Subjective risk premia and intermediary asset pricing: evidence from commodity markets

Massimiliano Bondatti*

Nova School of Business and Economics

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Abstract

I investigate how financial intermediaries and changes in the composition of the intermediary sector drive the dynamics of subjective risk premia. I measure subjective risk premia using return expectations of professional forecasters for commodities, a sophisticated asset class. Commodities provide an ideal setting as they allow to explore the unprecedented increase in institutional investor participation, beyond primary dealers, that occurred during the "financialization" of commodity markets. I show that the financial health of intermediaries, particularly primary dealers, plays a crucial role in driving subjective risk premia. However, with the change in the mix of market participants, the importance of primary dealers for subjective return expectations diminishes, while that of non-primary dealers increases. These findings reveal intermediaries as a novel source of variation in subjective risk premia, emphasize the significance of intermediary heterogeneity in shaping asset prices and highlight the time-varying nature of this relationship.

Keywords: Commodity risk premia, Subjective return expectations, Financial intermediation, Financialization of commodities, Sophisticated asset classes

JEL Classification: G12, G13, G14, G20

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1 Introduction

Expectations lie at the core of asset pricing. A primary focus of research is indeed to understand the dynamics of expected excess returns over time. To achieve this goal, it is essential to study the real-time return expectations of (marginal) investors. Survey data on ex-ante subjective return expectations, as opposed to ex-post realized returns, provide valuable insights for this purpose. However, as argued also in Adam and Nagel (2023), to effectively map the dynamics of survey-based return expectations into asset pricing models, it is crucial to take a stand on whether the survey forecasters represent the marginal investors within specific models.

Therefore, I start by observing that a large portion of professional forecasters in commonly used surveys are, in fact, financial intermediaries. Consequently, intermediary-based asset pricing models (e.g., He and Krishnamurthy (2013)), which target the average expectation of intermediaries as the marginal investors in financial markets, should provide a suitable framework for matching the dynamics of the subjective return expectations. Given that the expectations of financial intermediaries may impact asset prices, macroeconomic outcomes, and credit supply, it is important to determine the factors that shape these expectations.

In this paper, I build upon these theories that attribute to financial intermediaries a key role for expected returns and I contribute to the existing literature on subjective risk premia by empirically analysing whether the subjective return expectations of professional forecasters, for a sophisticated asset class like commodities, are driven by shocks to the average financial health of intermediaries. Given that financial intermediaries actively and frequently trade across many markets and possess expertise in complex assets, they are natural candidates to be the marginal investors in financial markets. Therefore, shocks to their financial health, serving as a proxy for their marginal value of wealth, should affect expected returns. While empirical studies in the intermediary-based literature, such as Haddad and Muir (2021), have demonstrated that these shocks explain variation in realized returns, particularly in more sophisticated asset classes, the question of whether they also drive variation in subjective return expectations remains unanswered. The

dynamics of subjective risk premia and realized returns can indeed substantially diverge, as highlighted in Nagel and Xu (2023), among others.[1] Additionally, I investigate whether the relation between intermediary financial health and subjective risk premia varies over time and with changes in relevance of different types of intermediaries participating in the market. Empirical evidence on the time-variation and the relevance of heterogeneity among intermediaries remains limited, even within the literature focusing on realized returns. Overall, my findings shed light on the role of intermediary financial health both as a potential driver of risk premia and as a relevant information on which intermediaries condition when forming their expectations.

To measure the health of financial intermediaries, I adopt a well-established proxy from the asset pricing literature. Specifically, I use the intermediary capital ratio of He et al. (2017), which measures the marginal utility of wealth for primary dealers who serve as counterparties the Federal Reserve Bank of New York in its monetary policy operations. These intermediaries, such as J.P. Morgan or Goldamn Sachs, are large and sophisticated institutions that trade in all asset markets, face low transaction costs, and employ updated, high frequency, and sophisticated trading models. Therefore, they act as marginal investors in many financial markets.

I then construct subjective risk premia for commodities, relying on return expectations of professional forecasters collected by Consensus Economics.[2] Commodity markets provide an ideal setting to assess the relevance of intermediaries in driving subjective excess returns for three main reasons. First, the survey participants who provide expectations for commodity prices are primarily financial intermediaries. Second, commodity markets are a sophisticated asset class where, as such, intermediaries play potentially a crucial role in driving the dynamics of risk premia. Third, there has been a fast and unprecedented increase in commodity futures market participation by financial institutions occurred around 2004, which is commonly referred to as the "financialization" of commodity markets

[1] Other papers arguing that there is a wedge between subjective and objective risk premia include: Cieslak (2018), Xu (2020), Adam et al. (2021), Nagel and Xu (2022), Dahlquist and Söderlind (2023).

[2] Consensus Economics is a prominent international survey provider for macroeconomic and financial forecasts, including exchange rates and commodity prices. These forecasts are commonly used in the literature on subjective risk premia (see, for example, Valente et al. (2022), Nagel and Xu (2023), and Kremens et al. (2023)).

(e.g., Henderson et al. (2015) and Basak and Pavlova (2016)). The large entry of traders such as mutual funds, hedge funds and pension funds had a significant impact on the commodity futures markets and their composition of market participants, as discussed in studies such as Büyükşahin and Robe (2014), Brunetti et al. (2016), and Goldstein and Yang (2022). Consequently, this change enables me to delve into a shift in investor types within the same asset class, and analyze whether and how the influence of intermediaries on subjective expected returns changes over time.

In the first part of the analysis, I conduct standard in-sample predictive regressions to demonstrate that the financial health of intermediaries predicts subjective risk premia in a portfolio of commodities. Consistent with intermediary-based theories, I find that when the risk-bearing capacity of intermediaries is impaired, and their effective risk aversion increases due to negative shocks to equity capital, (subjective) expected returns significantly rise going forward. The economic magnitude of this effect is substantial, a one-standard deviation increase in intermediary effective risk aversion is associated with a two/three times larger standardized subjective risk premia over a one-year horizon. This result offers new evidence that the financial health of the intermediary sector is a driver of the return expectations of professional forecasters, at least for an intermediated asset class as commodities. Subjective risk premia exhibit countercyclical variations within an intermediary-based asset pricing framework. Additionally, this finding indicates that shocks to intermediary capital may serve as a relevant source of information on which investors rely to form their return expectations.

Next, I explore the "financialization" of commodity markets to understand whether the relationship between intermediaries and subjective return expectations changes over time. To do so, I extend the baseline predictive regression by including an interaction term between intermediary effective risk aversion and a financialization dummy variable. The previously estimated coefficient masks a more complex dynamic. Before the "financialization" intermediary financial health drives variations in subjective return expectations more strongly than what observed on average. However, the relevance of intermediaries, specifically primary dealers, diminishes after the financialization. In particular, a one-

standard deviation increase in the intermediary risk aversion measure is associated with at least a threefold increase in the standardized subjective risk premia over the one-year horizon. In contrast, after the financialization, there is a marginal decay in this relation of at least two times the full sample average. Overall, these findings reinforce the evidence on the existence of the relationship between intermediaries and subjective risk premia, while also documenting a significant time variation in this relation.

After revealing the change in the relationship between intermediary financial health and subjective risk premia following the "financialization", I shed light on the potential economic mechanism behind the declining relevance of primary dealers in driving commodities subjective risk premia. To this aim, I investigate two main hypothesis.

First, the "financialization" was characterized by a large and fast increase in participation of institutional investors, such as hedge funds and mutual funds. Hence, one hypothesis is that primary dealers began to lose their significance as marginal investors in the commodity markets, while other types of institutional investors entering the market started to gain more prominence over time. Consequently, I build upon a placebo test in He et al. (2017) and construct a measure of the financial health of *non*-primary dealers, i.e. standalone broker-dealers such as Blackrock and Charles Schwab. In contrast to my results for primary dealers, I find that the financial health of non-primary dealers is not relevant for return expectations before the "financialization". However, it gains importance over time, indicating that different types of financial intermediaries drive the dynamics of return expectations differently. This result partially complements recent research, including Kargar (2021) and Ma (2023), showing that the composition of the financial sector has important asset pricing implications beyond the health of the aggregate financial sector, particularly for stocks and bonds but less so for other asset classes like commodities. Overall, my findings indicate that there is a change over time in the relevance of different intermediary types for return expectations. Hence, the heterogeneity among financial intermediaries plays a non-trivial role in shaping the dynamics of subjective risk premia in commodity markets. Moreover, the source of information that investors use to form their expectations appears to change over time, in conjunction with shifts in the composition

of market participants.

Second, the rise of index investing presents an alternative mechanism that could contribute to the declining relevance of primary dealers in driving subjective risk premia following the "financialization". To investigate this possibility, I examine the predictability of the return expectations for a portfolio composed of non-index commodities. The findings indicate that the role of primary dealers' financial health in driving variation in subjective risk premia for non-index commodities does not significantly decrease after "financialization". Therefore, the decline is primarily observed in those commodities more profoundly affected by "financialization", namely, commodities that constitute major indexes. This result could suggest that the substantial influx of slow-moving capital through index investing contributes to the reduced role of primary dealers in actively shaping commodity risk premia. However, it also appears that the influx of index capital is not the primary driving force behind the observed dynamics.

Furthermore, as the expectations of professional forecasters encompass beliefs from various types of intermediaries, I also conduct a separate analysis to distinguish between the subjective risk premia of primary dealers and those of all other professional forecasters (commercial banks, financial advisors, etc). Subsequently, I examine how the financial health of primary dealers and non-primary dealers independently relates to the return expectations within the two distinct subgroups of professional forecasters. Overall, the findings reveal similar patterns to those observed across all forecasters for both subgroups. Specifically, while the financial health of primary dealers is a significant driver of subjective risk premia on average, its relevance diminishes in the wake of the "financialization". In contrast, the significance of the financial health of non-primary dealers appears to increase only later. Hence, the return expectations of various types of investors have similar dynamics with respect to the financial health of different intermediaries. This suggests that intermediaries' return expectations exhibit a substantial degree of homogeneity in their reliance on these shocks.

My results are robust to additional analysis. I start by exploring the Consensus Economics forecasts' panel dimension through panel tests of each forecaster's subjective

return expectations. These tests are conducted on both the average intermediary financial health and on the forecaster's own financial health. To address a non-discrete effect of the "financialization", I construct a continuous financialization-measure using the growth in open interest as an alternative to the baseline dummy variable. Moreover, to account for potential changes in commodity markets during the "financialization", I consider various factors that might have influenced the dynamics of excess returns around this episode. These factors include, among others, potential shifts in hedging pressure from hedgers to speculators, which are controlled for using measures constructed from CFTC data as in Szymanowska et al. (2014). Overall, the relevance of intermediary financial health in driving commodity subjective risk premia, and the decrease in the significance of primary dealers after financialization, are robust to alternative specifications. Lastly, the relevance of intermediaries in driving variations in commodity subjective risk premia does not appear to be confined to a specific period of intermediaries distress, such as the global financial crisis.

Literature Review. This work contributes to three main strands of the literature. First, it adds to the growing body of research on the dynamics of survey expectations and risk premia within and across asset classes. This includes studies on stocks (Adam et al. (2021), De La O and Myers (2021), Heyerdahl-Larsen and Illeditsch (2021), Nagel and Xu (2022), Jensen (2022), Bastianello (2022), Dahlquist and Ibert (2023), and Boons et al. (2023)), bonds (Piazzesi et al. (2015), Cieslak (2018), Xu (2020), Giacoletti et al. (2021), and Singleton (2021)), foreign bonds (Pesch et al. (2023)), forex (Valente et al. (2022), Dahlquist and Söderlind (2023) and Kremens et al. (2023)), and across asset classes, including commodities, (Bacchetta et al. (2009), Andonov and Rauh (2022), and Nagel and Xu (2023)). Many of these papers examine the cyclical patterns of subjective risk premia computed from professional or individual forecasts. However, the evidence on what drives the return expectations has so far been limited and mixed (see also Adam and Nagel (2023) for a review). My study diverges from the existing literature by recognizing that the return expectations of professional forecasters predominantly reflect the expectations of financial intermediaries. Consequently, it demonstrates that the dynamics of subjective risk premia,

for an intermediated asset class as commodities, exhibit countercyclical variations with the financial health of intermediaries. This finding suggests that intermediary-based models offer a promising framework for examining the dynamics of subjective risk premia and to understand how financial intermediaries, i.e. marginal investors, form their expectations.

