

Berlemann, Michael; Eurich, Marina; Meyer, Hennes

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HWWI Commodity Price Index: A technical documentation of the 2023 revision

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HWWI WORKING PAPER SERIES

HWWI Commodity Price Index: A Technical Documentation of the 2023 Revision

Michael Berlemann | Marina Eurich | Hennes Meyer



HWWI WORKING PAPER NO. 1/2023

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HWWI Commodity Price Index: A Technical Documentation of the 2023 Revision

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Abstract

The HWWI Commodity Price Index, which aims at reflecting price developments of raw materials imported by highly industrialized countries, dates back to the 1950s. This paper explains the calculation of the index at the example of its latest revision, which became effective on 1st September 2023. While the index and its subindices are still calculated for OECD and European Momentary Union countries at four different frequencies (annual, monthly, quarterly and daily) for two different currencies (USD, EUR), it now additionally includes index values for several weighting periods (long-term: 2012-2021, pre-crisis: 2017-2019 and crisis years: 2020-2021), for individual countries and for different perspectives (daily revised, real-time and historical time series). The paper also provides detailed information on the employed methodology and the input data (commodities, import data, prices) used to calculate the weights and the index values. Although the revision is not without effect on the resulting index values, especially throughout the crises periods, the correlation between the initial and the revised index remains very high.

A commodity appears at first sight an extremely obvious, trivial thing. But its analysis brings out that it is a very strange thing, abounding in metaphysical subtleties and theological niceties.

Karl Marx, 1967

1 Introduction

A commodity, also called primary product, primary good or raw material, is a good sold for production or consumption just as it was found in nature. Commodities include crude oil, coal, copper or iron ore, rough diamonds, and agricultural products such as wheat, coffee beans or cotton; they are often traded on commodity exchanges. Many countries around the globe are dependent on commodities, either in terms of exports or imports.

According to the UNCTAD definition, countries are commodity-export-dependent whenever commodities account for more than 60 percent of their merchandise exports in value terms. According to the UNCTAD (2023), more than half of the world's countries (101 of the 191 UNCTAD member States) were commodity-export-dependent over the period of 2019 to 2021. The sources of commodity dependence are often linked to a country's persistent or structural conditions, such as its resource endowment and factor composition, institutional framework, geographic situation or history. Commodity-export-dependence is especially pronounced in countries on low levels of development. Here, the share of countries which heavily depend on commodities amounts to almost 67 percent over the period of 2019 to 2021 (UNCTAD 2023).

HWWI Working Paper

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However, there are also countries which heavily depend on the import of commodities. Throughout the twentieth century, the rich world became more and more dependent on faraway supplies of commodities. This development was partly driven by heavily declining transport costs, partly by quick industrialization which was accompanied by the rapid expansion of infrastructure and heavy industries (Radetzki and Warell 2020). These activities have absorbed huge quantities of raw materials, and foreign sources regularly offered supplies at lower costs than those of domestic producers. Altogether, this resulted in an increasing dependence of Western Europe, the USA and Japan and, more recently, China and India on commodity imports over the past century.

Obviously, for both commodity-export- and commodity-import-dependent countries the prices of commodities play a major role. Prices have an impact on the revenue potential of exporter countries and determine producer or even consumer prices in importer countries. As the Covid-19 pandemic and the consequences of the Russian attack on Ukraine recently demonstrated impressively, changes in commodity prices can cause major frictions in commodity-dependent countries and in the world economy as a whole. It is thus not too surprising, that commodity prices are monitored intensively by market participants. In order to ease an aggregate overview on commodity prices, various commodity price indicators have been developed in the course of time. While these indicators share the general objective of measuring changes in prices of major commodities, they differ in various dimensions (Siddique 1984).

