2.71)	(0.43)	(-0.32)	(-1.00)	(-1.16)	(-1.37)	(-1.59)	(2.53)	(0.63)	(-1.95)	(0.95)	(-1.95)	(0.43)	(0.26)		
High Grade Copper	$R^2$	<b>6.11***</b>	0.01	<b>0.85**</b>	<b>0.60**</b>	<b>0.82**</b>	<b>0.39*</b>	<b>0.43*</b>	<b>5.31***</b>	0.02	<b>2.09***</b>	0.03	<b>3.92***</b>	<b>3.67***</b>	<b>7.61***</b>	<b>4.49***</b>	0.00	-6.19***	5.41
	$R^2_{\text{cons}}$	<b>1.88***</b>	-0.12*	<b>1.02***</b>	-0.84	<b>11.02***</b>	-4.14	-4.90	-0.40**	-1.54	-0.50	-1.54	<b>7.76***</b>	-4.34	<b>10.98***</b>	<b>5.75***</b>	-0.48**		
	$t - stat$	(7.12)	(0.29)	(2.58)	(2.16)	(2.53)	(-1.74)	(-1.82)	(-6.60)	(-0.42)	(-4.08)	(-0.52)	(-5.64)	(5.44)	(-8.00)	(6.05)	(0.09)		
Nickel	$R^2$	<b>5.09***</b>	0.11	0.01	0.39	<b>1.00**</b>	<b>0.68*</b>	<b>0.70*</b>	<b>6.72***</b>	0.01	0.55	<b>1.01**</b>	<b>1.04**</b>	<b>3.57***</b>	<b>2.23***</b>	<b>2.55***</b>	0.28	-2.91*	-1.01
	$R^2_{\text{cons}}$	-24.08	-5.10	<b>0.33**</b>	-1.40	<b>10.17***</b>	-24.04	-23.81	-26.19	-0.77	-0.95	-1.37	<b>3.12***</b>	-0.70	-16.24	-4.25	-5.35		
	$t - stat$	(4.73)	(0.67)	(-0.24)	(1.28)	(2.05)	(-1.69)	(-1.72)	(-5.49)	(-0.17)	(-1.52)	(-2.07)	(-2.09)	(3.94)	(-3.09)	(3.32)	(-1.09)		
Palladium	$R^2$	<b>5.08***</b>	<b>0.85**</b>	0.09	0.36	0.01	<b>0.50*</b>	0.40	<b>5.10***</b>	<b>0.60*</b>	<b>0.94**</b>	0.07	<b>3.42***</b>	<b>0.59*</b>	<b>3.57***</b>	<b>0.82**</b>	<b>0.57*</b>		
	$R^2_{\text{cons}}$	<b>4.44***</b>	-3.96	-3.17	-1.80	<b>4.33***</b>	<b>4.10***</b>	<b>4.33***</b>	<b>2.02***</b>	-0.18	-1.04	-2.48	-10.04	-6.47	<b>0.87***</b>	-2.55	-3.25	-20.15**	<b>10.17*</b>
	$t - stat$	(5.49)	(2.20)	(0.69)	(1.43)	(0.22)	(-1.67)	(-1.51)	(-5.49)	(1.83)	(-2.31)	(-0.65)	(-4.46)	(1.83)	(-4.56)	(2.16)	(1.80)		
Platinum	$R^2$	<b>2.97***</b>	<b>1.85***</b>	<b>0.73**</b>	0.14	0.21	<b>0.67**</b>	<b>0.68**</b>	<b>3.70***</b>	0.00	<b>0.77**</b>	0.18	<b>1.08***</b>	<b>1.67***</b>	<b>1.92***</b>	<b>0.96***</b>	0.03	-12.81***	<b>4.66***</b>
	$R^2_{\text{cons}}$	-1.46	-1.02	<b>0.52***</b>	-1.27	<b>7.95***</b>	<b>0.90***</b>	<b>0.51***</b>	<b>7.79***</b>	-1.34	-1.18	-1.52	<b>5.37***</b>	-70.28	<b>3.21***</b>	-2.69	-6.02		
	$t - stat$	(4.62)	(3.83)	(2.39)	(1.06)	(1.27)	(-2.30)	(-2.30)	(-5.47)	(0.09)	(-2.46)	(-1.18)	(-2.91)	(3.63)	(-3.90)	(2.75)	(0.52)		
Silver	$R^2$	0.15	0.01	0.04	0.02	0.06	0.01	0.00	0.04	0.11	0.00	0.11	<b>0.90***</b>	<b>0.32*</b>	<b>1.03***</b>	0.13	0.23		
	$R^2_{\text{cons}}$	<b>0.32***</b>	-0.66	-0.57	-0.64	<b>3.38***</b>	-3.53	-3.00	-2.14	-0.48	<b>0.03**</b>	-1.20	<b>4.01***</b>	-11.54	<b>0.46***</b>	-0.99	-1.85	-12.10***	<b>9.83**</b>
	$t - stat$	(1.09)	(0.34)	(0.55)	(0.35)	(-0.67)	(0.21)	(-0.54)	(-0.93)	(-0.93)	(0.11)	(0.95)	(-2.66)	(1.58)	(-2.85)	(0.99)	(1.33)		
Tin	$R^2$	<b>1.04***</b>	<b>0.91***</b>	0.05	<b>0.63**</b>	0.10	<b>0.90***</b>	<b>0.85**</b>	<b>2.64***</b>	0.14	<b>1.11***</b>	0.16	<b>4.78***</b>	0.11	<b>5.69***</b>	<b>0.84***</b>	<b>0.61**</b>		
	$R^2_{\text{cons}}$	-6.06	<b>1.13***</b>	<b>0.90***</b>	-0.28*	<b>7.09***</b>	-1.18	-0.85*	-2.55	-1.14	-2.83	-1.18	<b>10.62***</b>	-5.86	<b>9.09***</b>	-0.09**	<b>2.13***</b>	-0.23***	<b>8.45*</b>
	$t - stat$	(2.86)	(2.68)	(-0.60)	(0.22)	(0.89)	(-2.65)	(-2.58)	(-4.60)	(1.04)	(-2.95)	(-1.11)	(-6.25)	(0.93)	(-6.85)	(2.56)	(2.18)		
Zinc	$R^2$	<b>1.40***</b>	0.01	0.15	0.24	<b>1.66***</b>	<b>0.52*</b>	<b>0.53**</b>	<b>2.31***</b>	0.00	<b>0.68**</b>	0.00	<b>1.21***</b>	<b>4.21***</b>	<b>2.62***</b>	<b>1.86***</b>	<b>0.52**</b>		
	$R^2_{\text{cons}}$	-0.33**	-0.89	-1.16	-1.02	<b>4.50***</b>	-2.21	-3.32	-3.06	-1.73	-0.61	-1.55	-3.22	-15.22	<b>5.66***</b>	<b>0.50***</b>	-6.14	-20.83*	0.08
	$t - stat$	(3.32)	(0.26)	(1.09)	(1.36)	(3.63)	(-2.03)	(-2.04)	(-4.29)	(0.03)	(-2.30)	(-0.19)	(-3.09)	(5.84)	(-4.57)	(3.84)	(2.02)		

Table A18: Volatility Predictability from 1950 (1 Month)

This table reports the regression results of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable(s). We predict the next month's volatility. Statistical inferences are based on a bootstrapped distribution. "de" denotes the dividend-payout ratio, " $\Delta indpro$ " the growth of industrial production, and " $\Delta M1$ " the growth of money supply M1. "dfr" is the default return spread as the difference between long-term U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "infl" the inflation rate, "ltr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "swar" the stock variance, and "tbl" the 3-month Treasury bill rate. "unrate" is the unemployment rate. "MSA" and "MFC" denote the model selection approach and mean forecast combination.  $\Delta R^2$  and  $R_{cos}^2$  are the in-sample difference between the adjusted  $R^2$ 's of the unrestricted and restricted model, and the out-of-sample  $R^2$ , respectively. We report the t-statistics of the respective predictive variables in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10%, 5%, and 1% significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency. The sample period is from January 1950 to December 2015.