The second strand of the literature to which I contribute consists of studies on intermediary-based asset pricing. These papers emphasize that financial intermediaries are the marginal investors in financial markets. Therefore, in theory, intermediaries should affect asset prices and expected returns (see, for example, the models in He and Krishnamurthy (2012), He and Krishnamurthy (2013) and Brunnermeier and Sannikov (2014)). Empirically, the dynamics of intermediary balance sheet indeed explain cross-sectional and time series variation of realized returns in stocks and bonds (Adrian et al. (2014) and Haddad and Sraer (2020)), MBS (Gabaix et al. (2007) and Diep et al. (2021)), commodities (Etula (2013)), options (Chen et al. (2019)), FX and emerging markets sovereign bonds (Fang and Liu (2021) and Du et al. (2023)) and, more broadly, in many asset classes (He et al. (2017) and Baron and Muir (2022)). More specifically, Haddad and Muir (2021) employ an identification strategy that assesses the level of intermediation across different asset classes and demonstrate that the marginal value of wealth of intermediaries primarily drives realized returns in more sophisticated asset classes. Furthermore, as suggested by Kargar (2021) and Ma (2023), the composition of the financial sector also plays a crucial role in explaining realized returns in stocks and bonds, but has a weaker impact on other asset classes like commodities. My paper extends this finding by demonstrating that the financial health of intermediaries can also explain variations in ex-ante measures of expected returns that directly capture investors' real-time return expectations, and whose dynamics may differ from those of realized returns. This suggests that intermediary-based models are ideal for explaining time-varying risk premia. Additionally, I connect this literature with research on the "financialization" of commodity markets. This allows me to provide empirical evidence on the time-varying nature of the relationship between intermediaries and expected returns, as well as on the importance of heterogeneity among intermediaries in driving risk premia also in commodity markets.

Lastly, this paper contributes to the literature that examines how the "financialization" of commodity futures markets has affected commodities and, consequently, the real economy (for a broad discussion and an early review of the literature, see Cheng and Xiong (2014)). On the empirical side, several papers, including Boons et al. (2014) and Büyükşahin and Robe (2014), have documented a significant shift in the correlation between commodities and stocks after "financialization". Moreover, Singleton (2014), Henderson et al. (2015), Brogaard et al. (2019) and Da et al. (2023), examine the effects of this increase in capital inflows from institutional and index investors on commodity futures prices, volatilites, and price informativeness. Similarly, on the theoretical side, Basak and Pavlova (2016) and Goldstein and Yang (2022) argue that the "financialization" of commodity markets led to changes in commodity futures prices, volatilities, price informativeness, and correlations among commodities and with other assets such as stocks. Lastly, Baker (2021) calibrates a macro-finance model for storable commodities and finds a decrease in their risk premium in response to "financialization". I contribute to this literature by analysing how the relevance of financial intermediaries in driving commodity risk premia changed around the "financialization". Specifically, I show that after the "financialization" the financial health of primary dealers is a less relevant driver of commodity subjective risk premia than it was before. On the other hand, the change in the mix of market participants and the entry of institutional investors during the "financialization" period led to different types of financial intermediaries, for example *non*-primary dealers, gaining increased importance over time in driving commodity subjective risk premia. Hence, I highlight a connection between the "financialization" of commodity futures markets and heterogeneous intermediary asset pricing.

The paper is organized as follows. Section 2 describes the data used to construct commodity subjective risk premia and the measures of intermediary financial heath. Section 3 presents the main empirical strategies and results. Section 4 analyses the mechanism behind the patterns observed after the "financialization". Section 5 conducts robustness tests, while Section 6 explores extensions to the main analysis. Finally, Section 7 concludes.

2 Data

This section provides a description of the commodity futures and survey data, outlines the construction of subjective risk premia, and explains the measure of effective risk aversion employed to capture the health of financial intermediaries and to predict commodity subjective expected returns.

2.1 Commodity subjective expectations and risk premia data

I use commodity spot price forecasts to compute subjective expected excess returns on buy-and-hold futures positions. The consensus spot price forecasts are obtained from the Energy & Metals Consensus Forecasts by Consensus Economics. These surveys cover the period from August 1995 to December 2022 and serve as the data source for commodity futures markets (e.g., Nagel and Xu (2023)). The publication frequency of the surveys was quarterly before 2012, bi-monthly until 2015, and became monthly since 2016.[3] As common for surveys of professional forecasters, these forecasts represent the expectations of primary dealers (e.g., Citibank), commercial banks (e.g., ING Bank), financial advisors (e.g., Wilson HTM), and economic consulting companies (e.g., Oxford Economics). Hence, they potentially well reflect the expectations of financial intermediaries, i.e. the marginal investor in an intermediary-based framework.

Following Nagel and Xu (2023), and using a similar notation, I use the spot price forecasts to calculate the one-year expected excess returns from entering a one-year futures position at time t at the one-year futures price F_t and holding it until maturity $t+1$ (i.e., one year later) at the spot price S_{t+1}:[4]

$$\tilde{\mathrm{E}}_t[\mathrm{r}_{t,t+1}] = \frac{\tilde{\mathrm{E}}_t[\mathrm{S}_{t+1}]}{\mathrm{F}_t} - 1$$

where $\tilde{E}_t[S_{t+1}]$ represents the forecasted spot price from the Energy & Metals Consensus

[3] While the surveys are conducted regularly, there were some instances when they were not carried out on certain dates. For example, during the period August 2002 to March 2004, and in the third quarter of 2007, there are no forecasts available.

[4] As typical in commodity futures markets, the spot price S_{t+1} is proxied by a futures price very close to the spot price shortly before maturity.

Forecasts data. The futures data are obtained from Datastream and Bloomberg. The one-year futures price (F_t) is the price at the end of date t of the next maturity contract at date $t+1$ (e.g., Bakshi et al. (2019)). In the remainder of the paper, the notation $t+1$ represents a one-year time horizon. However, it is important to note that the frequency of the data aligns with the frequency of the surveys, as described at the beginning of this section (i.e. ranging from quarterly to monthly over the sample period). To compute an unique subjective excess return for each commodity, I take the average across forecasters for each commodity on each survey date.[5]

I construct two portfolios to use as (separate) test assets by taking an equal-weighted average of the subjective expected excess returns across the commodities within each portfolio. More specifically, the first portfolio, labeled *Commodity Portfolio*, consists of oil and four metals (copper, gold, aluminium, silver). These commodities are the major components of the S&P GSCI index, and have the highest coverage and longest history in the Energy & Metals Consensus Forecasts surveys. The second portfolio, labeled *Commodity Portfolio Extended*, includes additional energy commodities (RBOB gasoline, gas oil, natural gas) and metal commodities (nickel, lead, zinc, tin), expanding the range of commodities beyond those included in the previous portfolio.

Descriptive statistics for these portfolios are presented in Table 1. Figure 1 plots the subjective excess return expectations. In the Appendix, I also provide descriptive statistics (Table A.1) and plots (Figure A.1) for the realized excess returns of the portfolios.[6] Consistent with what highlighted in the previous literature, subjective expected returns tend to be, on average, smaller and less volatile than realized excess returns. Additionally, they can be negative for extended periods, partly in contrast to rational expectations models of risk premia.

[5]For robustness, I analyze the results when subjective excess returns are computed by taking the median across forecasters. As explained later, the findings of this exercise also indirectly speak at the accuracy of professional forecasters.

[6]Realized excess returns are computed similarly to subjective excess returns, but using ex-post realizations instead of ex-ante expectations: $r_{t,t+1} = \frac{S_{t+1}}{F_t} - 1$.

2.2 Intermediary financial health

To address whether the financial health of intermediaries drives variation in subjective risk premia, I examine a proxy of intermediaries' effective risk aversion as predictor. This measure has been theoretically and empirically shown in previous literature to capture intermediary distress and drives fluctuations in realized returns.

Specifically, my main predictor is the monthly *intermediary capital ratio* (henceforth, *icap*) from He et al. (2017) (Figure 2). This variable is constructed as:

$$\text{icap}_t = \frac{\sum_p \text{Market Equity}_{p,t}}{\sum_p (\text{Market Equity}_{p,t} + \text{Book Debt}_{p,t})}$$

where, for each intermediary-p, market equity is calculated as number of shares outstanding multiplied by the stock price, and book debt is calculated as total assets minus common equity. Overall, *icap* is constructed by aggregating the balance sheets of the *primary*-dealers sector, which consists of financial intermediaries that serve as counterparties to the monetary policy operations of the Federal Reserve Bank of New York. These primary dealers, including Citigroup, J.P. Morgan, Goldman Sachs, and others, are large and sophisticated financial institutions that trade across numerous asset classes, employing sophisticated investment strategies. Furthermore, they operate with minimal transaction costs and rely on sophisticated models and extensive data to develop forward-looking expectations for asset return strategies. As a result, they possess the essential attributes to serve as marginal investors in multiple markets. Hence, the marginal value of their wealth likely provides a more informative stochastic discount factor compared to other agents.

For robustness, I also consider a second predictor, namely the measure of intermediary financial health proposed in Haddad and Muir (2021), which is available only at quarterly frequency. However, the results for this second proxy need to be taken with caution as in some periods there are mismatches between the quarterly dates in which the surveys are conducted and the quarterly dates in which this measure are observed. Given this and other limitations explained in Section 5.6, I primarily focus on the monthly intermediary

capital ratio proposed by He et al. (2017), which does not face these challenges.

As common in other papers, I compute the annual growth rates in the predictors and then take their negative values. This transformation allows me to interpret the final predictors as measures of average intermediary effective risk aversion. Shocks to these measures should then be associated with changes in expected returns, according to intermediary-based asset pricing theories. To briefly explain the economic logic behind this, consider the intermediary capital ratio (*icap*), which reflects the equity capital of primary dealers. Higher values of *icap* indicate a greater risk-bearing capacity and lower effective risk aversion. This condition drives down the intermediary's marginal value of wealth and, consequently, leads to lower expected returns on risky assets going forward.

As Haddad and Muir (2021), I also emphasise that I do not provide a detailed theory for what determines intermediary risk bearing capacity, despite the two measures being motivated in previous papers. My main goal is to use existing and well-established proxies (and theories) from the literature to test whether they can rationalize variation in subjective risk premia as measured by return expectations of professional forecasters.

3 Main empirical analysis

In this section, I analyse whether and how the subjective return expectations of the forecasters for an intermediated asset class, commodities, vary over time with the financial health of intermediaries.