The HWWI commodity price index is among the indices with the longest tradition. It was developed by Hamburgisches WeltWirtschaftsarchiv (HWWA) in the early 1950s with the purpose of measuring the level of raw material prices in the world markets. Following a major revision, the index focuses on commodity price movements in western industrialized countries since 1980. (Timm 1980). These countries typically have a high share of commodities in their imports. The index has been subject to various revisions over time (see e.g. Timm 1980 and Timm and Matthies 1997). After the closure of Hamburgisches WeltWirtschaftsarchiv (HWWA) the calculation and publication of the commodity price indicator was organized by Hamburgisches WeltWirtschaftsinstitut (HWWI), the successor institute of HWWA.

As of 1st September 2023 the HWWI commodity price indicator is published in a revised form. While the basic systematic is still the same, the revised index comes with some additional features.

The index still focuses on commodity-importing industrialized western countries and is based on a Laspeyres index. It is published in four frequencies for various commodity groups and in two currencies. The index is still available for OECD and European Monetary Union weighting schemes.

In the new version, the HWWI commodity price index is also available from the perspective of individual countries and for different weighting periods. Moreover, the index is now provided in three different variants, (1) historical time series which are most appropriate to run long-run analyses, (2) real-time datasets which allow to mimic the information set a decision maker had available in the past and (3) a "daily revised" time series which contains the highest level of information not only on the reporting date but also on the recent past as the time series is updated whenever a single lacking price information is arriving. These time series might be most useful for forecasting issues. Finally, due to technical reasons, there is also a slight variation of the employed commodity prices.

In the remainder of this paper the major changes are explained in detail. Furthermore, a comparison of the new and the old version of the index to clarify the consequences of the revision is provided.

2 Methodology

The HWWI commodity price index aims at measuring the price development of commodities which are imported by western industrialized countries. In order to do so the employed methodology is based on the aggregative approach of index number theory (see e.g. Siddique 1984). According to this approach the index is constructed as the weighted price average of a representative commodity

goods basket over time, with the weights reflecting the relative importance of these goods. It is well known that such indices can be constructed in various forms. The HWWI index traditionally relies on the Laspeyres type of index and is thus calculated as

$$COMPI_{t_0,t}^{HWWI} = \frac{\sum_{i=1}^I p_t^i \cdot q_{t_0}^i}{\sum_{i=1}^I p_{t_0}^i \cdot q_{t_0}^i} \cdot 100 \quad (1)$$

with p_t^i being the price of commodity i at time t , q^i capturing the weight of commodity i , t_0 being the base period and t being the reporting period. Thus, the Laspeyres index uses the price weights from the base period t_0 to construct the index values. In line with other approaches it is assumed that the quality of the commodities included in the price index are constant over time. All subindices of the total index are calculated accordingly.

3 Employed Commodity Basket

The choice of commodities used to calculate the HWWI commodity price index has not changed in comparison to the preceding version of the index. Thus, the same basket of 31 commodities is used to calculate the new version of the index as before. These commodities belong to three major groups: energy raw materials, industrial raw materials and food.

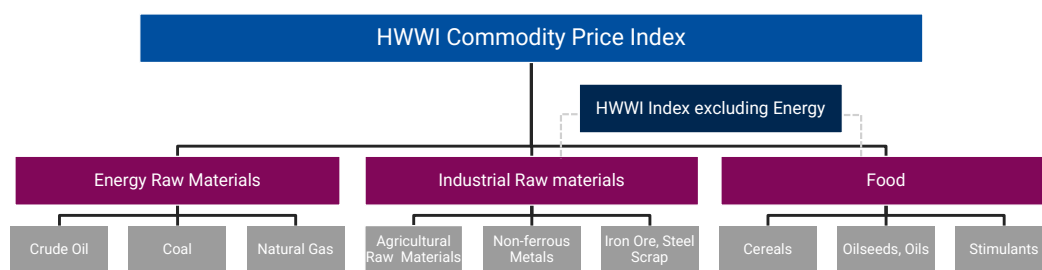


Figure 1. Structure of the HWWI Commodity Price Index

The first group of energy raw materials consists of the three most relevant forms of energy commodities: crude oil, coal and natural gas.

The group of industrial raw materials consists of three subgroups. The first group consists of agricultural raw materials such as cotton, wool, hides, wood, rubber and pulp. The second group consists of non-ferrous metals such as aluminum, lead, copper, nickel, zinc and tin and the last group includes ferrous metals such as iron ore and steel scrap.