Commodity	Statistic	de	$\Delta indpro$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	swar	tbl	tms	unrate	MSA	MFC	
Butter	$\Delta R^2$	<b>0.21***</b>	-0.03	-0.03	0.04	-0.02	<b>1.23***</b>	<b>1.21***</b>	<b>0.30***</b>	-0.03	-0.03	0.01	-0.01	<b>0.12**</b>	0.01	0.00	-0.02	-17.88***	-56.63	
	$R_{cos}^2$	<b>0.53***</b>	-0.15	-0.09	-0.84	-1.15	<b>2.60***</b>	<b>2.83***</b>	-1.47	-1.78	-0.57	-1.54	<b>0.28**</b>	-3.37	-1.38	-1.70	<b>0.93***</b>			
	t-stat	(-2.74)	(0.17)	(-0.20)	(-1.52)	(-0.52)	(-6.44)	(-6.39)	(-3.23)	(0.07)	(-0.38)	(1.08)	(-0.79)	(2.16)	(-1.20)	(1.06)	(-0.70)			
Cocoa	$\Delta R^2$	<b>0.19*</b>	-0.08	-0.08	0.11	<b>1.25***</b>	<b>0.49**</b>	<b>0.50**</b>	0.04	-0.09	<b>0.36**</b>	-0.09	<b>0.17*</b>	0.09	<b>0.24*</b>	-0.09	<b>0.41**</b>	-13.72***	-11.66	
	$R_{cos}^2$	-0.16	-1.74	-0.32	-1.37	<b>0.18**</b>	<b>0.56***</b>	<b>0.12**</b>	<b>0.87***</b>	-1.36	<b>1.65***</b>	-1.43	-4.02	-19.73	-1.94	-1.29	-2.37			
	t-stat	(1.74)	(0.45)	(1.06)	(1.48)	(3.78)	(2.48)	(2.50)	(1.21)	(0.27)	(-1.08)	(-0.21)	(2.18)	(1.40)	(1.87)	(0.17)	(2.30)			
Coffee Arabica	$\Delta R^2$	<b>0.14*</b>	-0.08	-0.06	-0.05	-0.09	-0.03	-0.05	-0.07	-0.02	-0.08	0.05	0.00	-0.06	-0.08	0.11	-0.04	-11.82***	-21.59	
	$R_{cos}^2$	-0.59	-1.22	-0.85	-0.98	<b>0.81***</b>	<b>0.25**</b>	<b>0.28**</b>	<b>0.68***</b>	-0.59	-0.31	-0.33	<b>2.44***</b>	-3.07	-3.00	-1.05	<b>1.13***</b>			
	t-stat	(-1.62)	(0.17)	(0.55)	(0.61)	(0.05)	(-0.78)	(-0.08)	(0.45)	(0.90)	(0.34)	(-1.27)	(1.03)	(-0.56)	(0.14)	(1.52)	(0.72)			
Corn Oil	$\Delta R^2$	0.00	<b>0.21*</b>	-0.05	-0.06	<b>1.21***</b>	<b>0.89***</b>	<b>0.50***</b>	-0.07	<b>1.32***</b>	0.03	<b>1.68***</b>	-0.04	<b>1.59***</b>	-0.01	<b>0.31**</b>	-0.01	<b>0.31**</b>	-14.07***	-19.02
	$R_{cos}^2$	<b>1.13***</b>	<b>0.89***</b>	-1.03	-0.86	<b>2.50***</b>	<b>0.85***</b>	<b>0.95***</b>	<b>1.96***</b>	-0.34	-3.45	-0.47	<b>0.53***</b>	-3.97	-3.58	-3.08	-0.77	<b>1.13***</b>		
	t-stat	(0.97)	(-2.00)	(0.48)	(0.38)	(4.28)	(3.70)	(3.70)	(2.85)	(0.02)	(4.46)	(1.19)	(5.03)	(0.69)	(4.80)	(-0.89)	(2.31)			
Cotton	$\Delta R^2$	0.00	0.06	<b>0.09*</b>	-0.03	<b>0.34**</b>	0.09	0.11	-0.02	0.02	<b>0.46***</b>	0.08	<b>0.67***</b>	0.08	0.09	<b>0.57***</b>	<b>0.43***</b>	-16.31*	-12.37	
	$R_{cos}^2$	-0.37	-0.21	-1.07	-1.81	-1.79	-1.91	-1.95	-3.06	-1.80	-0.32	-0.74	-2.37	-4.21	-1.96	-0.20	-0.97			
	t-stat	(-1.03)	(-1.39)	(1.58)	(0.70)	(2.54)	(-1.57)	(-0.83)	(-1.16)	(-1.16)	(2.89)	(-1.04)	(3.43)	(1.53)	(1.55)	(3.17)	(2.81)			
Live Cattle	$\Delta R^2$	<b>0.79***</b>	-0.10	<b>0.82***</b>	-0.08	<b>1.18***</b>	<b>1.48***</b>	<b>1.42***</b>	<b>0.69***</b>	-0.04	<b>0.45**</b>	-0.10	<b>2.46***</b>	-0.10	<b>2.40***</b>	-0.01	<b>0.82***</b>	-10.02***	-3.48**	
	$R_{cos}^2$	<b>7.90***</b>	-0.78	-1.38	-0.44	-0.08*	-0.57	-1.54	<b>2.90***</b>	<b>0.19**</b>	-1.08	<b>1.13***</b>	-8.96	-8.96	-1.24	-1.12	<b>2.50***</b>			
	t-stat	(-2.92)	(-0.11)	(2.97)	(-0.53)	(3.51)	(3.51)	(3.83)	(6.13)	(0.77)	(-2.30)	(-0.31)	(4.99)	(-0.18)	(4.94)	(-0.96)	(2.98)			
Lean Hog	$\Delta R^2$	<b>0.51**</b>	-0.07	-0.09	-0.09	-0.08	<b>1.75***</b>	<b>1.72***</b>	<b>0.51**</b>	-0.08	-0.06	-0.09	-0.09	-0.07	-0.09	-0.08	-0.02	-16.43**	-16.72	
	$R_{cos}^2$	-1.06	-1.66	-1.07	-2.03	-2.54	-2.54	-2.54	-1.98	<b>0.84***</b>	-0.95	-1.92	-0.27	-14.31	-1.02	-2.00	<b>0.13**</b>			
	t-stat	(-2.56)	(-0.49)	(-0.15)	(0.20)	(0.34)	(-4.53)	(-4.50)	(-2.56)	(0.28)	(-0.29)	(-0.54)	(0.15)	(-0.48)	(-0.05)	(0.41)	(-0.88)			
Milk	$\Delta R^2$	<b>0.13*</b>	<b>0.08*</b>	-0.04	0.05	-0.02	<b>1.80***</b>	<b>1.89***</b>	<b>0.75***</b>	0.02	-0.04	0.04	<b>0.09*</b>	-0.02	<b>0.33***</b>	<b>0.30***</b>	-0.02	-20.57*	-23.55	
	$R_{cos}^2$	-1.84	-0.97	-1.14	-1.02	-2.88	-1.75	-1.36	-2.05	-0.31	-0.66	-0.96	-0.92	-2.86	-0.37	-0.98	-1.66			
	t-stat	(-2.00)	(-1.71)	(0.20)	(-1.45)	(0.74)	(-6.71)	(-6.87)	(-4.33)	(-1.23)	(0.31)	(1.40)	(-1.78)	(0.70)	(-2.97)	(2.85)	(0.72)			
Oranges	$\Delta R^2$	-0.01	-0.03	-0.06	<b>0.13*</b>	<b>0.18*</b>	<b>0.58***</b>	<b>0.72***</b>	<b>0.32**</b>	<b>0.59***</b>	-0.06	-0.04	-0.02	<b>0.23**</b>	-0.02	-0.06	<b>0.13*</b>	-13.19***	-16.62	