3.1 Predictive regressions

To assess whether the financial health of intermediaries drives variation in subjective risk premia, I conduct in-sample predictive regressions of the return expectations on the predictors that capture intermediary effective risk aversion:

$$\text{risk premia}^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1} \tag{1}$$

For ease of interpretation, I standardize the intermediary financial health predictors

γ_j (with $j = \{icap,\ intermediaryra\}$) to have unit standard deviations. I present the results for my primary predictor, *icap*, in this section while reserving the results for the alternative measure, *intermediaryra*, for the robustness section (Section 5.6). Additionally, for each portfolio of commodities-i, I normalize the subjective risk premia by their full sample standard deviation, i.e. (subjective) *risk premia*$^{\sigma}_{i,t+1} = \frac{\tilde{E}_t[r^i_{t,t+1}]}{\sigma(\tilde{E}_t[r^i_{t,t+1}])}$. To account for autocorrelation and heteroscedasticity in the error terms, I use Newey and West (1987) standard errors adjustment (as done also in Xu (2020) and Adam et al. (2021), among others) with Andrews (1991) lag-length selection.[7]

This methodological approach parallels the in-sample predictive regressions conducted in the previous literature on subjective risk premia (e.g., Xu (2020), Adam et al. (2021) and Nagel and Xu (2023), among others). However, it distinguishes itself by recognizing that a significant portion of professional forecasters are financial intermediaries. Consequently, it utilizes the financial health of intermediaries as a potential predictor to explain variations in these subjective risk premia. Thus, while the methodology is similar, my framework departs from the previous literature on the dynamics of subjective risk premia as it aims at indirectly testing whether intermediary-based asset pricing theories can rationalize variations in the subjective return expectations of professional forecasters.

Similarly, this specification aligns also with the one used in Haddad and Muir (2021) and other studies in the intermediary-based literature. However, unlike these papers, my analysis employs the financial health of intermediaries to explain variations in ex-ante measures of expected returns, which represent how investors perceive the dynamics of subjective risk premia in real-time, rather than ex-post measures as realized returns. As the literature of subjective risk premia as shown for the standard macro-finance framework, the dynamics of subjective risk premia might be different from that of ex-post (objective) risk premia (see Adam and Nagel (2023) for an overview of the discussion). Since time-varying risk premia models are about ex-ante expected excess returns, understanding the dynamics of these ex-ante survey-based measures of return expectations is of great importance for asset pricing.

[7]Results would be similar computing standard errors as in Hansen and Hodrick (1980).

In summary, the results of my analysis provide insights into how investors, particularly financial intermediaries, perceive the dynamics of subjective expected excess returns in real-time and whether these expectations can be rationalized within an intermediary-based asset pricing framework. Additionally, they allow to indirectly infer a potential information on which these marginal investors rely when forming their return expectations.

3.2 Baseline Results

Panel A of Table 2 presents the results. The health of financial intermediaries predicts one-year subjective excess returns in both the test assets. Specifically, when the health of financial intermediaries is in a bad state (i.e., when $\hat{\tilde{\gamma}}$ is high), subjective risk premia increase going forward. To provide an economic interpretation of the results, consider the estimated coefficient of 0.22 for the *icap* measure when the test asset is the *Portfolio Commodities Extended* (composed by energy + metals). Given that this portfolio has an average standardized subjective excess return of 0.21 (see Table 1), the estimated coefficient $\hat{\tilde{\gamma}}$ indicates that a one-standard deviation increase in the intermediary risk aversion measure is associated with a doubling of the standardized subjective risk premia over the one-year horizon. Similarly, standardized subjective risk premia in the other test asset would more than triple. Therefore, this effect is economically significant.

Overall, these findings complement the recent literature on the dynamics of subjective risk premia by showing that return expectations of professional forecasters vary countercyclically in an intermediary-based asset pricing framework, where intermediaries are the marginal investors in (at least) sophisticated markets. Additionally, they offer indirect evidence that shocks to the financial health of the intermediary sector are a significant factor on which marginal investors, particularly financial intermediaries, rely when forming their expectations.

3.3 "Financialization" of commodity markets

After establishing a relationship between intermediary financial health and return expectations of professional forecasters, a natural question to ask is whether this relationship

changes over time. Empirical evidence on the time varying nature of the link between financial intermediaries and expected returns are limited even in studies looking at realized returns. To address this point, commodity markets provide an ideal setting as they allow me to explore a rapid change over time in investors' types that occurred within the same market. This event is commonly referred to in the commodities literature as the "financialization" of commodity markets (see Basak and Pavlova (2016) and Goldstein and Yang (2022), among others).

3.3.1 Institutional background

Around 2004, commodity futures markets experienced a large and fast increase in investment inflows. For example, capital inflows from index investments grew from approximately $20 billion in 2003 to over $200 billion in 2008 (CFTC (2008), Stoll and Whaley (2010) and Irwin and Sanders (2011)). The total U.S. exchange-traded futures and futures option trading volume increased instead from around 630m contracts per year in 1998 to about 3.2b contracts per year in 2007, with growth observed across all commodities (CFTC (2008)). As shown by Boons et al. (2014) and Brogaard et al. (2019), as well as similarly replicated in Figure 3, total open interest across commodities remained relatively flat between 1998 and 2003 but experienced a dramatic increase after 2004.

At the same time, and importantly for the purpose of this study, there was also a significant change in the mix of market participants, with a strong influx of institutional and index investors (see Domanski and Heath (2007), Irwin and Sanders (2011), Basak and Pavlova (2016) and Brogaard et al. (2019)). The entrance of traders such as pension and endowment funds, mutual funds, hedge funds, commodity index traders, as well as retail investors, has altered the composition of participants in the market (see CFTC (2008), Büyükşahin and Robe (2014), Brunetti et al. (2016), and Goldstein and Yang (2022)). As of 2008, approximately 24% of the total net notional value of funds invested in commodity indexes was held by "Index Funds", and around 42% was held by "Institutional Investors" (CFTC (2008)).

Overall, this change in market structure and the significant influx of capital has been

dated in 2004 (e.g., Basak and Pavlova (2016) and Brogaard et al. (2019)) and is referred to as the "financialization" of commodity futures markets in the academic literature.

The consequences of this event are still the subject of debate among academics, regulators, and practitioners. This paper deviates from previous academic literature as it explores how the relation between financial intermediaries and subjective return expectations of professional forecasters changed around this shift in the mix of market participants.

3.3.2 Empirical analysis

In order to explore the role of the "financialization" of commodity markets on the relevance of intermediaries for commodity subjective risk premia, I augment the empirical specification in (1) as follows:

$$\text{risk premia}^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times \text{DF}_t) + d_{i,j}\text{DF}_t + \epsilon_{i,t+1} \tag{2}$$

where DF_t is dummy variable that takes the value 1 after the occurrence of the "financialization" in 2004 and 0 before (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others, on the choice of this date). I interact this dummy with the measures of intermediary effective risk aversion $\tilde{\gamma}_{j,t}$. Consequently, the coefficient $c_{i,j}$ represents the marginal contribution of the financialization to the relevance of intermediary financial health in driving subjective return expectations.

To ensure a balanced sample before and after the "financialization" event and to exclude any potential confounding periods during the post-"financialization" era, I apply the above specification to a sample period that concludes at the onset of the Global Financial Crisis (GFC)[8], in addition to analyzing the full sample period of the data.

The results are presented in *Panel B* of Table 2. The findings show that, before the financialization, the financial health of financial, particularly primary dealers, strongly drives variation in subjective risk premia. The coefficient $b_{i,j}$ associated with the measure

[8]The results remain robust when considering both mid-2007 (e.g., RBA and FED NY) or December 2007 (NBER recession) as the initial date of the global financial crisis.

of effective risk aversion $\tilde{\gamma}_{j,t}$ is positive and economically significant across portfolios. The estimate is larger than in the specification that does not account for the effect of the financialization. This is because the marginal contribution of the financialization, represented by the coefficient $c_{i,j}$ attached to the interaction term, is negative and quantitatively significant. Specifically, a one-standard deviation increase in the intermediary risk aversion measure is associated to a three to six times increase in the standardized subjective risk premia over the one-year horizon before financialization ($\hat{b}_{i,j}$ coefficient), but a marginal decay after the financialization of two to four times the full sample average ($\hat{c}_{i,j}$).[9]

In Section 4, I will show that, while the importance of primary dealers decreases with the change in the mix of market participants occurred around the financialization, the relevance of the financial health of other types of intermediaries, e.g. *non*-primary dealers, exhibits very different dynamics. Additionally, I will show that this decay observed for the financial health of primary dealers is not present in the return expectations on non-index commodities, i.e. in those commodities that were less affected by the financialization.

In summary, the results of this section demonstrate that while shocks to the financial health of the intermediary sector play key a role in driving variation in subjective risk premia in commodities, their relevance may change over time.[10] Hence, this result highlights and provides novel empirical evidence of the time-varying nature of the relationship between intermediary financial health and expected returns.

[9]Table A.2 in the Appendix shows a similar finding when running the specification in (1) for two subsamples: before and after the financialization of commodity markets. In the pre-financialization period, the estimated coefficient attached to $\tilde{\gamma}$ is more than two times larger, indicating a higher relevance of financial intermediaries, specifically primary dealers, for subjective risk premia. In the post-financialization period, the coefficient remains lower even after the global financial crisis.

[10]Table A.3 in the Appendix shows that the results remain robust even when constructing subjective expected returns by taking the median across forecasters for each commodity, rather than the mean. Therefore, it appears that, differently from individual forecasters, professional forecasters are on average potentially accurate (see also Buraschi et al. (2022) and Bastianello (2022) for a similar conclusion). This finding indirectly speaks at the evidence in Heyerdahl-Larsen and Illeditsch (2021), where the authors suggest that accounting for the heterogeneity in accuracy among individual forecasters helps reconcile the wedge in cyclicality between objective and subjective risk premia within a macro-finance framework.

4 Exploring the "financialization" decay: potential mechanisms

This section explores potential mechanisms that contribute to the decline in the relevance of intermediaries, mainly primary dealers, in driving subjective expected returns of commodities following the "financialization" (as observed in Section 3.3). Two main drivers are investigated, both associated with the changing composition of market participants around this event. The first driver relates to the increasing role of other types of intermediaries, for example standalone broker-dealers (i.e., non-primary dealers), occurred with the change in the mix of market participants. The second driver pertains to the increase in the inflow of slow-moving capital into the market through index investing.

4.1 *Non-primary* dealers

As discussed in Section 3.3, there was a strong entrance of institutional investors in commodity markets with the "financialization". Institutional traders, including pension funds, mutual funds, hedge funds, and commodity trading advisers, increased their participation in the commodity futures markets and altered the composition of market participants (see CFTC (2008), Büyükşahin and Robe (2014), Brunetti et al. (2016) and Goldstein and Yang (2022), among others).

In Section 2.2, I explained that the intermediary financial health measures primarily focus on primary dealers, such as JP Morgan or Goldman Sachs, which are large and sophisticated financial institutions operating across capital markets. Consequently, one possible explanation for the decline in the relevance of intermediaries in driving subjective risk premia after the financialization is that primary dealers experienced a diminished role as marginal investors, likely due to the entry of other institutional investors.

To investigate this possibility, I explore a placebo test conducted in He et al. (2017) comparing the role of primary dealers to *non*-primary dealers for realized returns. The authors demonstrate that the measure of intermediary financial health derived from the balance sheets of *non*-primary dealers explains cross-sectional variation in realized returns

in only a few markets.[11] In contrast, the financial health of primary dealers significantly influences the cross-section of many markets. *Non*-primary dealers such as Blackrock, Charles Schwab, and Waddell & Reed, are smaller, standalone broker-dealers that are less likely to trade extensively across asset classes and act as marginal investors in financial markets. Since the measure of their financial health captures the relevance of a different subset of institutional investors, it can provide valuable insights into the changes that occurred in the commodity markets with the shift of market participants during the financialization. Therefore, I incorporate it into my framework as follows.

Firstly, I construct the measure of financial health for *non*-primary dealers, labeled as *icap-nonprim*. In order to do so, I identify intermediaries based on the SIC codes of US broker-dealers, specifically codes 6211 ("security brokers, dealers, and flotation companies") and 6221 ("commodity contracts brokers and dealers"). From this pool of financial intermediaries, I exclude the primary dealers (as listed on the NY FED website). Using balance sheet information from CRSP/Compustat, I then construct the monthly *intermediary capital ratio* as described in Section 2.2, but only for the remaining standalone broker dealers (i.e., *non*-primary dealers) in the pool. This resulting measure, *icap-nonprim*, proxies for *non*-primary dealers effective risk aversion. I then repeat the analysis of Section 3, but using this new variable as predictor.