The third group of commodities is food. Different sorts of cereals are considered such as barley, maize, rice and wheat. Furthermore, oilseeds & oils are included which consists of soybeans, soybean meal, soybean oil, coconut oil, palm oil and sunflower seed oil. Finally, the food group also contains stimulants like coffee, cocoa, tea and sugar.

While the HWWI commodity index covers the price developments of all these commodities at the same time, the index is also calculated for various subgroups of these commodities (Figure 1). Besides the total index there is one variant "HWWI index excluding Energy", considering only industrial raw materials and food, as energy raw materials typically tend to dominate the total commodity index (as shown in the next section). However, three separate indices for energy raw materials, industrial raw materials and for food are calculated. Finally, indices for crude oil, coal, natural gas, agricultural raw materials, non-ferrous metals, ferrous metals, cereals, oilseeds & oil and stimulants are published. Thus, with the exception of the commodities marked in light grey in Figure 2, for all other groups (see Figure 2 a separate commodity price index is available).

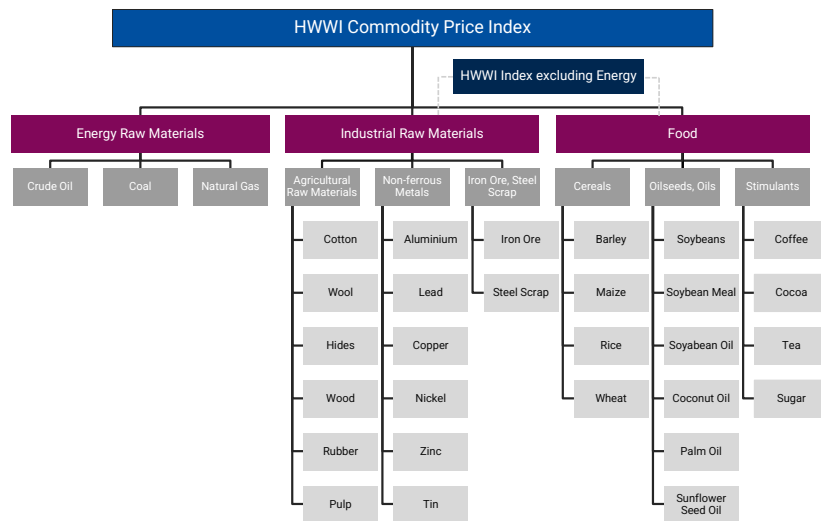


Figure 2. Structure of the HWWI Commodity Price Index and subindices

4 Calculation of Commodity Weights

In order to calculate the concrete weights for the commodity baskets, import data for the relevant countries and commodities over the relevant weighting period is necessary. The weight, a certain commodity gets in the basket of the total commodity indicator is related to the share of imports of this commodity in all commodity imports. Thus, in order to fix the weights, it is first necessary to calculate the imports of the 31 commodities included in the HWWI commodity index for the relevant weighting period and country group.

The employed data for this purpose comes from the BACI database (Gaulier and Zignago 2010).¹ This database contains data on bilateral trade flows for 200 countries at the product level (5000 products). The products correspond to the "Harmonized Commodity Code System" (HS) nomenclature (6 digit code). The advantage of BACI data is that harmonized and consistent data across different countries and years is provided which is important especially when comparing different countries. Another advantage is that BACI incorporates cleaning techniques to improve data quality.

To be able to calculate total imports of the relevant 31 commodities it is necessary to choose those products (e.g. HS codes) from the BACI database which belong to these commodities. In order to do the matching list provided by the International Monetary Fund is used (*IMF Primary Commodity Price Index* 2019). However, different from the IMF only products on very low processing levels are considered. As an example, the IMF considers as many as 13 different HS codes for the commodity "coffee", among them, for example, roasted coffee. However, as coffee roasting is already a significant additional processing step of a commodity all sorts of roasted coffee are excluded. Also different from the IMF, close substitutes such as ginseng roots or tobacco are also not considered. A complete list of the HS codes which have been used for calculating the commodity weights can be found in Table 1.