	$R_{cos}^2$	-2.92	-2.05	-1.65	-0.76	-1.59	-1.87	-1.96	-1.96	-2.21	-1.18	-1.13	-2.27	-2.27	-1.87	-1.83	-2.13			
	t-stat	(-0.91)	(0.73)	(0.27)	(-1.76)	(-1.97)	(-3.20)	(-3.52)	(-2.46)	(-2.46)	(-3.23)	(-0.11)	(0.60)	(-0.82)	(2.16)	(-0.78)	(0.10)	(-1.76)		
Soybean Oil	$\Delta R^2$	-0.05	0.10	-0.06	-0.04	<b>0.40**</b>	0.03	-0.01	0.07	<b>0.48***</b>	-0.06	<b>0.35***</b>	-0.06	<b>0.21**</b>	-0.05	-0.05	0.05	-15.57**	-38.12	
	$R_{cos}^2$	-1.85	<b>0.09*</b>	-1.28	-1.49	-0.16	-0.25	-0.92	-0.11*	-0.27	-0.03	-1.01	<b>0.51***</b>	-9.71	<b>1.28***</b>	-1.12	-1.18			
	t-stat	(-0.38)	(-1.61)	(-0.07)	(-0.55)	(2.72)	(1.20)	(0.91)	(1.45)	(1.45)	(-2.96)	(3.75)	(-0.11)	(2.59)	(-0.01)	(2.07)	(0.49)	(1.31)		
Soybeans	$\Delta R^2$	0.02	-0.06	-0.06	-0.05	0.08	-0.05	-0.02	-0.05	<b>1.02***</b>	<b>0.27**</b>	-0.01	0.03	-0.04	-0.05	0.03	0.04	-12.46***	-28.23	
	$R_{cos}^2$	<b>0.94***</b>	-1.03	-0.96	-1.09	-0.58	-1.09	-1.21	-2.47	<b>1.48***</b>	-0.22	-0.61	-1.73	-2.67	-0.22	-0.55	-0.21			
	t-stat	(-1.16)	(-0.09)	(0.08)	(-0.37)	(1.50)	(-0.42)	(-0.83)	(0.38)	(-4.19)	(2.32)	(-0.93)	(1.20)	(-0.62)	(0.50)	(1.25)	(1.28)			
Soybean Meal	$\Delta R^2$	-0.07	0.00	-0.06	0.00	-0.07	-0.07	-0.07	-0.06	0.01	<b>0.54***</b>	-0.04	-0.07	-0.05	-0.06	-0.07	-0.06	-14.50	-19.77	
	$R_{cos}^2$	<b>0.86***</b>	-0.88	-1.20	-1.72	-2.10	-1.67	-1.55	-2.64	-1.06	-0.56	-0.56	-1.56	-1.20	-0.96	-1.47	-1.61			
	t-stat	(-0.32)	(-1.01)	(0.36)	(-1.02)	(0.06)	(0.21)	(0.09)	(0.42)	(-1.08)	(2.90)	(-0.68)	(-0.32)	(0.51)	(-0.39)	(0.24)	(0.40)			
Sugar	$\Delta R^2$	-0.03	0.00	-0.03	-0.03	<b>0.10**</b>	0.00	0.02	-0.01	<b>0.10**</b>	<b>0.12**</b>	-0.03	<b>0.29***</b>	-0.03	<b>0.29***</b>	-0.01	0.01	-15.22	-66.15	
	$R_{cos}^2$	-2.61	-0.12	-1.55	-0.70	-0.59	-2.87	-1.90	-1.90	-0.45	-1.63	-0.36	-2.97	-2.94	-1.81	-2.18	-1.12			
	t-stat	(0.37)	(-1.07)	(-0.31)	(-0.09)	(2.14)	(1.01)	(1.24)	(0.73)	(2.14)	(2.27)	(-0.29)	(3.00)	(3.34)	(3.35)	(-0.77)	(1.18)			
Wheat	$\Delta R^2$	-0.01	-0.04	-0.04	0.07	<b>0.27***</b>	<b>0.25**</b>	<b>0.30***</b>	<b>0.10*</b>	<b>0.14**</b>	<b>0.35***</b>	-0.03	-0.03	0.03	-0.03	<b>0.27**</b>	<b>0.33***</b>	-14.47***	-54.14	
	$R_{cos}^2$	-0.28	-0.83	-1.09	-1.52	-0.80	-0.06*	-0.36	-0.36	-0.37	-2.03	-1.77***	-2.03	-1.54	-1.03	-0.98	-0.34			
	t-stat	(-0.92)	(0.13)	(0.36)	(-1.58)	(2.65)	(-2.55)	(-2.76)	(-1.82)	(-2.03)	(2.98)	(-1.80)	(0.62)	(1.27)	(-0.60)	(2.64)	(2.87)			



Table A18: Volatility Predictability from 1950 (1 Month) (continued)

Commodity	Statistic	de	$\Delta \text{indpro}$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	ltr	lty	svar	tbl	tms	unrate	MSA	MFC
Wool	$\Delta R^2$	0.04	-0.07	-0.06	<b>0.99***</b>	0.07	<b>0.89***</b>	<b>0.78***</b>	<b>1.40***</b>	<b>0.22**</b>	-0.05	0.07	<b>0.24**</b>	-0.03	<b>0.58***</b>	<b>0.34**</b>	-0.02		
	$R^2_{\text{cons}}$	-1.77	-0.99	-1.28	<b>1.53***</b>	<b>0.20**</b>	<b>0.40***</b>	<b>0.98***</b>	-1.37	<b>0.31**</b>	<b>0.32**</b>	-0.61	<b>1.72***</b>	-5.43	<b>0.28**</b>	-1.56	-2.19	-22.82***	-16.74
	t-stat	(1.26)	(-0.17)	(0.42)	(3.83)	(1.39)	(-3.64)	(-3.43)	(-4.52)	(2.02)	(0.61)	(-1.40)	(-2.06)	(0.80)	(-2.98)	(2.38)	(0.88)		
Yellow Corn	$\Delta R^2$	<b>0.30**</b>	0.04	<b>0.22*</b>	<b>0.58***</b>	<b>0.37**</b>	<b>1.23***</b>	<b>1.47***</b>	<b>0.37**</b>	<b>0.95***</b>	<b>0.60***</b>	-0.06	-0.04	<b>0.30**</b>	-0.05	<b>0.67***</b>	<b>0.54***</b>		
	$R^2_{\text{cons}}$	-1.09	-0.38	-1.34	-0.86	-1.74	-0.63	-0.90	-1.97	<b>0.24**</b>	<b>0.80***</b>	-0.57	-2.07	-0.86	-1.45	-1.06	-0.67		
	t-stat	(-2.08)	(-1.18)	(1.88)	(-2.76)	(2.28)	(-3.88)	(-4.23)	(-2.28)	(-3.44)	(2.80)	(0.58)	(0.76)	(2.09)	(-0.64)	(2.94)	(2.67)		
Coal	$\Delta R^2$	<b>0.44**</b>	<b>0.67***</b>	-0.05	-0.06	<b>3.36***</b>	<b>0.67***</b>	<b>1.82***</b>	-0.11	<b>0.19*</b>	-0.03	-0.03	<b>0.17**</b>	<b>1.47***</b>	<b>0.59***</b>	<b>0.44**</b>	<b>0.90***</b>		
	$R^2_{\text{cons}}$	-1.76	-0.97	-1.38	-2.25	-0.23	<b>1.86***</b>	<b>1.92***</b>	-3.50	-1.01	-0.61	-1.80	<b>0.17**</b>	-1.92	<b>0.79***</b>	-0.89	-1.29	-19.74**	-12.20
	t-stat	(2.25)	(-2.71)	(0.75)	(0.69)	(5.79)	(-2.70)	(-2.70)	(-4.28)	(0.03)	(-1.68)	(-0.87)	(-1.69)	(3.87)	(-2.56)	(2.26)	(3.08)		