The results are reported in Table 3 and can be summarized as follows. Over my entire sample, the financial health of *non*-primary dealers drives variation in subjective expected returns in commodity markets. However, this finding conceals more complex dynamics. Specifically, *non*-primary dealers do not play a significant role until the aftermath of the financialization. Nevertheless, their relevance in driving subjective risk premia increases over the longer term following the financialization (even when excluding the period of the Global Financial Crisis from the analysis, see Table A.5). In contrast, primary dealers (Section 3.3) appear relevant for subjective risk premia before the financialization but less so after. This highlights that different types of intermediaries drive differently the

[11] Specifically, they use data on realized returns from approximately 1970 to just after the financial crisis, around 2012. Their findings indicate that the capital risk factor of *non*-primary dealers is priced only in few specific markets, such as equity, options, and credit default swaps (CDS). The price of risk in commodities, instead, is relatively weaker and lacks statistical significance.

dynamics of the subjective return expectations. Hence, the source of information on which investors rely to form their expectations potentially changes over time, in conjunction with shifts in the composition of market participants. Additionally, this result indirectly suggests that the role of primary dealers as marginal investors in commodity markets potentially decreased following the change in the mix of market participants, while that of different types of intermediaries slowly increased. This evidence also further reinforce the evidence in the previous section on the time-varying nature of the relationship between intermediary financial health and subjective risk premia.[12]

To make a more direct comparison between the relevance of primary and non-primary dealers' financial health, I present the results in Table A.6 where I compare how the two measures predict subjective risk premia within a single specification that includes them both simultaneously. The key findings align with the previous analysis. Prior to the financialization period, it is mainly the financial health of primary dealers that influences the return expectations of professional forecasters. However, in the post-financialization era, the importance of primary dealers' financial health diminishes over time, while that of non-primary dealers' financial health increases. Interestingly, on average, the financial health of non-primary dealers appears to play a more significant role. This observation could be attributed to the fact that the dataset covers a substantially longer post-financialization period compared to the pre-financialization period.

Additionally, my findings highlight the importance of accounting for heterogeneity among financial intermediaries when studying the relevance of intermediary financial health in driving commodity subjective risk premia. Therefore, these results are connected and complement recent papers by Kargar (2021) and Ma (2023), which show that the composition of the financial sector has important asset pricing implications beyond the health of the aggregate financial sector. For example, following a negative shock to their risk-bearing capacity (e.g., during the GFC), more aggressive and less risk-adverse intermediaries like broker-dealers are forced to reduce their (higher) leverage by selling assets. Consequently, for market clearing, less aggressive and more risk-adverse

[12]The findings in Table A.4 support the increased significance of non-primary dealers' risk aversion after the financialization, albeit with a lag, not limited to the financial crisis.

intermediaries, who are also less leveraged, such as bank holding companies (i.e., the primary dealers in He et al. (2017)) have to take on more assets than they would in the absence of margin constraints. In turn, the risk premium must increase to compensate the latter intermediaries to take more risk. Empirically, the composition of the financial sector has indeed both time series and cross-sectional explanatory power for realized returns, but mainly in stocks and bonds, while not in other asset classes such as commodities.

I then establish a more direct connection between my findings on the increasing relevance of *non*-primary dealers for commodity subjective risk premia after the financialization and the literature on heterogeneous intermediary asset pricing. To this goal, I construct a proxy of the wealth share of the more aggressive intermediary (i.e., the broker dealers) as a fraction of the total financial sector using monthly data. The measure is defined as:

$$\text{intermheterog}_t = \frac{\text{Market cap of dealers}_t}{\text{Market cap of the financial sector}_t}$$

where publicly traded broker dealers are identified as the US firms in the CRSP universe with SIC codes 6211 ("security brokers, dealers, and flotation companies") or 6221 ("commodity contracts brokers and dealers"), and the financial sector consists of firms in the CRSP universe for which the first two digits of the header SIC code are between 60 and 67. This variable is inspired by a monthly measure discussed in Kargar (2021). Then, I repeat the analysis using this proxy for intermediary heterogeneity as predictor.

The results, presented in Table 4, demonstrate that the significance of the financial sector's composition in driving commodity subjective risk premia increases notably over time following the financialization, although not immediately after its occurrence (but not solely during the global financial crisis period, see Table A.5).[13] The mix of market participants changed indeed substantially over time with the financialization of commodity markets, resulting in increased heterogeneity among intermediaries. *Non*-primary dealers gained relevance in driving subjective risk premia, while primary dealers lost it. Therefore, over time, this increase in heterogeneity potentially enhanced the importance of the

[13] Kargar (2021)'s sample for commodities covers around 40 years of data, with almost three quarters belonging to the pre-financialization period. Thus, not only his focus is on realized returns, but also his sample is significantly more influenced by the pre-financialization era than mine.

composition of the financial sector in driving subjective expected returns in this market.

In summary, heterogeneity across intermediaries plays a relevant role for the dynamics of commodity subjective risk premia. Around the financialization of commodity markets, the prominence of primary dealers in driving subjective risk premia has decreased while that of other types of intermediaries, e.g. non-primary dealers, has increased. Investors potentially change the information on which they condition their expectations over time. Overall, my findings in this section highlight the complex relationship between intermediary heterogeneity, subjective risk premia, and the financialization of commodity markets.

4.2 Index investing

As discussed in Section 3.3, the financialization was characterised by significant capital inflows into commodity indexes, such as the S&P Goldman Sachs Commodity Index or the Dow Jones UBS Commodity Index. Consequently, to shed further light on the observed decay in the relevance of primary dealers, a potentially informative exercise is to analyse the dynamics of the return expectations of professional forecasters for non-index commodities, i.e. for those commodities less influenced by the financialization.

Therefore, I conduct an analysis similar the one in Section 3.3 but now focusing on a portfolio of non-index commodities (i.e., of commodities that do not constitute a major commodity index). However, it is important to note that this exercise faces data limitations, as the sample of non-index commodities included in the Consensus Economics surveys, for which also a futures price is available to compute the subjective excess returns, is limited and noisy. Specifically, I examine two non-index commodities, Tin and Platinum, available for the period of 1996 to 2022, along with three non-index commodities, Palladium, Coal, and Steel, for which data series start at a later part of the sample. I construct a non-index commodity portfolio by taking the equal-weighted average of their subjective excess returns. The results are presented in Table 5.

Primary dealers' financial health drives variation also in subjective risk premia of these non-index commodities. However, when investigating changes in this relationship around the financialization period, a different pattern emerges compared to Section 3.3.

Contrary before, there is no longer a decrease in the relevance of primary dealers' financial health. If anything, the effect appears to be moving in the opposite direction right after the financialization. Overall, these findings, although requiring a degree of caution, indicate that the decline in the significance of primary dealers' financial health in shaping the return expectations of professional forecasters is primarily noticeable for commodities that experienced a greater impact from financialization. Moreover, the results suggest that the influx of slow-moving capital into index commodities may potentially reduce the direct influence of primary dealers on expected returns, albeit to a lesser extent than the increased importance of various other types of financial intermediaries.

5 Robustness

This section conducts robustness tests on the main analysis presented in Section 3.

5.1 Panel Tests

To explore the panel dimension of the Consensus Economics data, I also conduct panel tests using the subjective risk premia of each forecaster, denoted as f, for each commodity, denoted as i. Specifically, I consider all twelve commodities included in the *Portfolio Commodities Extended*.

First, I estimate the following panel regressions:

$$\text{risk premia}^{\sigma}_{f,i,t+1} = b \times \tilde{\gamma}_t + \eta_f + \psi_i + \epsilon_{f,i,t+1}$$

$$\text{risk premia}^{\sigma}_{f,i,t+1} = b \times \tilde{\gamma}_t + c\,(\tilde{\gamma}_t \times DF_t) + d \times DF_t + \eta_f + \psi_i + \epsilon_{f,i,t+1}$$

where η_f represents forecaster-f fixed effects, and ψ_i are commodity-i fixed effects. In this setup, the individual subjective return expectations for each commodity are regressed on the average financial health of both primary and *non*-primary dealers. This specification allows for the disentanglement of the financialization impact and mirrors the time-series tests conducted in the main analysis. Standard errors are clustered by forecaster.

The results of these panel tests are reported in Table 6. Despite smaller magnitudes, the results corroborate the primary findings: the financial health of primary dealers impacts return expectations on average, and especially before financialization, while the financial health of *non*-primary dealers becomes relevant after financialization. Additionally, these results suggest potential homogeneity among expectations.

In the Appendix, a separate panel test is conducted. I match, when possible, forecasters in the Consensus Economics data with their own financial health. The final subset primarily comprises of primary dealers. Then, I estimate the following panel regression of each forecaster's subjective risk premia against its own financial health:

$$\text{risk premia}^{\sigma}_{f,i,t+1} = b \times \tilde{\gamma}_{f,t} + \eta_f + \psi_i + \epsilon_{f,i,t+1}$$

where η_f represents forecaster-f fixed effects, and ψ_i are commodity-i fixed effects. Standard errors are clustered by forecaster. The results of these panel tests are reported in Table A.7. Similarly, it appears that the worse the financial health of the individual forecaster, indicating a higher effective risk aversion $\tilde{\gamma}_{f,t}$, the higher the returns the forecaster subjectively expects to earn to invest in risky assets like commodities.

Overall, the results from this section reinforce the significance of intermediary financial health in impacting the subjective return expectations of the intermediaries providing forecasts.

5.2 Continuous Financialization Variable

Specification (2) employs a dummy variable to capture the effect of the "financialization". However, as discussed in Section 3.3, the "financialization" of commodity futures markets is not necessarily a discrete event that occurred immediately in 2004, but rather a rapid and substantial influx of capital that took place in an unprecedented manner within only a few years after that date. Therefore, as a robustness check, I construct an alternative continuous measure of "financialization" (DFOI_t). This new variable is designed to take the value 0 before the date commonly employed as the initial date of "financialization" in the academic literature (i.e., January 2004, see Basak and Pavlova (2016) and Brogaard

et al. (2019), among others). It takes the value 1 after the end of 2007, signifying the period when the sudden increase in capital inflows reached a peak. Between these dates, it assumes values equal to the (standardized) growth in open interest. By employing the growth in open interest as a proxy, I can capture the significant increase in capital inflows documented in the literature during the "financialization" period (see, for example, CFTC (2008) and Brogaard et al. (2019) for a similar interpretation of this measure).

Tables A.8 and A.9 present the results for the financial health of primary and non-primary dealers, respectively. The findings remain qualitatively similar to those observed in Section 3.3. On one hand, the financial health of primary dealers significantly drives the dynamics of return expectations of the professional forecasters before the financialization, but its relevance diminishes afterward. On the other hand, the financial health of non-primary dealers is not significant before the financialization, but its importance increases over time, albeit not immediately in the aftermath of the financialization. Overall, the results confirm the time-varying nature of the relationship between intermediaries and subjective return expectations, as well as as the importance of accounting for heterogeneity among financial intermediaries when studying the dynamics of risk premia.

5.3 Changes in the sensitivity of intermediaries to the measure of effective risk aversion

A potential concern is that around the "financialization" there might have been a break in how the capital ratio of intermediaries maps into the level of effective risk aversion. In other words, the sensitivity of primary dealers to the measure of effective risk aversion might have experienced a change that could alter the estimated relevance of this measure on subjective risk premia around the financialization.

To address this concern, I construct a proxy of the sensitivity of how the capital ratio of primary dealers changes with their stock risk premia over time by estimating the following out-of-sample regression:

$$\text{Dealers risk premia}^{\sigma}_{t+1} = a_t + s_t\tilde{\gamma}_t + \epsilon_{t+1}$$

where Dealers risk premia$^{\sigma}_{i,t+1}$ is a portfolio of excess returns of the primary dealers from which the risk aversion measure is constructed. $\hat{s}_t$ is then the resulting proxy of sensitivity over time.