With N^i being the number of HS codes belonging to commodity i , total imports of this com-

1. BACI is the french acronym of "Base pour l'Analyse du Commerce International", translated as Database for International Trade Analysis.

modity in period t_0 can be calculated as

$$IM_{t_0}^i = \sum_{n=1}^N im_{t_0}^{i,n} \quad (2)$$

With

$$IM_{t_0} = \sum_i^I IM_{t_0}^i \quad (3)$$

the weight of commodity i can be calculated as

$$q_{t_0}^i = \frac{IM_{t_0}^i}{IM_{t_0}} \quad (4)$$

It is easily possible to calculate the commodity weights $q_{t_0}^i$ for a single country or an aggregate region. In the latter case, import figures are simply added for all countries within the region of interest. In the past, the HWWI commodity price index was published for either the group of OECD countries or the member countries of the European Monetary Union (Euroland). While the index is still calculated for these two regions, in the future it is also calculated on the individual country level for all individual countries which are either member of the OECD or the European Monetary Union. Doing so allows the user to take the perspective of a single country, which might differ considerably even within the OECD countries or within Euroland.

Table 1. Relevant HS-Codes

Commodity	HS-Code	Description
Barley	100310	Cereals; barley, seed
Barley	100390	Cereals; barley, other than seed
Maize	100510	Cereals; maize (corn), seed
Maize	100590	Cereals; maize (corn), other than seed
Rice	100610	Rice in the husk (paddy or rough)
Rice	100620	Husked (brown) rice
Rice	100630	Cereals; rice, semi-milled or wholly milled, whether or not polished or glazed
Rice	100640	Cereals; rice, broken
Wheat	100111	Cereals; wheat and meslin, durum wheat, see
Wheat	100119	Cereals; wheat and meslin, durum wheat, other than seed
Wheat	100191	Cereals; wheat and meslin, other than durum wheat, seed
Wheat	100199	Cereals; wheat and meslin, other than durum wheat, other than seed
Soybeans	120110	Soya beans; seed, whether or not broken
Soybeans	120190	Soya beans; seed, whether or not broken
Soybean meal	230400	Oil-cake and other solid residues; whether or not ground or in the form of pellets, resulting from the extraction of soya-bean oil
Soya bean oil, crude	150710	Vegetable oils; soya-bean oil and its fractions, crude, whether or not degummed, not chemically modified
Coconut oil, crude	151311	Vegetable oils; coconut (copra) oil and its fractions, crude, not chemically modified
Palm oil, crude	151110	Vegetable oils; palm oil and its fractions, crude, not chemically modified
Palm oil, crude	151321	Vegetable oils; palm kernel or babassu oil and their fractions, crude, not chemically modified
Sunflower seed oil	151211	Vegetable oils; sunflower seed or safflower oil and their fractions, crude, not chemically modified
Coffee	90111	Coffee; not roasted or decaffeinated
Coffee	90112	Coffee; decaffeinated, not roasted
Cocoa	180100	Cocoa beans; whole or broken, raw or roasted
Cocoa	180500	Cocoa; powder, not containing added sugar or other sweetening matter
Cocoa	180200	Cocoa; shells, husks, skins and other cocoa waste