Heating Oil	$\Delta R^2$	-0.03	0.12	-0.09	-0.09	-0.07	<b>0.41**</b>	<b>0.38**</b>	-0.06	<b>0.88***</b>	0.07	0.12	<b>0.14*</b>	<b>0.14*</b>	-0.02	-0.06	<b>0.16*</b>		
	$R^2_{\text{cons}}$	-1.14	<b>0.18*</b>	-1.41	-0.67	<b>0.54**</b>	-2.52	-2.98	-0.93	-1.02	<b>0.90***</b>	-0.66	-2.95	-1.34	-2.44	-2.32	-1.23	-15.88	-15.26*
	t-stat	(0.82)	(-1.50)	(0.19)	(-0.15)	(0.52)	(-2.33)	(-2.26)	(-2.79)	(0.61)	(-3.25)	(1.32)	(-1.50)	(1.58)	(-0.92)	(-0.63)	(-1.66)		
Natural Gas	$\Delta R^2$	-0.10	<b>0.20*</b>	-0.06	0.04	-0.05	<b>2.11***</b>	<b>2.46***</b>	<b>1.71***</b>	<b>0.78***</b>	<b>0.52***</b>	-0.03	<b>1.78***</b>	<b>0.68***</b>	<b>1.16***</b>	-0.08	<b>0.48**</b>		
	$R^2_{\text{cons}}$	-4.40	-0.53	-5.15	-0.60	-0.93	<b>1.81***</b>	<b>1.97***</b>	<b>2.35***</b>	<b>2.35***</b>	<b>0.35*</b>	-0.72	<b>1.20***</b>	<b>2.89***</b>	-1.81	-1.25	<b>0.52**</b>	-12.83***	-24.84
	t-stat	(-0.11)	(-1.76)	(-0.59)	(-1.21)	(-0.71)	(-4.88)	(-4.39)	(-3.02)	(-3.02)	(-2.54)	(0.81)	(-4.48)	(2.84)	(-3.64)	(0.48)	(2.45)		
Unleaded Regular Gas	$\Delta R^2$	<b>0.43*</b>	<b>0.61**</b>	-0.13	-0.17	-0.10	<b>1.95***</b>	<b>2.04***</b>	<b>3.63***</b>	-0.07	0.22	-0.09	<b>2.63***</b>	<b>1.40***</b>	<b>0.90**</b>	0.31	<b>1.80***</b>		
	$R^2_{\text{cons}}$	-0.56	<b>0.20*</b>	-1.65	-1.43	<b>2.52***</b>	-1.47	-5.41	-0.50	-3.18	-2.22	-2.87	-3.50	-3.21	-1.06	-1.06	-0.45	-12.50***	<b>0.33**</b>
	t-stat	(1.85)	(-2.11)	(-0.51)	(-0.27)	(0.66)	(-3.49)	(-3.57)	(-4.72)	(-0.76)	(-1.49)	(-0.71)	(-4.03)	(3.00)	(-2.47)	(-1.66)	(-3.36)		
WTI Oil	$\Delta R^2$	0.03	0.03	-0.02	0.01	<b>0.05*</b>	<b>0.37***</b>	<b>0.35***</b>	<b>0.15**</b>	-0.01	<b>0.13**</b>	<b>0.17***</b>	-0.02	<b>0.27***</b>	-0.02	-0.01	-0.02	-19.30**	-75.05*
	$R^2_{\text{cons}}$	-0.45	-0.17	-1.90	-1.05	-2.15	-5.98	-5.11	-1.48	-2.14	-0.01	<b>0.10*</b>	-5.27	-1.54	-2.61	-1.76	-2.88		
	t-stat	(-1.43)	(-1.45)	(0.23)	(-1.23)	(1.77)	(-4.05)	(-3.93)	(-2.66)	(0.88)	(-2.53)	(2.83)	(0.49)	(3.47)	(0.05)	(0.88)	(0.20)		
Aluminium	$\Delta R^2$	-0.02	0.06	<b>0.13**</b>	0.06	0.03	<b>0.32***</b>	<b>0.34***</b>	<b>0.19**</b>	-0.01	-0.01	-0.03	<b>0.44***</b>	<b>0.44***</b>	-0.01	<b>0.27***</b>	0.01	-14.90***	-57.23
	$R^2_{\text{cons}}$	-0.42	<b>0.71***</b>	<b>0.45**</b>	-1.20	<b>1.84***</b>	<b>1.11***</b>	<b>1.48***</b>	-0.58	-1.48	<b>0.87***</b>	-0.70	<b>0.46***</b>	<b>0.67***</b>	-0.76	-1.11	<b>0.49***</b>		
	t-stat	(-0.70)	(-1.59)	(2.10)	(-1.58)	(3.15)	(-3.13)	(-3.21)	(-2.49)	(-0.81)	(-0.87)	(-0.53)	(0.48)	(3.60)	(-0.82)	(2.87)	(1.08)		
Gold	$\Delta R^2$	<b>0.07*</b>	-0.04	-0.01	0.01	<b>1.13***</b>	-0.03	-0.03	0.05	-0.04	<b>0.14**</b>	0.00	<b>0.76***</b>	<b>0.31***</b>	<b>0.49***</b>	-0.03	<b>0.53***</b>		
	$R^2_{\text{cons}}$	-2.02	-1.11	-1.49	-1.86	<b>1.49***</b>	<b>4.73***</b>	<b>4.48***</b>	-0.14	-1.45	<b>0.99***</b>	-0.73	<b>6.78***</b>	-34.69	<b>3.09***</b>	-1.19	-2.07	-8.06***	-48.67
	t-stat	(-1.69)	(0.05)	(0.85)	(-1.17)	(5.68)	(0.34)	(0.34)	(1.50)	(-0.21)	(2.19)	(1.03)	(4.68)	(3.04)	(3.80)	(0.35)	(3.92)		
High Grade Copper	$\Delta R^2$	-0.04	0.02	0.02	-0.01	<b>0.27***</b>	-0.04	-0.04	-0.01	-0.01	0.05	-0.03	0.00	<b>0.50***</b>	-0.04	0.02	-0.04	-12.95***	-86.62*
	$R^2_{\text{cons}}$	-4.53	-1.03	-0.49	-1.61	<b>2.78***</b>	<b>0.70</b>	-2.33	-2.33	-1.16	-1.16	-1.16	-1.52	-3.24	-3.24	-2.79	-2.79		
	t-stat	(0.29)	(1.23)	(1.18)	(0.91)	(2.76)	(0.30)	(0.22)	(0.09)	(-0.80)	(-1.51)	(-0.61)	(0.95)	(3.66)	(0.32)	(1.18)	(0.12)		
Nickel	$\Delta R^2$	-0.20	-0.02	-0.21	-0.17	-0.21	0.17	0.17	0.03	-0.21	<b>0.35*</b>	0.15	<b>0.53*</b>	0.19	<b>0.41*</b>	-0.21	<b>0.39*</b>	-16.80**	<b>4.34***</b>
	$R^2_{\text{cons}}$	-0.97	-0.05	-1.63	-3.07	-1.26	-1.68	-1.84	-3.27	-0.32	-0.32	-0.50	-2.23	0.00	-2.01	<b>0.47*</b>	-1.87		
	t-stat	(-0.20)	(-0.95)	(0.07)	(0.42)	(0.12)	(-1.35)	(-1.34)	(-1.07)	(0.14)	(1.63)	(-1.31)	(-1.88)	(1.37)	(-1.72)	(0.06)	(-1.70)		
Palladium	$\Delta R^2$	-0.11	<b>1.00***</b>	-0.16	-0.14	<b>1.26***</b>	<b>0.37*</b>	<b>0.37*</b>	<b>0.52**</b>	-0.15	<b>0.47*</b>	-0.08	-0.11	0.12	-0.04	-0.03	0.23	-7.46***	-4.19