I then augment the regression in (2) to control for this potential change in the sensitivity of intermediaries to the measure of effective risk aversion:

$$\text{risk premia}^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + e_{i,j}\hat{s}_t + \epsilon_{i,t+1}$$

Table A.10 reports the findings. Overall, the relevance of primary dealers in driving commodity subjective risk premia before the financialization, and the decrease in this relationship afterwards, continue to hold.

5.4 Changes in hedging pressure and open interests

Commodity markets are potentially characterized by a risk premium paid by hedgers to unload their risks to speculators (Keynes (1930) and Hicks (1939)). Empirical tests of this view require speculators to refrain from hedging and primarily engage in speculation to accommodate hedging needs. In contrast, the intermediary-based view of the market does not necessarily rely on these assumptions.

However, the "financialization" of commodity markets, in theory, may have reduced the premium paid by hedgers by increasing speculation in the market. While evidence on the existence of a hedging pressure premium is mixed and subject to ongoing debate, recent progress has been made by Kang et al. (2020), which uncovers the existence of two premia within hedging pressure. The authors find that the liquidity premium, which constitutes part of the hedging pressure premium, remains unchanged around the financialization. Furthermore, Baba Yara and Bondatti (2022) do not observe a decrease in the hedging pressure premium when examining changes in commodity trading strategy returns around the financialization. Nevertheless, as these studies focus on realized returns rather than subjective return expectations, I repeat the test in (2) while controlling for hedging pressure. The hedging pressure measure, constructed according to Szymanowska et al.

(2014) using data from the Commodity Futures Trading Commission (CFTC), is given by:

$$\text{hp}_t = \frac{\#\text{short hedge positions} - \#\text{long hedge positions}}{\text{total } \#\text{ short hedge positions}}$$

Additionally, as previously mentioned, the financialization of commodity markets was accompanied by a rapid increase in capital inflows. Therefore, I use an aggregate measure of open interest, constructed from CFTC data, as a proxy for inflows and include it as a control variable in the specification in (2).

The results of these two robustness tests around the financialization are presented in Tables A.11 and A.12. The findings of Section 3.3 continue to go through. The impact of hedging pressure on subjective risk premia is weak, even when analyzing a period limited to the aftermath of the financialization. However, the significance of primary dealers' effective risk aversion in driving subjective expected returns and the marginal decay of this relationship after the financialization persist.

5.5 Business Cycle Fluctuations and Household Risk Aversion

While prior literature has primarily focused on the importance of financial intermediaries on realized returns as natural candidates to be marginal investors in financial markets, Haddad and Muir (2021) take a step further by assessing their relevance particularly in more sophisticated asset classes. In order to do so, they employ an identification strategy across different asset classes, ranking them by the level of intermediation, and demonstrate that intermediary financial health has a more pronounced impact on more sophisticated assets like MBS, CDS, or commodities, while household financial health is more relevant for less intermediated assets such as equities. This empirical approach enables them to address the issue of multicollinearity between these two categories of variables.

Due to my data limitations on the return expectations in other asset classes, I cannot adopt the same empirical strategy. However, to shed further light on the relevance of financial intermediaries compared to households, I directly extend the specifications presented in equations (1) and (2) to include consumption growth (which is also available

at monthly frequency). Additionally, to be as restrictive as possible, I also simultaneously incorporate business cycle variables as controls, which could potentially predict commodity returns, specifically industrial production and the term spread.

Table A.13 presents the results of this robustness analysis. On average, none of the four predictors appear to be statistically significant. Notably, the financial health of primary dealers and industrial production exhibit stronger economic significance. However, this outcome suggests a potential issue of multicollinearity. Importantly, when I separate the "financialization" effect, the financial health of primary dealers remains a relevant factor in explaining return expectations before the financialization, with the highest economic impact among the predictors. Moreover, its significance continues to diminish considerably after the financialization period. Hence, while subject to caution, these results still seem to highlight an important role played by intermediaries in shaping return expectations of professional forecasters.

5.6 Alternative measure of intermediary financial health

For robustness, I examine an alternative proxy of intermediary financial health proposed in Haddad and Muir (2021), which I label *intermediaryra*. This measure, is constructed from the quarterly intermediary capital ratio of He et al. (2017) and the quarterly broker-dealer leverage factor of Adrian et al. (2014). The two measures are standardized and averaged to obtain the final proxy.

However, due to the quarterly nature of *intermediaryra*, caution is required when interpreting the results for this measure. This is because in some periods there are mismatches between the quarterly dates in which the surveys are conducted and the quarterly dates in which the measure is observed.[14] Additionally, the recent studies on heterogeneous intermediaries and asset prices (see Kargar (2021) and Ma (2023)) have shown that the two measures averaged in *intermediaryra* may capture distinct dynamics. As my findings emphasize the significance of intermediary heterogeneity for subjective risk

[14]As a result, either the observations for the quarterly *intermediaryra* measure are leaded/lagged to match the dates of the surveys, resulting in a sample period that partly covers different months, or some dates do not have a match between subjective risk premia and the quarterly intermediary measure, leading to missing observations.

premia, the monthly *icap* measure of He et al. (2017) represents a more suitable baseline.

Nevertheless, I repeat the main analysis using as predictor this second proxy of intermediary financial health (i.e., *intermediaryra*). The results are presented in Tables A.14 to A.15. Due to space constraints, Table A.15 reports the financialization analysis with controls only up to the global financial crisis. Overall, the findings in Section 3 for the *icap* measure remain consistent. Specifically, financial intermediaries are important in driving the dynamics of subjective risk premia, but their relevance diminishes around the financialization. Hence, also this results highlight the importance of intermediary financial health as a driver of the return expectations of intermediaries, albeit with variations over time, and as an information on which they potentially condition to form their expectations.

6 Extension: Separating the Expectations

The findings so far have also highlighted that shocks to the financial health of the intermediary sector are a potentially relevant source of information on which investors, specifically financial intermediaries, rely on when forming their return expectations and producing their forecasts. However, as the professional forecasters are different types of intermediaries, one question that arises is whether these survey-based expectations are homogeneous or heterogeneous in nature.

Consequently, in this section, I extend the previous analysis by distinguishing between the expectations of primary dealers and those of other professional forecasters, including various types of intermediaries (e.g., commercial banks, financial advisors, etc.), within the Consensus Economics survey data. I construct subjective risk premia separately for these two categories and repeat the main analysis to investigate how the financial health of primary dealers and of non-primary dealers drives the return expectations of each subgroup of professional forecasters. The results are as follows.

Table 7 demonstrates that return expectations of both primary dealers and other professional forecasters similarly vary with the financial health of primary dealers, and particularly before the financialization. Especially when examining the aftermath of

financialization, it appears that the relevance of primary dealers' effective risk aversion in driving all the return expectations decreases, although the decay is weaker for the primary dealers' expectations. Qualitatively, these findings parallel the results in Section 3 for the average expectations across all professional forecasters.

Table 8 presents instead the results for the financial health of non-primary dealers and shows a similar pattern to Section 4.1. The return expectations of both subgroups of professional forecasters vary with the health of non-primary dealers. However, while the relevance of non-primary dealers' financial health is not evident before the financialization of commodity markets, it increases over time, although not immediately following the financialization. The economic magnitudes of the effect are similar for the return expectations of the two different subgroups[15].

Overall, the results of this analysis suggest that the return expectations of various types of professional forecasters are similarly driven by the financial health of different intermediaries. Various financial intermediaries may condition their return expectations on shocks to the intermediary sector's capital in a comparable manner. Hence, intermediaries' expectations for commodity excess returns appear to exhibit a substantial degree of homogeneity in the way they rely on these shocks. This evidence also helps mitigate potential concerns about the results being solely associated with a particular subgroup of forecasters or about the aggregation of expectations when examining averages.

7 Conclusions

I show that the subjective return expectations of professional forecasters for a sophisticated asset class, commodities, are impacted by shocks to the financial health of intermediaries. This relationship exhibits temporal variation and is contingent upon changes in the composition of financial intermediaries participating in the market. On average, the financial health of primary dealers plays an important role in driving the commodity subjective risk premia. However, following the "financialization" of commodity markets,

[15]Table A.16 shows that also the results for the heterogeneity among intermediaries in Section 4.1 hold when separating the expectations of professional forecasters.

which was characterized by a substantial increase in institutional and index investor participation, the significance of primary dealers diminishes. Conversely, the financial health of other financial intermediaries, such as non-primary dealers, gains prominence in shaping commodity return expectations over time post-"financialization". These findings unveil a novel driver for the dynamics of subjective risk premia in intermediated asset classes, providing empirical support for the relevance of financial intermediaries and their heterogeneity in understanding asset prices behavior. As the expectations of the professional forecasters reflect in large part expectations of financial intermediaries, the evidence presented in this study also sheds light on the information sources these marginal investors potentially rely on when forming their beliefs and producing forecasts. As also argued in Adam and Nagel (2023), understanding the expectations of intermediaries is a critical avenue for future research, given their influence on asset prices, asset allocation decisions (see Wang (2021) and De Marco et al. (2022)), and real outcomes like lending (see Ma et al. (2021)).

While this work represents an initial step in connecting the return expectations of professional forecasters with an intermediary-based asset pricing framework, future research could explore the applicability of this relationship across diverse asset classes characterized by varying degrees of intermediation. Additionally, it would be interesting to investigate potential variations in the properties of subjective return expectations among different market participant groups, including individual investors and various categories of professional investors (e.g., pension funds, insurance companies, hedge funds, etc.). Lastly, it would be useful to study how the financial health of specific institutional investors that entered commodity markets more robustly around the "financialization" (such as pension funds, endowment funds and hedge funds) drives the return expectations on commodities over time. This analysis would provide insights into which specific type of intermediary predominantly assumes the role of marginal investors in commodity futures markets post-"financialization".

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8 Tables and Figures

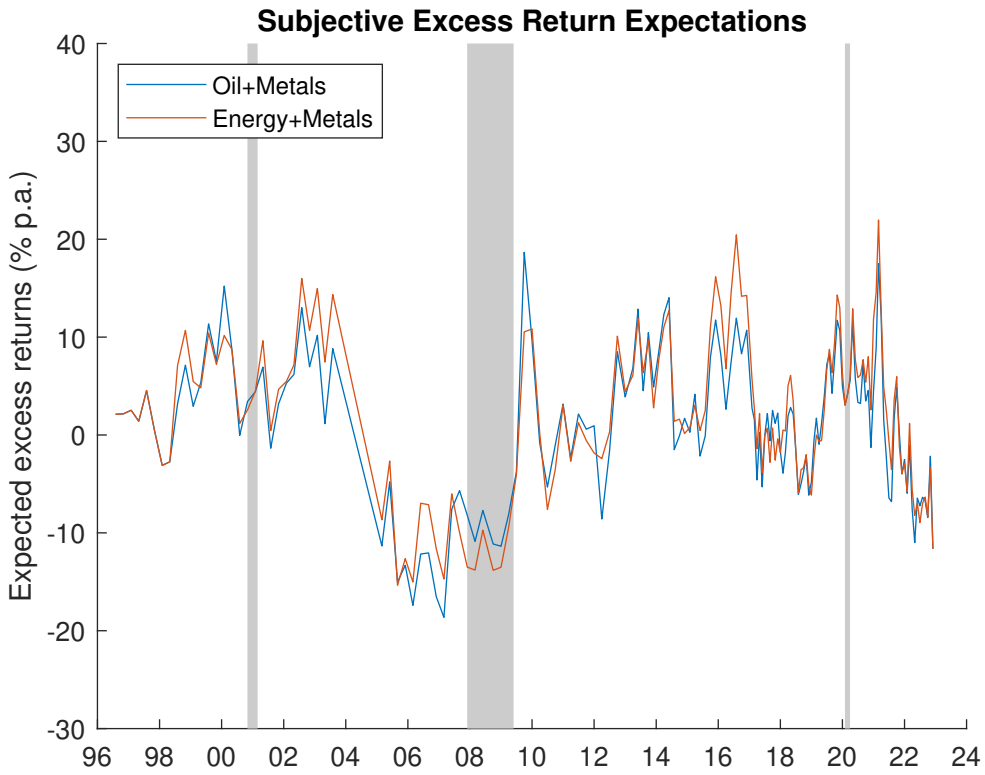

Figure 1: Subjective Excess Return Expectations

This figure plots the subjective excess return expectations implied by the Consensus Economics surveys of professional forecasters of each portfolio of commodities. Grey-shaded areas indicate recessions. The expected excess returns are over the one-year horizon. Descriptive statistics are reported in Table 1.