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Commodity	HS-Code	Description
Cocoa	180310	Cocoa; paste, not defatted
Cocoa	180320	Cocoa; paste, w holly or partly defatted
Cocoa	180400	Cocoa; butter, fat and oil
Tea	90210	Tea, green; (not fermented), in immediate packings of a content not exceeding 3kg
Tea	90220	Tea, green; (not fermented), in immediate packings of a content exceeding 3kg
Tea	90230	Tea, black; (fermented) and partly fermented tea, in immediate packings of a content not exceeding 3kg
Tea	90240	Tea, black; (fermented) and partly fermented tea, in immediate packings of a content exceeding 3kg
Sugar	170114	Sugars; cane sugar, raw, in solid form, other than as specified in Subheading Note 2 to this chapter, not containing added flavouring or colouring matter
Sugar	170113	Sugars; cane sugar, raw , in solid form, as specified in Subheading Note 2 to this chapter, not containing added flavouring or colouring matter
Sugar	170112	Sugars; beet sugar, raw, in solid form, not containing added flavouring or colouring matter
Cotton	520100	Cotton; not carded or combed
Wool	510111	Wool; (not carded or combed), greasy (including fleece-washed wool), shorn
Wool	510119	Wool; (other than shorn), greasy (including fleece-washed wool), not carded or combed
Wool	510121	Wool; (not carded or combed), degreased, (not carbonised), shorn
Wool	510129	Wool; (not carded or combed), degreased, (not carbonised), (other than shorn)
Hides	410120	Raw hides and skins; whole, unsplit, of bovine or equine animals, of a weight per skin not exceeding 8kg when simply dried, 10kg when dry-salted or 16kg when fresh, wet-salted or otherwise preserved
Hides	410150	Hides and skins; raw, whole, of bovine or equine animals, of a weight per skin exceeding 16 kg
Hides	410190	Hides and skins; other than whole, but including butts, bends and bellies, of bovine (including buffalo) and equine animals, fresh, salted or preserved, but not tanned, parchment dressed or further prepared, whether or not dehaired or split
Hides	410320	Hides and skins; raw, of reptiles (fresh or salted, dried, limed, pickled or otherwise preserved, but not tanned, parchment-dressed or further prepared), whether or not dehaired or split
Hides	410330	Hides and skins; raw, of swine, (fresh or salted, dried, limed, pickled or otherwise preserved, but not tanned, parchment-dressed or further prepared), whether or not dehaired or split
Hides	410390	Hides and skins; raw, of animals n.e.c. in this chapter, fresh, salted, dried, limed, pickled or otherwise preserved, (but not tanned, parchment-dressed or further prepared), whether or not dehaired or split
Hides	410210	Skins; raw, of sheep or lambs, fresh, or salted, dried, limed, pickled or otherwise preserved, (but not tanned, parchment-dressed or further prepared), with wool on
Hides	410221	Skins; raw, of sheep or lambs, pickled (but not tanned, parchment-dressed or further preserved), without wool on
Hides	410229	Hides and skins; raw, of animals n.e.c. in this chapter, fresh, salted, dried, limed, pickled or otherwise preserved, (but not tanned, parchment-dressed or further prepared), whether or not dehaired or split
Hides	411520	Leather; parings and other waste, of leather or composition leather; not suitable for the manufacture of leather articles; leather dust, powder and flour
Wood	440320	Wood; non-coniferous species, in the rough, whether or not stripped of bark or sapwood, or roughly squared; treated with paint, stains, creosote or other preservatives
Wood	440710	Wood sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, of a thickness exceeding 6mm
Rubber	400110	Rubber; natural rubber latex, whether or not pre-vulcanised, in primary forms or in plates, sheets or strip
Rubber	400121	Rubber; natural (excluding latex), in smoked sheets