	$R^2_{\text{cons}}$	-2.57	<b>1.92***</b>	-1.36	-1.95	<b>0.89**</b>	<b>1.34***</b>	<b>1.74***</b>	<b>1.54***</b>	-0.82	-0.86	-1.22	-1.81	-2.68	-1.39	-1.09	<b>1.73***</b>		
	t-stat	(0.53)	(-2.71)	(0.08)	(0.32)	(3.01)	(-1.83)	(-1.82)	(-2.06)	(0.20)	(2.00)	(0.70)	(-0.58)	(1.32)	(-0.85)	(0.89)	(1.57)		
Platinum	$\Delta R^2$	0.00	0.01	<b>0.29**</b>	-0.06	<b>0.39***</b>	<b>0.47***</b>	<b>0.44***</b>	<b>0.23**</b>	0.00	0.09	-0.03	-0.04	<b>0.20**</b>	0.00	<b>0.74***</b>	0.11	-16.73***	-28.06
	$R^2_{\text{cons}}$	-1.02	-0.38	-0.27	-0.71	<b>0.09**</b>	-0.34	-0.75	-1.27	-0.67	<b>0.82***</b>	-0.61	-1.45	-5.23	-0.73	-0.55	-0.06*		
	t-stat	(-1.00)	(-1.07)	(2.36)	(0.07)	(2.66)	(-2.91)	(-2.80)	(-2.14)	(1.00)	(-1.54)	(-0.69)	(0.60)	(2.02)	(-1.03)	(3.57)	(1.66)		
Silver	$\Delta R^2$	<b>0.13*</b>	0.01	0.02	-0.05	<b>1.08***</b>	0.03	0.03	-0.05	-0.05	<b>0.22**</b>	-0.04	<b>0.69***</b>	<b>0.12*</b>	<b>0.26**</b>	<b>0.10*</b>	<b>0.93***</b>	-17.35***	-31.05
	$R^2_{\text{cons}}$	-4.55	-0.97	-1.55	-1.02	-1.06	<b>1.32***</b>	<b>1.22***</b>	-0.12	-0.94	<b>0.52***</b>	-2.00	<b>2.57***</b>	-34.27	<b>2.71***</b>	-1.60	<b>0.05**</b>		
	t-stat	(-1.89)	(-1.14)	(1.14)	(0.02)	(4.77)	(-1.28)	(-1.26)	(0.02)	(-0.00)	(2.31)	(0.55)	(3.83)	(1.81)	(2.49)	(1.70)	(4.44)		
Tin	$\Delta R^2$	<b>0.09*</b>	-0.01	<b>0.84***</b>	<b>0.12**</b>	0.08	<b>0.14**</b>	<b>0.14**</b>	-0.02	-0.05	-0.05	0.01	0.01	<b>0.34***</b>	<b>0.10*</b>	0.06	<b>0.11*</b>	-15.26***	-39.62
	$R^2_{\text{cons}}$	-1.64	-0.36	<b>2.56***</b>	-1.76	-1.63	-0.36	-0.92	-3.88	-1.43	-1.35	-0.83	-1.00	-3.14	-1.59	-1.29	-0.97		
	t-stat	(-1.68)	(-0.93)	(4.26)	(-1.83)	(1.63)	(-1.95)	(-1.93)	(-1.74)	(-0.32)	(-0.28)	(1.12)	(-1.13)	(2.81)	(-1.72)	(1.51)	(-1.76)		
Zinc	$\Delta R^2$	<b>0.20**</b>	-0.05	<b>0.12*</b>	-0.05	<b>0.19**</b>	<b>0.98***</b>	<b>1.07***</b>	<b>0.30***</b>	<b>0.16**</b>	-0.02	<b>0.31***</b>	-0.05	<b>0.38***</b>	0.06	<b>0.46***</b>	<b>0.18**</b>	-20.67**	-27.74
	$R^2_{\text{cons}}$	-0.89	-0.14	-0.52	-0.48	-3.73	<b>1.34***</b>	<b>0.64***</b>	-0.35	-0.85	-1.20	<b>0.41***</b>	<b>2.44***</b>	-37.95	<b>1.30***</b>	-2.12	-2.86		
	t-stat	(-2.21)	(0.23)	(1.80)	(-0.22)	(2.18)	(-4.50)	(-4.71)	(-2.63)	(-2.01)	(-0.84)	(-2.66)	(-0.04)	(2.89)	(-1.44)	(3.16)	(2.12)		

Table A19: Volatility Predictability from 1950 (12 Months)

This table reports the regression results of monthly volatilities on a constant, the lagged volatility, and the lagged predictive variable(s). We predict the next year's volatility. Statistical inferences are based on a bootstrapped distribution. "de" denotes the dividend-payout ratio, "Δindpro" the growth of industrial production, and "ΔM1" the growth of money supply M1. "dfy" is the default return spread as the difference between long-term U.S. corporate bond returns and long-term U.S. government bond returns. "dfy" is the default yield spread as the difference between U.S. BAA- and AAA-rated corporate bond yields. "dp" is the dividend-price ratio, "dy" the dividend yield, "ep" the earnings-price ratio, "erp" the market risk premium, "inf" the inflation rate, "itr" the long-term U.S. government bond returns, "lty" the long-term U.S. government bond yields, "svar" the stock variance, and "tbl" the 3-month Treasury bill rate. "unrate" is the term spread as the difference between the long-term yield on U.S. government bonds and the 3-month Treasury bill rate. "unrate" is the unemployment rate. "MSA" and "MFC" denote the model selection approach and mean forecast combination.  $\Delta R^2$  and  $R_{cos}^2$  are the in-sample difference between the adjusted  $R^2$ s of the unrestricted and restricted model, and the out-of-sample  $R^2$ , respectively. We report the t-statistics of the respective predictive variables in parentheses. \*, \*\*, \*\*\* indicate the significance at the 10 %, 5 %, and 1 % significance levels, respectively. We split the commodities into the agricultural, energy, and metal sector. All data are sampled at the monthly frequency. The sample period is from January 1950 to December 2015.