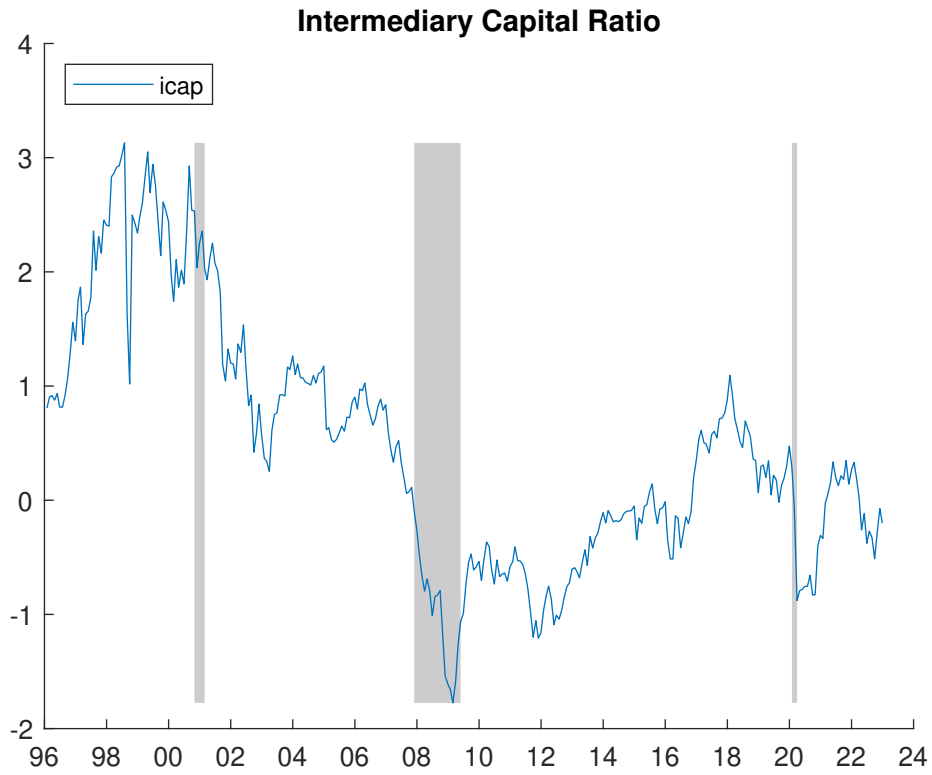

Figure 2: Intermediary Capital Ratio

This figure plots the standardized monthly intermediary capital ratio of He et al. (2017). Grey-shaded areas indicate recessions.

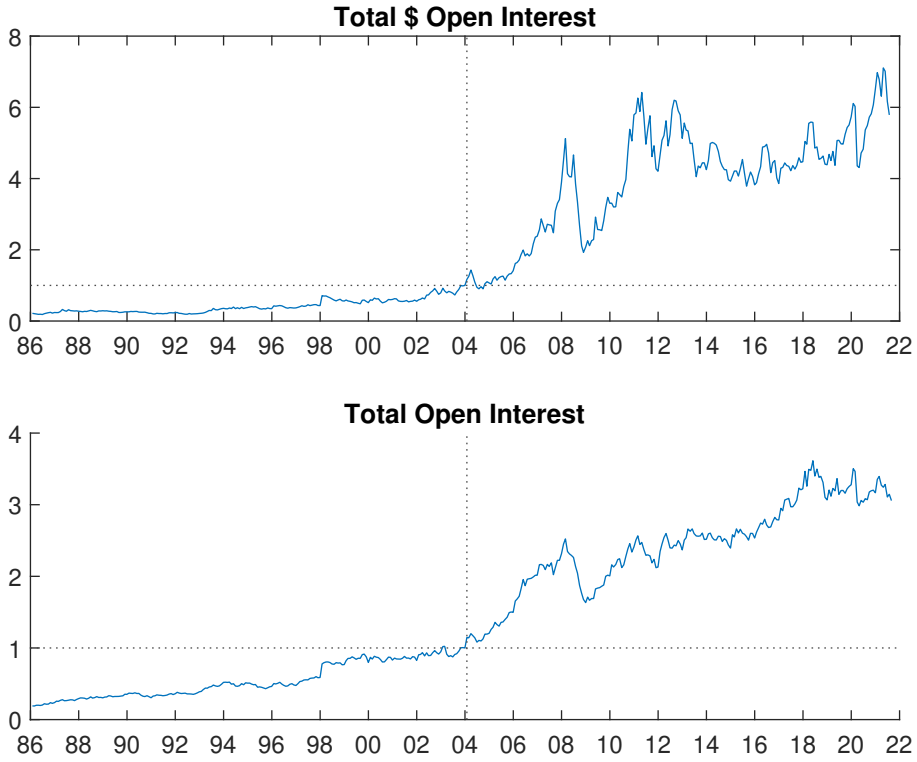

Figure 3: Total Open Interest

This figure plots the sum of open interest over time. The data cover the period 03/1986-12/2022 and are retrieved from the Commodity Futures Trading Commission (CFTC).

Table 1: Descriptive Statistics of Commodity Excess Returns Expectations

This table reports the one-year subjective excess returns as implied by the survey expectations of professional forecasters. I report the one-year excess returns on the two portfolios constructed. For each portfolio, the table reports the name, the survey used, the sample period, the mean (in %), the standard deviation (in %) and the standardized mean.

Portfolio	Source	Sample Period	$E[\tilde{E}_t[r_{t,t+1}]]$	$\sigma(\tilde{E}_t[r_{t,t+1}])$	$\frac{E[\tilde{E}_t[r_{t,t+1}]]}{\sigma(\tilde{E}_t[r_{t,t+1}])}$
Commodity Portfolio	Consensus Economics	08/1995-12/2022	0.66	7.23	0.09
Commodity Portfolio Extended	Consensus Economics	08/1995-12/2022	1.60	7.77	0.21

Table 2: Intermediary Financial Health and Subjective Risk Premia around the Financialization

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\hat{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. *Panel A* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported. *Panel B* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A		*Panel B*			
	Full Sample		Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.22	0.22	0.51	0.62	0.51	0.62
	[2.24]	[2.10]	[5.09]	[4.64]	[4.41]	[4.93]
$\tilde{\gamma} \times$ DF			-0.30	-0.41	-0.71	-0.84
			[-2.07]	[-2.44]	[-2.41]	[-3.37]
DF			-0.78	-0.79	-2.37	-2.23
			[-3.96]	[-4.01]	[-12.49]	[-13.97]
$Adj.R^2$	0.05	0.05	0.14	0.14	0.89	0.91
N	167	167	167	167	42	42

Table 3: Non-Primary Dealers Financial Health and Subjective Risk Premia

This table reports results of predictive regressions of excess return expectations on the proxy for intermediary risk aversion computed only for non-primary dealers $\tilde{\gamma}$ (i.e. *icap-nonprim*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. *Panel A* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported. *Panel B* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A		*Panel B*			
	Full Sample		Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.34	0.37	0.06	0.12	0.06	0.13
	[2.84]	[3.03]	[0.98]	[1.38]	[0.96]	[1.37]
$\tilde{\gamma} \times$ DF			0.59	0.50	0.05	-0.10
			[2.66]	[2.23]	[0.36]	[-0.70]
DF			-0.55	-0.51	-2.21	-2.05
			[-2.49]	[-2.40]	[-9.81]	[-10.65]
$Adj.R^2$	0.12	0.14	0.23	0.22	0.83	0.82
N	167	167	167	167	42	42

Table 4: Heterogeneous Intermediaries and Subjective Risk Premia

This table reports results of predictive regressions of excess return expectations on the monthly proxy for heterogeneity among intermediaries (i.e. *intermheterog*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. *Panel A* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported. *Panel B* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the measure of heterogeneity among intermediaries is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A		*Panel B*			
	Full Sample		Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.37	0.40	0.26	0.29	0.26	0.29
	[1.82]	[2.02]	[5.67]	[4.81]	[4.32]	[4.32]
$\tilde{\gamma} \times$ DF			1.37	1.35	0.57	-0.42
			[4.34]	[4.51]	[0.93]	[-0.71]
DF			-0.89	-0.90	-2.11	-2.36
			[-4.83]	[-4.36]	[-6.00]	[-6.99]
$Adj.R^2$	0.05	0.06	0.32	0.33	0.87	0.86
N	167	167	167	167	42	42

Table 5: Intermediary Financial Health and Subjective Risk Premia for Non-Index Commodities

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for a test asset containing non-index commodities. *Panel A* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported. *Panel B* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A	*Panel B*	
	Full Sample	Full Sample	Up to the GFC
$\tilde{\gamma}$	0.24	0.41	0.41
	[1.97]	[1.21]	[1.27]
$\tilde{\gamma} \times$ DF		-0.18	0.14
		[-0.5]	[0.36]
DF		-0.31	-1.49
		[-1.02]	[-5.28]
$Adj.R^2$	0.06	0.08	0.57
N	151	151	38

Table 6: Panel Tests - Forecasters' Subjective Risk Premia on the Average Intermediary Financial Health

This table reports the results of panel regressions of each forecaster's excess return expectations on the main proxy of intermediary risk aversion for both primary and *non*-primary dealers $\tilde{\gamma}$ (i.e., *icap* and *icap-nonprim*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the 12 commodities included in the *Portfolio Commodities Extended*. *Panel A* presents the results for the regressions on the financial health of the primary dealers. *Panel B* presents the results for the regressions on the financial health of the *non*-primary dealers. The panel regressions are in the following form: risk premia$^{\sigma}_{f,i,t+1} = b \times \tilde{\gamma}_t + c\,(\tilde{\gamma}_t \times DF_t) + d \times DF_t + \eta_f + \psi_i + \epsilon_{f,i,t+1}$, where the coefficients b, c and d are reported. Here, f represents the forecasters and i the commodities. All specifications include commodity and forecaster fixed effect. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics clustering by forecaster.