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Commodity	HS-Code	Description
Rubber	400122	Rubber; technically specified natural rubber (TSNR), in primary forms or in plates, sheets or strip (excluding latex and smoked sheets)
Rubber	400129	Rubber; natural (excluding latex, technically specified natural rubber and smoked sheets), in primary forms or in plates, sheets or strip
Rubber	400130	Balata, gutta-percha, guayule, chicle and similar natural gums; in primary forms or in plates, sheets or strip
Pulp	470311	Wood pulp; chemical wood pulp, soda or sulphate, (other than dissolving grades), unbleached, of coniferous wood
Pulp	470319	Wood pulp; chemical wood pulp, soda or sulphate, (other than dissolving grades), unbleached, of non-coniferous wood
Pulp	470321	Wood pulp; chemical wood pulp, soda or sulphate, (other than dissolving grades), semi-bleached or bleached, of coniferous wood
Pulp	470329	Wood pulp; chemical wood pulp, soda or sulphate, (other than dissolving grades), semi-bleached or bleached, of non-coniferous wood
Pulp	470411	Wood pulp; chemical wood pulp, sulphite, (other than dissolving grades), unbleached, of coniferous wood
Pulp	470419	Wood pulp; chemical wood pulp, sulphite, (other than dissolving grades), unbleached, of non-coniferous wood
Pulp	470421	Wood pulp; chemical wood pulp, sulphite, (other than dissolving grades), semi-bleached or bleached, of coniferous wood
Pulp	470429	Wood pulp; chemical wood pulp, sulphite, (other than dissolving grades), semi-bleached or bleached, of non-coniferous wood
Aluminum	260600	Aluminium ores and concentrates
Aluminum	760110	Aluminium; unwrought, (not alloyed)
Aluminum	760120	Aluminium; unwrought, alloys
Lead	260700	Lead ores and concentrates
Lead	780191	Lead; unwrought, unrefined, containing by weight antimony as the principal other element
Lead	780199	Lead; unwrought, unrefined, not containing by weight antimony as the principal other element
Lead	780110	Lead; unwrought, refined
Copper	260300	Copper ores and concentrates
Copper	740200	Copper; unrefined, copper anodes for electrolytic refining
Copper	740311	Copper; refined, unwrought, cathodes and sections of cathodes
Copper	740312	Copper; copper-zinc base alloys (brass) unwrought
Copper	740313	Copper; refined, unwrought, billets
Copper	740319	Copper; refined, unwrought, n.e.c. in item no. 7403.1
Copper	740500	Copper; master alloys of copper
Copper	740321	Copper; copper-zinc base alloys (brass) unwrought
Copper	740322	Copper; copper-tin base alloys (bronze) unwrought
Copper	740329	Copper; copper alloys n.e.c. in heading no. 7403 (other than master alloys of heading no. 7405)
Nickel	260400	Nickel ores and concentrates
Nickel	750210	Nickel; unwrought, not alloyed
Nickel	750220	Nickel; unwrought, alloys
Zinc	260800	Zinc ores and concentrates
Zinc	790111	Zinc; unwrought, (not alloyed), containing by weight 99.99% or more of zinc
Zinc	790112	Zinc; unwrought, (not alloyed), containing by weight less than 99.99% of zinc
Zinc	790120	Zinc; unwrought, alloys
Tin	260900	Tin ores and concentrates
Tin	800110	Tin; unwrought, not alloyed
Tin	800120	Tin; unwrought, alloys
Iron Ore	260120	Iron pyrites; roasted
Iron Ore	260111	Iron ores and concentrates; non-agglomerated
Iron Ore	260112	Iron ores and concentrates; agglomerated (excluding roasted iron pyrites)
Scraps	720410	Ferrous waste and scrap; of cast iron
Scraps	720421	Ferrous waste and scrap; of stainless steel

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Commodity	HS-Code	Description
Scraps	720429	Ferrous waste and scrap; of alloy steel (excluding stainless)
Scraps	720430	Ferrous waste and scrap; of tinned iron or steel
Scraps	720441	Ferrous waste and scrap; turnings, shavings, chips, milling waste, sawdust, fillings, trimmings and stampings, whether or not in bundles
Scraps	720450	Ferrous products; remelting scrap ingots
Scraps	720449	Ferrous waste and scrap; n.e.c. in heading no. 7204
Coal	270111	Coal; anthracite, whether or not pulverised, but not agglomerated
Coal	270112	Coal; bituminous, whether or not pulverised, but not agglomerated
Coal	270119	Coal; (other than anthracite and bituminous), whether or not pulverised but not agglomerated
Oil	270900	Oils; petroleum oils and oils obtained from bituminous minerals, crude
Natural Gas	271111	Petroleum gases and other gaseous hydrocarbons; liquefied, natural gas
Natural Gas	271121	Petroleum gases and other gaseous hydrocarbons; in gaseous state, natural gas