Commodity	Statistic	de	Δindpro	ΔM1	dfy	dp	dy	ep	erp	inf	itr	lty	svar	tbl	tms	unrate	MSA	MFC
Butter	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	$R_{cos}^2$	-5.12	-1.50	-2.50	-0.90	-2.05	-2.51	-1.87	-0.66	-1.53	-0.92	-0.63	-2.69	-8.12	-6.86	-2.22	-17.50*	-4,422.60**
	t-stat	(-0.75)	(0.65)	(-0.34)	(-0.29)	(-1.44)	(-0.43)	(0.11)	(0.87)	(0.26)	(0.26)	(0.41)	(-0.01)	(-0.87)	(0.35)	(-0.76)	(0.45)	
Cocoa	$\Delta R^2$	0.02**	0.00	0.00	0.00	0.01*	0.01**	0.00	0.01*	0.00	0.00	0.00	0.00	0.01	0.01**	0.01		
	$R_{cos}^2$	-2.60	-0.49	-1.58	-0.34	-4.25	-1.05	-1.78	-0.21	-1.65	-0.26	-2.68	-26.56	-1.73	-4.23	-4.23	-24.16***	-2,421.84
	t-stat	(-2.77)	(0.47)	(-0.20)	(-0.65)	(-1.14)	(-2.46)	(-2.63)	(-0.49)	(-1.91)	(-0.54)	(-1.00)	(1.07)	(1.05)	(1.91)	(-2.03)	(-1.85)	
Coffee	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01*	0.04***	0.00		
	$R_{cos}^2$	-3.42	-1.06	-1.81	-1.01	-2.30	-2.74	-6.21	-0.77	-1.08	-1.40	-4.35	-48.20	-2.23	2.33***	0.51**	-35.07***	-2,084.13
	t-stat	(0.50)	(-0.38)	(-1.22)	(-0.11)	(-0.95)	(0.76)	(0.67)	(0.34)	(-0.68)	(-0.44)	(-0.27)	(-0.08)	(-2.08)	(3.95)	(1.29)		
Corn	$\Delta R^2$	0.02***	0.01*	0.00	0.00	0.01*	0.01	0.00	0.00	0.00	0.00	0.00	0.00*	0.01	0.02***	0.00		
	$R_{cos}^2$	1.94***	-0.11	-0.65	-1.49	2.16***	-1.10	-1.72	2.89***	-1.62	-0.90	-2.27	-45.81	0.31**	2.43***	-1.32	-14.97***	-2,115.78
	t-stat	(3.55)	(1.88)	(-0.11)	(0.61)	(-1.60)	(-2.34)	(-2.26)	(0.28)	(0.52)	(1.50)	(-1.07)	(0.07)	(-1.85)	(1.94)	(-3.61)		
Cotton	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	$R_{cos}^2$	-1.32	-0.49	-0.75	-1.32	-0.79	-1.20	-1.22	-1.09	-0.82	-0.97	-1.41	-2.98	-14.60	-1.93	-0.84	-19.17*	-1,535.01
	t-stat	(-1.05)	(1.23)	(-0.58)	(-0.82)	(0.53)	(-0.68)	(-0.63)	(0.06)	(0.40)	(-1.14)	(0.50)	(1.05)	(-1.01)	(1.05)	(-0.35)	(0.55)	
Live Cattle	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	$R_{cos}^2$	-5.10	-0.99	-0.08	-1.18	-3.29	-1.60	-1.62	-4.13	-0.59	-1.14	-1.06	-4.54	-36.06	-2.99	-3.57	-37.91**	-2,442.92
	t-stat	(0.37)	(-0.24)	(1.27)	(-0.22)	(-1.18)	(-1.34)	(-1.24)	(-1.68)	(0.85)	(-1.20)	(-0.67)	(-0.04)	(-1.42)	(-0.61)	(1.15)		
Lean Hog	$\Delta R^2$	0.00	0.00	0.00	0.01*	0.01	0.01	0.01*	0.00	0.01*	0.00	0.00	0.00	0.00	0.00	0.00		
	$R_{cos}^2$	-1.81	-1.29	-1.26	-0.91	-1.39	-1.09	-1.84	-1.14	-0.59	-0.71	-1.03	-1.28	-5.43	-0.90	-1.34	-19.42**	-1,470.64
	t-stat	(0.30)	(-0.23)	(0.20)	(1.91)	(-0.53)	(-2.09)	(-1.92)	(-2.13)	(1.49)	(-1.68)	(-0.16)	(-0.78)	(-1.03)	(-0.88)	(0.39)		
Milk	$\Delta R^2$	0.00	0.00	0.00	0.00	0.01**	0.01**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	$R_{cos}^2$	-2.60	0.14**	-0.77	-0.49	-2.82	-2.86	-2.90	-3.53	-0.88	-1.23	-1.49	-2.45	-4.04	-2.15	-2.92	-22.80*	-1,887.37
	t-stat	(-0.83)	(0.62)	(0.77)	(1.58)	(-0.17)	(-2.80)	(-2.79)	(-1.58)	(0.03)	(0.09)	(0.14)	(-0.48)	(0.80)	(0.48)	(-2.01)		
Oranges	$\Delta R^2$	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02***	0.00	0.01*	0.00	0.00	0.00	0.01*	0.00		
	$R_{cos}^2$	-4.12	-1.76	-1.17	-1.35	-3.98	-3.26	-2.71	-2.31	-0.53	-0.91	-0.43	-2.72	-2.82	-2.80	-3.00	-24.80**	-1,197.41
	t-stat	(-0.59)	(1.10)	(-0.38)	(0.27)	(-0.19)	(-1.86)	(-1.54)	(-1.26)	(2.72)	(0.11)	(-1.64)	(0.72)	(-0.40)	(-0.25)	(1.91)		
Soybean Oil	$\Delta R^2$	0.01*	0.00	0.00	0.00	0.02***	0.01*	0.01*	0.00	0.00*	0.00	0.00	0.00	0.00	0.01***	0.02***		
	$R_{cos}^2$	-2.21	-1.11	-0.93	-1.83	-2.99	3.67***	2.94***	4.27***	-2.02	-1.20	-1.52	-6.48	-17.17	0.53**	-1.98	-11.52**	-3,176.54
	t-stat	(-2.22)	(0.83)	(-0.13)	(0.88)	(-3.35)	(-2.68)	(-2.70)	(-1.09)	(-0.48)	(1.71)	(-0.52)	(-0.03)	(-1.15)	(1.28)	(-2.75)		
Soybeans	$\Delta R^2$	0.00	0.00	0.00	0.00	0.01	0.01*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	$R_{cos}^2$	-2.84	-0.45	-0.30	-0.54	-1.84	0.25*	-0.24	1.22***	-1.02	-2.49	-0.33	-7.82	-5.97	-2.09	-1.03	-23.60**	-2,375.58
	t-stat	(-1.03)	(0.14)	(0.78)	(-0.88)	(-0.34)	(-2.28)	(-2.40)	(-1.52)	(-1.19)	(-1.30)	(-0.55)	(-0.29)	(0.06)	(-0.68)	(0.91)		