	Panel A			*Panel B*	
	Full Sample			Full Sample	
$\tilde{\gamma}$	0.15	0.29	$\tilde{\gamma}_{nonprim}$	0.27	0.07
	[10.80]	[6.35]		[15.09]	[6.64]
$\tilde{\gamma} \times$ DF		-0.15	$\tilde{\gamma}_{nonprim} \times$ DF		0.29
		[-3.14]			[9.71]
DF		-0.32	DF		-0.24
		[-4.70]			[-3.23]
$Adj.R^2$	0.24	0.30	$Adj.R^2$	0.43	0.54
N	29,619	29,619	N	29,619	29,619
Forecaster FE	Yes	Yes	Forecaster FE	Yes	Yes
Commodity FE	Yes	Yes	Commodity FE	Yes	Yes

Table 7: Separating Expectations: Intermediary Financial Health

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\hat{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk adverion measures. The subjective risk premia are for the test asset *Portfolio Commodities*, containing oil and four metals. However, the return expectations are divided over time into the expectations of the primary dealers and the expectations of all the professional forecasters except the primary dealers. The results are for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported.; and risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Expectations Primary Dealers			*Expectations Other Forecasters*		
	Full Sample		Up to GFC	Full Sample		Up to GFC
$\tilde{\gamma}$	0.27	0.49	0.49	0.16	0.48	0.48
	[2.77]	[4.81]	[3.93]	[1.50]	[4.56]	[4.41]
$\tilde{\gamma} \times$ DF		-0.23	-0.57		-0.34	-0.86
		[-1.53]	[-2.01]		[-2.24]	[-2.43]
DF		-0.71	-2.23		-0.81	-2.48
		[-3.67]	[-12.05]		[-4.05]	[-11.94]
$Adj.R^2$	0.08	0.09	0.86	0.15	0.12	0.89
N	167	167	42	167	167	42

Table 8: Separating Expectations: Non-Primary Dealers Financial Health

This table reports results of predictive regressions of excess return expectations on the proxy for intermediary risk aversion computed only for non-primary dealers $\tilde{\gamma}$ (i.e. *icap-nonprim*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk adverion measures. The subjective risk premia are for the test asset *Portfolio Commodities*, containing oil and four metals. However, the return expectations are divided over time into the expectations of the primary dealers and the expectations of all the professional forecasters except the primary dealers. The results are for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported.; and risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Primary Dealers Expectations			*Expectations Other Forecasters*		
	Full Sample		Up to GFC	Full Sample		Up to GFC
$\tilde{\gamma}$	0.36	0.07	0.07	0.31	0.05	0.05
	[2.91]	[1.25]	[1.27]	[2.72]	[0.71]	[0.70]
$\tilde{\gamma} \times$ DF		0.63	0.08		0.54	0.05
		[2.90]	[0.65]		[2.46]	[0.32]
DF		-0.47	-2.04		-0.60	-2.34
		[-2.20]	[-10.94]		[-2.65]	[-8.97]
$Adj.R^2$	0.13	0.25	0.81	0.10	0.21	0.83
N	167	167	42	167	167	42

A Appendix

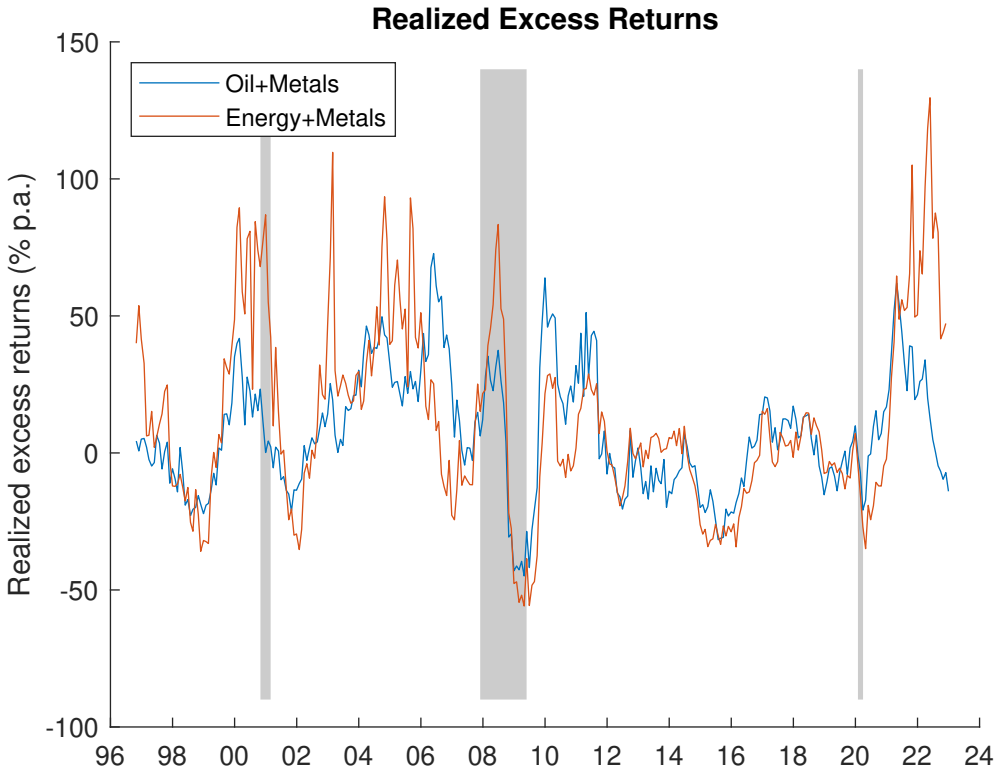

Figure A.1: Realized Excess Returns

This figure plots the realized excess return of each portfolio of commodities, computed using (ex-post realization) data from Datastream (and Bloomberg). Grey-shaded areas indicate recessions. The realized returns are over the one-year horizon. Descriptive statistics are reported in Table A.1.

Table A.1: Descriptive Statistics of Commodity Realized Excess Returns

This table reports the one-year realized excess returns. I report the one-year excess returns on the two portfolios constructed. For each portfolio, the table reports the name, the source used to retrieve the data, the sample period, the mean (in %), the standard deviation (in %) and the sharpe ratio.

Portfolio	Source	Sample Period	$E[r_{t,t+1}]$	$\sigma(r_{t,t+1})$	$\frac{E[r_{t,t+1}]}{\sigma(r_{t,t+1})}$
Commodity Portfolio	Datastream and Bloomberg	08/1995-12/2022	7.06	21.78	0.32
Commodity Portfolio Extended	Datastream and Bloomberg	08/1995-12/2022	12.17	33.20	0.37

Table A.2: Intermediary Financial Health and Subjective Risk Premia Across Subsamples

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *icap*). The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$ and the coefficients $b_{i,j}$ are reported. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022, but the regressions are run over three different subsamples: i) pre-financialization (left panel), post-financialization (mid panel), post-Global Financial Crisis (right panel). The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Pre-Financialization		Post-Financialization		Post-GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.51	0.62	0.21	0.21	0.28	0.31
	[4.37]	[4.63]	[2.13]	[1.96]	[2.55]	[2.92]
$Adj.R^2$	0.39	0.53	0.05	0.05	0.11	0.13
N	29	29	138	138	115	115

Table A.3: Intermediary Financial Health and Subjective Risk Premia, Using Median Subjective Returns

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. Subjective returns for each commodity are now computed taking the median, instead of the mean, across forecasters. *Panel A* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported. *Panel B* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A		*Panel B*			
	Full Sample		Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.19	0.20	0.51	0.63	0.51	0.63
	[1.87]	[1.83]	[4.49]	[4.34]	[4.38]	[5.12]
$\tilde{\gamma}$ × DF			-0.33	-0.45	-0.77	-0.84
			[-2.17]	[-2.48]	[-2.37]	[-3.07]
DF			-0.77	-0.76	-2.31	-2.18
			[-4.06]	[-3.74]	[-11.79]	[-12.86]
Adj.R^2	0.04	0.04	0.12	0.13	0.89	0.90
N	167	167	167	167	42	42

Table A.4: Non-Primary Dealers Financial Health and Subjective Risk Premia Across Subsamples

This table reports results of predictive regressions of excess return expectations on the monthly proxy of non-primary dealers risk aversion $\tilde{\gamma}$ (i.e. *icap-nonprim*). The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$ and the coefficients $b_{i,j}$ are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022, but the regressions are run over three different subsamples: i) pre-financialization (left panel), post-financialization (mid panel), post-global financial crisis (right panel). The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Pre-Financialization		Post-Financialization		Post-GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.06	0.12	0.65	0.63	0.64	0.69
	[0.92]	[1.35]	[3.11]	[3.18]	[3.31]	[3.64]
$Adj.R^2$	0.04	0.12	0.18	0.17	0.16	0.17
N	29	29	138	138	115	115

Table A.5: Non-Primary Dealers Financial Health and Heterogeneous Intermediary, and Subjective Risk Premia (Excluding the Global Financial Crisis)

This table reports results of predictive regressions of excess return expectations on the proxy for intermediary risk aversion computed only for non-primary dealers (i.e. *icap-nonprim*) and on the proxy for heterogeneity in intermediaries (i.e. *intermheterog*). The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$; and the coefficients b_t, c_t and d_t are reported. Subjective risk premia are normalized by their full-sample volatility and the two intermediary effective risk aversion measures are standardized. The sample period is from 08/1995 to 12/2022, but excludes the years of the Global Financial Crisis. I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	icap-nonprim				*intermheterog*			
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.29	0.32	0.06	0.12	0.31	0.33	0.26	0.29
	[2.57]	[2.76]	[0.98]	[1.38]	[2.72]	[2.03]	[5.66]	[4.81]
$\tilde{\gamma} \times$ DF			0.51	0.44			1.31	1.20
			[2.05]	[1.75]			[3.64]	[4.05]
DF			-0.53	-0.46			-0.91	-0.88
			[-2.33]	[-2.11]			[-4.68]	[-4.12]
$Adj.R^2$	0.09	0.11	0.19	0.19	0.09	0.11	0.30	0.28
N	156	156	156	156	156	156	156	156

Table A.6: Primary vs Non-Primary Dealers Financial Health, and Subjective Risk Premia

This table reports results of predictive regressions of excess return expectations on the monthly proxies of intermediary risk aversion computed for primary $\tilde{\gamma}_{icap}$ (i.e., *icap*) and non-primary $\tilde{\gamma}_{icap-nonprim}$ (i.e. *icap-nonprim*) dealers, on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. *Panel A* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported. *Panel B* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_i + b_{i,1}\tilde{\gamma}_{1,t} + c_{i,1}(\tilde{\gamma}_{1,t} \times DF_t) + d_{i,2}\tilde{\gamma}_{2,t} + e_{i,2}(\tilde{\gamma}_{2,t} \times DF_t) + f_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t, d_t, e_t and f_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the two intermediary effective risk aversion measures are standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A		*Panel B*			
	Full Sample		Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}_{icap}$	0.13	0.12	0.51	0.58	0.51	0.58
	[1.26]	[1.10]	[5.00]	[4.22]	[4.44]	[4.65]
$\tilde{\gamma}_{icap}$ × DF			-0.49	-0.56	-0.65	-0.80
			[-2.93]	[-3.07]	[-2.04]	[-3.20]
$\tilde{\gamma}_{icap-nonprim}$	0.30	0.33	0.01	0.06	0.01	0.06
	[2.42]	[2.57]	[0.14]	[1.76]	[0.17]	[1.92]
$\tilde{\gamma}_{icap-nonprim}$ × DF			0.62	0.55	0.08	-0.06
			[2.37]	[2.12]	[0.49]	[-0.34]
DF			-0.67	-0.65	-2.33	-2.19
			[-3.35]	[-3.43]	[-11.12]	[-11.29]
$Adj.R^2$	0.13	0.15	0.26	0.26	0.94	0.97
N	167	167	167	167	42	42

Table A.7: Panel Tests - Forecasters' Subjective Risk Premia on Their Own Financial Health

This table reports the results of panel regressions of each forecaster's excess return expectations on its own financial health. The forecasters considered in the regression are a subset of the Consensus Economics data universe, mainly primary dealers, for which the corresponding financial health could be matched. The subjective risk premia are for the 12 commodities included in the *Portfolio Commodities Extended*. The panel regressions are in the following form: risk premia$^{\sigma}_{f,i,t+1} = b \times \tilde{\gamma}_{f,t} + \eta_f + \psi_i + \epsilon_{f,i,t+1}$, where the coefficient b is reported. Here, f represents the forecasters and i the commodities. All specifications include commodity and forecaster fixed effect. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. I compute test statistics clustering by forecaster.