As the trade figures of commodities naturally change in the course of time, the choice of the weighting period also affects the calculated commodity weights. In the past, the commodity weights were calculated based on average figures over various years in order to exclude the effect of random variations in single years (Timm 1980). As an example, the last version of the index used the average trade patterns over the years 2017 to 2019 to calculate the commodity weights. In the future, the index will be provided for three different weighting periods. First, a long-term perspective is provided by using average figures over the decade from 2012 to 2021. In addition, the index is also provided for the three pre Covid-19 years 2017 to 2019. Finally, there is a variant which uses the first two crisis years 2020 to 2021 as weighting period.²

Figure 3 shows how the choice of the regional perspective and the base period affects the commodity weights. It becomes obvious that, regardless of the chosen country perspective and the applied weighting period, the development of energy raw material prices play a major role for the total index. Especially the prices of crude oil and natural gas have large weights and account, depending on region and weighting period, together for roughly 60 percent of the total index. When adding coal, the importance further increases. In the OECD countries, the relative importance of crude oil is slightly lower than in Euroland. For natural gas and coal, the opposite holds true. When using the most recent crisis period 2020 to 2021 as base period the relative role of energy raw materials turns out to be slightly lower than in the pre-crisis periods.

Table 2 shows the detailed weights of all commodities and commodity groups for the OECD countries and the base period of 2017 to 2019. When HWWI regularly reports on the newest developments of commodity prices, e.g. within press releases, it typically refers to the OECD weights for this weighting period. For the 2017 to 2019 weighting period, the weights of the three major subindices, energy raw materials, industrial raw materials and food turn out to be very similar for Euroland and OECD countries.

5 Price data

Finally, appropriate commodity price data is necessary to be able to calculate the commodity price index values. In general, each commodity is represented by one price. This is either the price of the commodity at the most important trading place or a composite price which already reflects price developments at different relevant markets of high importance. An example for this one-commodity-one-price-principle is coffee, which is represented in the index with the Coffee-Composite Price, published by the International Coffee Organization.

However, there are few exceptions from this principle. In the case of tea, the average price of