Soybean Meal	$\Delta R^2$	0.01	0.00	0.01*	0.00	0.01**	0.01*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01**	0.00		
	$R_{cos}^2$	-2.34	1.43***	-0.09	-0.92	-3.53	0.46**	-1.04	0.64**	-0.95	-0.78	-0.60	-6.27	3.02***	-3.16	-0.75	-12.27**	-2,234.45
	t-stat	(-1.90)	(0.96)	(-1.88)	(-0.47)	(-0.08)	(-2.54)	(-2.50)	(-1.19)	(0.47)	(-1.10)	(-0.69)	(-0.71)	(0.46)	(-1.67)	(-2.32)		
Sugar	$\Delta R^2$	0.01*	0.00	0.00*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	$R_{cos}^2$	-11.69	-0.16	-1.36	-1.20	-12.57	-1.49	-2.54	-0.50	-1.94	-1.79	-1.95	-2.91	-0.72	-2.28	-7.15	-14.47**	-4,187.97
	t-stat	(2.19)	(1.41)	(-1.77)	(0.02)	(0.58)	(0.95)	(-1.02)	(-0.58)	(0.69)	(0.48)	(0.67)	(-0.26)	(2.04)	(0.82)	(-2.01)		
Wheat	$\Delta R^2$	0.00	0.00	0.00	0.00	0.01***	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01***	0.02***		
	$R_{cos}^2$	-3.94	-0.71	-1.52	-1.16	-0.61	-3.36	-2.55	-4.65	-1.11	-1.42	-0.96	-10.01	-4.03	-2.84	-0.50	-12.68**	-3,681.85*
	t-stat	(0.04)	(-0.28)	(-0.88)	(-0.18)	(-2.97)	(-1.73)	(-1.79)	(-1.67)	(-0.48)	(-0.74)	(-0.01)	(-1.17)	(-0.89)	(0.28)	(-3.00)		

Table A19: Volatility Predictability from 1950 (12 Months) (continued)

Commodity	Statistic	de	$\Delta \text{indpro}$	$\Delta M1$	dfr	dfy	dp	dy	ep	erp	infl	ltr	hty	svar	tbl	tms	unrate	MSA	MFC	
Wool	$\Delta R^2$	0.00	0.00	0.00	0.01**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02***	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-2.28	-0.18	-1.19	-0.98	-2.70	-3.82	-3.82	-3.82	-3.82	-1.10	-0.95	-0.95	0.318	-1.63	-0.85	-0.95	-1.89	-19.68	-1,908.76
	$t - \text{stat}$	(-0.04)	(0.54)	(-0.61)	(-2.50)	(1.26)	(-0.62)	(-0.62)	(-0.62)	(-0.59)	(-1.35)	(-1.39)	(0.50)	(0.28)	(3.57)	(0.64)	(-0.82)	(-1.48)		
Yellow Corn	$\Delta R^2$	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01**	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-5.54	-0.73	-1.17	-1.05	-5.00	-2.10	-2.06	-1.50	-1.49	-0.60	-0.99	-0.99	-3.87	-23.43	-2.10	-3.15	-3.68	-42.68**	-1,638.30
	$t - \text{stat}$	(-1.58)	(1.15)	(-0.12)	(-0.64)	(-1.54)	(-2.23)	(-2.31)	(-0.93)	(-0.66)	(-0.76)	(-0.07)	(-0.07)	(0.05)	(-2.35)	(-0.37)	(0.94)	(-1.27)		
Coal	$\Delta R^2$	0.02***	0.00	0.00	0.01**	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02***	0.03***			
	$R^2_{\text{cons}}$	-1.58	-0.79	-1.51	-1.79	-0.99	-0.94	-1.11	-1.28	-1.11	-1.23	-1.43	-1.43	-1.90	-37.25	-1.06	2.26***	-0.30	-56.03***	-1,554.90
	$t - \text{stat}$	(-3.38)	(-1.06)	(-0.84)	(-1.24)	(-2.77)	(-1.81)	(-1.81)	(-1.81)	(-0.61)	(-1.34)	(0.85)	(0.60)	(-0.71)	(0.76)	(0.88)	(-3.29)	(-4.14)		
Heating Oil	$\Delta R^2$	0.05***	0.01*	0.01*	0.05***	0.00	0.00	0.00	0.01	0.00	0.00	0.02***	0.00	0.01**	0.00	0.00	0.02**			
	$R^2_{\text{cons}}$	-6.29	-1.12	-1.49	-0.91	1.18***	-3.33	-3.00	-0.58	-2.16	-0.12	0.84***	-0.49	-6.49	-69.57	-3.34	-2.68	-2.18	-13.33***	-1,641.04
	$t - \text{stat}$	(-4.12)	(2.03)	(-1.75)	(-1.46)	(-4.14)	(-1.29)	(-1.21)	(1.88)	(0.74)	(-1.55)	(2.65)	(-0.02)	(-2.08)	(-2.08)	(-0.48)	(1.01)	(-2.74)		
Natural Gas	$\Delta R^2$	0.08***	0.00	0.04***	0.01*	0.06***	0.03**	0.03***	0.01*	0.00	0.01*	0.00	0.00	0.02***	0.01	0.02***	0.04***			
	$R^2_{\text{cons}}$	3.33***	-0.62	2.92***	-1.83	7.67***	3.76***	4.15***	4.13***	-0.98	-0.38	-2.60	-2.60	-0.77	2.58***	5.34***	5.56***	1.71**	-18.50**	-2,029.36
	$t - \text{stat}$	(-5.71)	(1.17)	(-4.13)	(-1.88)	(-4.98)	(-3.63)	(-3.80)	(2.59)	(-0.83)	(1.83)	(0.12)	(0.12)	(0.50)	(-3.21)	(1.94)	(-2.97)	(-4.21)		
Unleaded Regular Gas	$\Delta R^2$	0.12***	0.03**	0.00	0.02**	0.15***	0.00	0.01	0.03*	0.00	0.00	0.00	0.00	0.01*	0.00	0.01	0.04**			
	$R^2_{\text{cons}}$	-2.10	-0.69	-2.30	-0.96	3.22***	-5.07	-4.87	-4.20	-0.91	-3.52	-0.73	-7.41	-55.61	-5.66	-3.72	-1.25	-2.18	-14.83	-1,279.91
	$t - \text{stat}$	(-4.64)	(2.34)	(-0.77)	(-1.96)	(-5.17)	(-1.29)	(-1.40)	(2.41)	(-1.00)	(-0.67)	(0.88)	(-0.64)	(-1.81)	(-1.81)	(-1.15)	(1.52)	(-2.90)		