	Full Sample
$\tilde{\gamma}_f$	0.17
	[3.53]
$Adj.R^2$	0.13
N	11,229
Forecaster FE	Yes
Commodity FE	Yes

Table A.8: Primary Dealers Financial Health and Subjective Risk Premia around the Financialization (using a Continuous Financialization Variable)

This table reports results of predictive regressions of excess return expectations on the proxy for intermediary risk aversion computed only for non-primary dealers $\hat{\gamma}$ (i.e. *icap-nonprim*), on a continuous variable capturing the "financialization" $DFOI_t$, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1}$ = $a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DFOI_t) + d_{i,j}DFOI_t + e_{i,j}\hat{s}_t + \epsilon_{i,t+1}$; and the coefficients $b_{i,j}$, $c_{i,j}$, $d_{i,j}$ and $e_{i,j}$ are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.54	0.64	0.44	0.56
	[3.61]	[5.25]	[3.24]	[3.98]
$\tilde{\gamma} \times$ DFOI	-0.32	-0.43	-0.49	-0.58
	[-1.94]	[-3.12]	[-2.95]	[-3.53]
DFOI	-0.90	-0.89	-1.10	-1.07
	[-6.09]	[-7.39]	[-5.82]	[-9.95]
$Adj.R^2$	0.24	0.24	0.71	0.78
N	167	167	42	42

Table A.9: Non-Primary Dealers Financial Health and Subjective Risk Premia around the Financialization (using a Continuous Financialization Variable)

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\hat{\gamma}$ (i.e. *icap*), on a continuous variable capturing the "financialization" $DFOI_t$, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DFOI_t) + d_{i,j}DFOI_t + e_{i,j}\hat{s}_t + \epsilon_{i,t+1}$; and the coefficients $b_{i,j}$, $c_{i,j}$, $d_{i,j}$ and $e_{i,j}$ are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.09	0.16	0.09	0.14
	[1.29]	[1.56]	[1.42]	[1.61]
$\tilde{\gamma} \times$ DFOI	0.35	0.28	-0.05	-0.13
	[2.04]	[1.54]	[-0.60]	[-1.38]
DFOI	-0.60	-0.58	-1.02	-0.99
	[-6.09]	[-7.39]	[-5.39]	[-7.14]
$Adj.R^2$	0.27	0.26	0.66	0.71
N	167	167	42	42

Table A.10: Controlling for Changes in the Sensitivity of Primary Dealers to the Effective Risk Aversion Measure Around the Financialization

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\hat{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization, on its interaction with the intermediary effective risk aversion measures, and on a measure $\tilde{\gamma}$ that captures potential changes in the sensitivity of primary dealers to the effective risk aversion measure. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + e_{i,j}\hat{s}_t + \epsilon_{i,t+1}$; and the coefficients $b_{i,j}$, $c_{i,j}$, $d_{i,j}$ and $e_{i,j}$ are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.88	0.97	0.58	0.69
	[5.86]	[5.27]	[3.75]	[4.23]
$\tilde{\gamma} \times$ DF	-0.72	-0.81	-0.77	-0.90
	[-3.98]	[-3.86]	[-2.59]	[-3.55]
DF	-0.68	-0.69	-2.28	-2.15
	[-3.85]	[-3.70]	[-9.61]	[-11.13]
$\hat{s}$	-0.57	-0.54	-0.10	-0.10
	[-3.75]	[-3.23]	[-0.55]	[-0.67]
$Adj.R^2$	0.35	0.33	0.91	0.94
N	167	167	42	42

Table A.11: Controlling for Changes in Hedging Pressure Around the Financialization

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization, on its interaction with the intermediary effective risk aversion measures, and on a measure hp_t that captures potential changes in hedging pressure. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + e_{i,j}hp_t + \epsilon_{i,t+1}$; and the coefficients $b_{i,j}$, $c_{i,j}$, $d_{i,j}$ and $e_{i,j}$ are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.51	0.64	0.49	0.61
	[5.05]	[4.74]	[3.85]	[4.74]
$\tilde{\gamma} \times$ DF	-0.29	-0.44	-0.71	-0.83
	[-2.03]	[-2.56]	[-2.80]	[-3.30]
DF	-0.77	-0.78	-2.38	-2.24
	[-3.89]	[-3.98]	[-11.66]	[-13.93]
hp	-0.03	-0.47	-0.16	0.16
	[-0.97]	[-5.45]	[-1.63]	[1.61]
$Adj.R^2$	0.14	0.16	0.92	0.93
N	167	167	42	42

Table A.12: Controlling for Changes in Open Interests Around the Financialization

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization, on its interaction with the intermediary effective risk aversion measures, and on a measure oi_t that captures potential changes in open interests. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + e_{i,j}oi_t + \epsilon_{i,t+1}$; and the coefficients $b_{i,j}$, $c_{i,j}$, $d_{i,j}$ and $e_{i,j}$ are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.51	0.62	0.52	0.62
	[4.66]	[4.34]	[4.39]	[5.26]
$\tilde{\gamma} \times$ DF	-0.38	-0.43	-0.65	-0.87
	[-2.16]	[-2.06]	[-2.26]	[-3.57]
DF	-0.77	-0.80	-2.65	-2.23
	[-3.61]	[-3.74]	[-9.67]	[-13.77]
oi	-0.21	-0.06	0.23	0.10
	[-1.27]	[-0.30]	[1.98]	[1.22]
$Adj.R^2$	0.17	0.15	0.93	0.94
N	167	167	42	42

Table A.13: Controlling for Business Cycle and Household Risk Aversion

This table reports results of predictive regressions of excess return expectations on the main proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *icap*), on a dummy DF_t that takes value 1 after the financialization, on its interaction with the intermediary effective risk aversion measures, and on a set of controls for business cycle fluctuations and household risk aversion. These controls include: consumption growth, industrial production, and term spread. The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \mu_i \times controls_t + \epsilon_{i,t+1}$; and the coefficients $b_{i,j}$, $c_{i,j}$, $d_{i,j}$ and $e_{i,j}$ are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A		*Panel B*			
	Full Sample		Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.11	0.10	0.40	0.46	0.45	0.51
	[0.82]	[0.70]	[2.47]	[2.54]	[3.19]	[3.91]
$\tilde{\gamma} \times$ DF			-0.35	-0.43	-0.67	-0.65
			[-2.05]	[-2.29]	[-1.69]	[-2.16]
DF			-0.91	-0.92	-2.32	-2.20
			[-4.06]	[-4.38]	[-12.96]	[-12.85]
controls	✓	✓	✓	✓	✓	✓
$Adj.R^2$	0.08	0.09	0.20	0.21	0.97	0.99
N	167	167	167	167	42	42

Table A.14: Alternative Measure of Intermediary Financial Health and Subjective Risk Premia

This table reports results of predictive regressions of excess return expectations on the quarterly alternative proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *intermediaryra*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk adverion measures. *Panel A* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported. *Panel B* presents the results for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Panel A		*Panel B*			
	Full Sample		Full Sample		Up to the GFC	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.19	0.21	0.56	0.65	0.56	0.65
	[2.10]	[2.15]	[3.42]	[2.86]	[3.33]	[3.56]
$\tilde{\gamma} \times$ DF			-0.39	-0.47	-0.88	-1.03
			[-1.96]	[-1.86]	[-2.37]	[-3.04]
DF			-1.01	-0.98	-2.36	-2.21
			[-3.36]	[-3.38]	[-11.21]	[-13.42]
$Adj.R^2$	0.03	0.04	0.22	0.23	0.86	0.87
N	79	79	79	79	42	42

Table A.15: Alternative Measure of Intermediary Financial Health and Controls for Changes Around the Financialization

This table reports results of predictive regressions of excess return expectations on the quarterly alternative proxy of intermediary risk aversion $\tilde{\gamma}$ (i.e. *intermediaryra*), on a dummy DF_t that takes value 1 after the financialization, on its interaction with the intermediary effective risk aversion measures, and on different control variables that might change around the financialization. The controls are the ones studied in Section 5, namely: a proxy for changes in the sensitivity of intermediaries to the effective risk aversion measure ($\hat{s}$), a proxy for hedging pressure (hp_t), and a proxy for open interest (oi_t). The subjective risk premia are for the two test assets *Portfolio Commodities*, containing oil and four metals, and *Portfolio Commodities Extended*, containing energy and metals. The regressions are in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + e_{i,j}hp_t + \epsilon_{i,t+1}$; and the coefficients $b_{i,j}$, $c_{i,j}$, $d_{i,j}$ and $e_{i,j}$ are reported. Subjective risk premia are normalized by their full-sample volatility and the intermediary effective risk aversion measure is standardized. The sample period is from 08/1995 to 12/2022. For space constraints, the table reports only the results for the analysis up to the global financial crisis, i.e. in the aftermath of the financialization. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	$\hat{s}$		hp		oi	
	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals	Oil+Metals	Energy+Metals
$\tilde{\gamma}$	0.53	0.56	0.52	0.63	0.59	0.66
	[1.90]	[2.22]	[3.07]	[3.37]	[3.13]	[3.80]
$\tilde{\gamma} \times$ DF	-0.85	-0.96	-0.90	-1.01	-0.75	-1.06
	[-1.98]	[-2.70]	[-2.53]	[-2.95]	[-1.73]	[-2.93]
DF	-2.39	-2.29	-2.37	-2.22	-2.67	-2.22
	[-8.90]	[-9.49]	[-11.32]	[-13.37]	[-9.02]	[-13.16]
control	0.04	-0.10	-0.21	0.18	0.25	0.11
	[0.14]	[0.44]	[-2.09]	[1.49]	[2.03]	[1.36]
$Adj.R^2$	0.89	0.89	0.90	0.89	0.91	0.90
N	42	42	42	42	42	42

Table A.16: Distinguishing Expectations: Heterogeneous Intermediaries

This table reports results of predictive regressions of excess return expectations on the monthly proxy for heterogeneity among intermediaries (i.e. *intermheterog*), on a dummy DF_t that takes value 1 after the financialization, and on its interaction with the intermediary effective risk aversion measures. The subjective risk premia are for the test asset *Portfolio Commodities*, containing oil and four metals. However, the return expectations are divided over time into the expectations of the primary dealers and the expectations of all the professional forecasters except the primary dealers. The results are for the regressions in the following form: risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + \epsilon_{i,t+1}$, where the coefficients $b_{i,j}$ are reported.; and risk premia$^{\sigma}_{i,t+1} = a_{i,j} + b_{i,j}\tilde{\gamma}_{j,t} + c_{i,j}(\tilde{\gamma}_{j,t} \times DF_t) + d_{i,j}DF_t + \epsilon_{i,t+1}$, where the coefficients b_t, c_t and d_t are reported. "GFC" stands for Global Financial Crisis. Subjective risk premia are normalized by their full-sample volatility and the measure of heterogeneity among intermediaries is standardized. The sample period is from 08/1995 to 12/2022. The choice of 2004 as date for the financialization of commodity markets is driven by the previous literature (see Basak and Pavlova (2016) and Brogaard et al. (2019), among others). I compute test statistics using Newey and West (1987) corrected standard errors (with lag selection following Andrews (1991)).

	Expectations Primary Dealers			*Expectations Other Forecasters*		
	Full Sample		Up to GFC	Full Sample		Up to GFC
$\tilde{\gamma}$	0.40	0.28	0.28	0.33	0.22	0.22
	[1.96]	[5.78]	[4.44]	[1.64]	[4.16]	[3.63]
$\tilde{\gamma} \times$ DF		1.35	0.81		1.37	0.39
		[4.81]	[1.60]		[3.95]	[0.55]
DF		-0.85	-1.88		-0.90	-2.30
		[4.64]	[-7.03]		[-4.86]	[-5.28]
Adj.R^2	0.06	0.32	0.87	0.04	0.32	0.86
N	167	167	42	167	167	42