Metals: resources or financial assets? A multivariate cross-sectional analysis

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Abstract Metals are very important resources for industrial production, but recently they have attracted more and more attention from investors. While certainly industrial producers, consumers, and financial investors do have some influence on metal price development, the role of relevant price factors is not yet quite clear. Therefore, in this paper, we examine the explanatory power of various fundamental factors and characteristics known from financial markets, specifically on the expected returns in a unique data sample of 30 metals. We apply—to our knowledge for the first time in this context—the widely accepted method of characteristic-sorted portfolios, extended by the very recent method of two-way portfolio sorts as an alternative to classical multivariate regressions. This mostly nonparametric approach, combined with portfolio aggregation, provides very robust results. Our major finding is that the financial characteristics value and momentum have a very high predictive power for monthly returns of metal portfolios. Metal-specific fundamental factors like stocks, secondary production, apparent consumption, country concentration, mine production, or reserves perform depending on the interpretation moderately well or rather poorly, regarding some economically interpretable transformations and when using multivariate two-way sorts. Hence, from the perspective of expected returns, metals are predominantly assets, while fundamental metal-specific factors still play a non-negligible role. Thus, to a much lesser extent, metals can still be regarded as resources. Overall, the combination of financial characteristics and metal-specific fundamental factors yields the

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best results. With these robust results, we hope to contribute to a better understanding of metal prices and their underlying factors.

Keywords Metals · Value · Momentum · Fundamentals · Cross-sectional analysis · Nonparametric

JEL Classification G12 · G17 · Q02

1 Introduction

Commodities and metals, in particular, have always been crucial resources for many primary industries and are still indispensable to the modern economy. Besides their fundamental industrial importance, metals as financial assets have played an increasingly important role in financial markets in the last decade.

Following the above two perspectives on commodities, this paper takes into consideration two models of metal prices: an economic explanation and a financial one (see among others Borensztein and Reinhart 1994). The former interprets the prices of resources as a function of microeconomic, commodity-specific factors, such as supply and demand. The latter builds on the early work of Frankel (1986). According to his idea, commodities behave in the short term like financial assets, and are therefore dependent on interest rates and other monetary aggregates. Correspondingly, this view derives from the idea in financial literature that commodities obey the same rules as financial assets, and, although this concept has been developed independently from economic literature, it is the dominating view in financial literature. The goal of our analysis is to contrast the two perspectives and determine which is more pronounced. To this end, we examine the explanatory power of various fundamental factors related to the supply and demand of metals, as well as characteristics known from financial markets, on average monthly returns in a cross-sectional analysis.

In order to present the specific contribution of our approach, we analyze the different strands in relevant literature. From the theoretical economic perspective, prices of commodities are determined by supply and demand factors. To be more specific, the fundamental economic factors analyzed are on the one hand macroeconomic factors and on the other hand microeconomic factors that apply specifically to just one metal. Starting with microeconomic determinants the overwhelming majority of studies (see e.g., Baffes and Savescu 2014; Chai et al. 2011; Nick and Thoenes 2014) find a negative relationship between *stocks* as *supply factor*, in theory negatively related to prices, and prices. Other studies observe a convincingly significant positive influence of the OPEC cartel as a proxy for *market concentration* on oil prices, whereas *reserves* (e.g., see) or the amount of *recycling* play a minor role (see e.g., Gleich et al. 2013; Merion and Ortiz 2005). Regarding the *demand* perspective, some studies focus on the demand of *special countries*, like China and South Korea, and are thus able to show their significant positive influence on prices (see e.g., Klotz et al. 2014). However, most studies use the macroeconomic factor *global economic activity* as proxy for demand (see e.g., Kilian 2009; Poncela et al. 2014) and show a significant influence of the world industrial production etc. on real and nominal prices. Here, different