WTI Oil	$\Delta R^2$	0.01***	0.01***	0.00	0.01**	0.01***	0.00	0.00	0.00	0.00	0.00	0.01***	0.00	0.00	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-3.00	-0.46	-0.13	-0.47	-3.80	-6.24	-6.11	-1.97	-1.27	-1.18	0.20**	-11.41	-65.97	-4.86	-1.58	-3.25	-17.65**	-2,957.67	
	$t - \text{stat}$	(-3.50)	(2.74)	(-0.74)	(-2.62)	(-3.80)	(-1.94)	(-2.03)	(0.89)	(-0.80)	(-0.75)	(2.81)	(0.78)	(-1.57)	(0.27)	(0.96)	(-2.04)			
Aluminium	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-5.31	-0.73	0.65***	-1.05	-1.63	-4.26	-4.58	-2.27	-1.01	0.40**	-1.78	-2.73	-4.40	-4.81	-1.26	-0.60	-14.72	-5,607.58	
	$t - \text{stat}$	(-1.13)	(1.13)	(1.03)	(-1.67)	(0.12)	(-1.74)	(-1.73)	(-1.57)	(0.09)	(0.46)	(-0.05)	(-0.05)	(-0.39)	(1.68)	(1.00)	(0.09)			
Gold	$\Delta R^2$	0.00*	0.00	0.00	0.00	0.01***	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-2.51	-1.24	-1.14	-0.17	-0.32	-6.34	-5.93	-5.46	-0.63	-0.59	-1.46	-1.94	-42.27	-4.81	-1.18	-2.11	-2.94	-17.67***	-4,100.28
	$t - \text{stat}$	(-2.12)	(1.47)	(-0.76)	(-0.27)	(-3.39)	(-1.63)	(-1.68)	(-1.18)	(-0.52)	(0.80)	(-0.51)	(-1.10)	(-0.12)	(-0.12)	(-1.02)	(0.18)	(-2.58)		
High Grade Copper	$\Delta R^2$	0.01**	0.00	0.00	0.00	0.02***	0.00	0.00	0.00	0.00	0.01**	0.00	0.00	0.00	0.00	0.00	0.01			
	$R^2_{\text{cons}}$	-3.12	-1.16	-2.53	-0.70	2.41***	-4.92	-4.56	-2.46	-1.07	-1.31	-0.73	-1.59	-42.54	-0.99	-0.07	0.34**	-18.80***	-2,032.95	
	$t - \text{stat}$	(-2.33)	(-0.99)	(0.71)	(-0.56)	(-3.26)	(-0.13)	(-0.22)	(1.47)	(-0.98)	(2.34)	(-1.03)	(-1.03)	(0.19)	(0.78)	(-1.67)	(-2.09)			
Nickel	$\Delta R^2$	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.01	-0.01	0.00	-0.01	0.00	-0.01	-0.01	-0.01	0.00			
	$R^2_{\text{cons}}$	-0.50	-0.97	-0.90	-1.39	-4.99	-14.64	-12.97	-3.55	-0.93	-1.48	-1.25	-2.32	-5.57	-5.77	-0.35	0.44*	-0.03	-18.23	-746.23
	$t - \text{stat}$	(0.21)	(-0.20)	(-0.16)	(-0.39)	(-0.16)	(-1.15)	(-1.16)	(-1.25)	(-0.10)	(0.98)	(-0.58)	(-0.58)	(-0.78)	(0.60)	(-0.75)	(-0.94)			
Palladium	$\Delta R^2$	0.04**	0.02**	0.00	0.00	0.01	0.00	0.00	0.00	0.01*	0.00	0.00	0.00	0.02**	0.01	0.03**	0.04**			
	$R^2_{\text{cons}}$	-2.40	0.20*	-2.64	-1.50	-0.47	-1.64	-2.44	-2.50	-1.22	-1.49	-0.62	-2.09	-10.73	-0.69**	0.48**	-1.40	-15.89*	-1,008.69	
	$t - \text{stat}$	(-2.79)	(-2.10)	(-1.01)	(-0.55)	(-1.40)	(-1.15)	(-0.95)	(0.96)	(1.82)	(0.45)	(1.23)	(0.30)	(-1.96)	(-1.36)	(-2.52)	(-2.68)			
Platinum	$\Delta R^2$	0.03***	0.00	0.00	0.01**	0.00	0.00	0.00	0.00	0.00*	0.00	0.00	0.00	0.04***	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	0.59**	-0.42	-0.56	-1.83	3.04***	-0.99	-0.83	-0.43	-0.94	1.17***	-1.33	-5.71	-23.33	-1.04	2.26***	-2.43	-14.44*	-2,207.78	
	$t - \text{stat}$	(-4.31)	(-0.29)	(-1.42)	(0.06)	(-2.39)	(-1.58)	(-1.38)	(1.46)	(1.82)	(0.07)	(0.79)	(1.11)	(-4.93)	(0.94)	(0.12)	(0.37)			
Silver	$\Delta R^2$	0.00*	0.00	0.00	0.01**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01**	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-1.69	-2.33	-0.84	-1.22	-1.01	-4.87	-5.41	-3.55	-0.97	-0.54	-2.60	-2.25	-5.06	-1.76	-3.16	-4.56	-21.22	-2,797.46	
	$t - \text{stat}$	(-0.03)	(-0.19)	(0.63)	(-0.58)	(-2.67)	(-0.47)	(-0.43)	(0.89)	(0.39)	(0.50)	(0.34)	(-0.84)	(-2.46)	(-0.05)	(-1.41)	(-0.91)			
Tin	$\Delta R^2$	0.03***	0.02***	0.00	0.01**	0.02**	0.02**	0.02**	0.00	0.00	0.00	0.00	0.00	0.00*	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-11.94	-3.23	-1.94	-1.36	-6.82	-2.92	-3.06	-8.13	-0.82	-2.73	-1.17	-8.06	-35.82	-3.88	-1.32	-1.95	-33.78***	-2,565.76	
	$t - \text{stat}$	(-4.22)	(3.95)	(0.02)	(-0.67)	(-2.17)	(-3.26)	(-3.31)	(-0.29)	(-0.54)	(-0.38)	(-0.07)	(1.42)	(-1.67)	(0.68)	(1.34)	(-0.13)			
Zinc	$\Delta R^2$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
	$R^2_{\text{cons}}$	-7.10	-1.20	-1.64	-0.96	-5.39	-4.65	-4.33	-3.33	-0.33	-2.54	0.51**	-6.13	-3.13	-3.22	-2.16	-2.16	-16.25***	-2,781.05	
	$t - \text{stat}$	(0.99)	(0.16)	(-1.56)	(1.42)	(-1.40)	(-2.18)	(-2.18)	(-2.68)	(-2.68)	(-0.40)	(-0.40)	(-2.51)	(2.18)	(-1.48)	(1.67)	(-0.28)			