2. At the time when the index was revised the data for 2022 was unavailable.

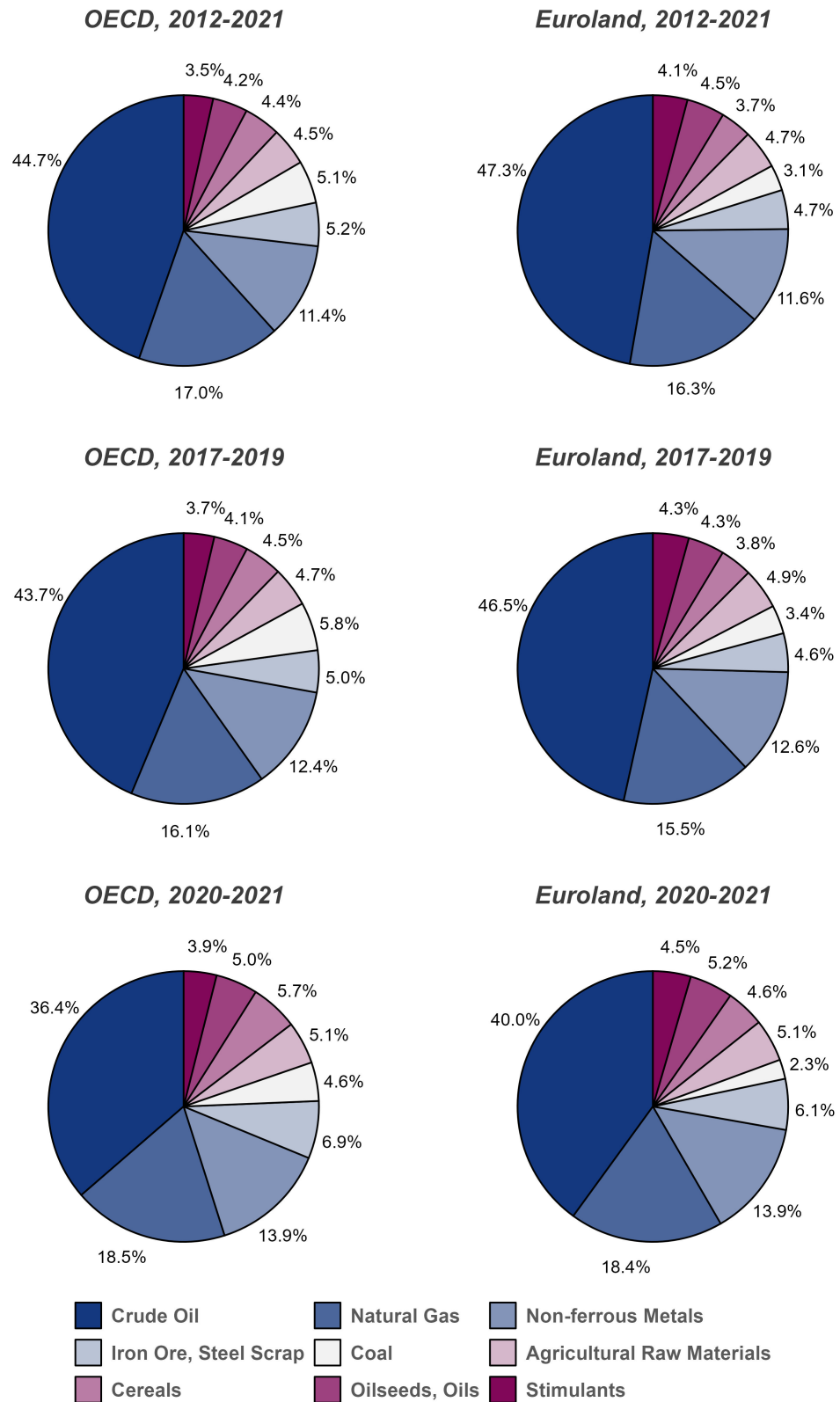


Figure 3. OECD and Euroland Weights for different Weighting Periods

Table 2. OECD and Euroland Weights of Commodities and Commodity Groups for Weighting Period 2017-2019

	OECD in %		Euroland in %	
HWI Total		100		100
Food	12.3		12.48	
Cereals	4.55		3.84	
Barley		0.29		0.38
Maize		2.03		1.5
Rice		0.6		0.45
Wheat		1.62		1.52
Oilseeds, oils	4.1		4.35	
Soybeans		1.44		1.33
Soybean meal		1.54		1.49
Soya bean oil, crude		0.11		0.07
Coconut oil, crude		0.11		0.17
Palm oil, crude		0.51		0.8
Sunflower seed oil		0.38		0.49
Stimulants	3.65		4.29	
Coffee		1.45		1.68
Cocoa		1.69		2.25
Tea		0.26		0.2
Sugar		0.25		0.16
Industrial raw materials	22.12		22.11	
Agricultural raw materials	4.75		4.9	
Cotton		0.31		0.09
Wool		0.07		0.09
Hides		0.3		0.41
Wood		1.77		1.67
Rubber		0.59		0.56
Pulp		1.71		2.09
Non-ferrous metals	12.36		12.58	
Aluminum		4.08		4.17
Lead		0.6		0.62
Copper		4.96		4.61
Nickel		0.81		1.02
Zinc		1.59		1.82
Tin		0.31		0.33
Iron ore, steel scrap	5.02		4.63	
Iron Ore		2.55		1.95
Steel Scrap		2.47		2.68
Energy raw materials	65.58		65.41	
Coal		5.78		3.41
Crude Oil		43.70		46.54
Natural Gas		16.10		15.46

tea produced in the three major tea markets India, Sri Lanka and Kenya is used. For metals, prices from the London Metal Exchange (LME) are employed. LME publishes bid and ask prices on a daily basis. The prices are calculated as average of bid and ask prices. For steel scrap, the most relevant prices in the US and Europe (temporarily) differ to quite some extent. For Euroland countries, the European price is used. For non-European OECD countries, the relevant price is calculated as the average price of the US and the European market. For coal, the two most important producer countries are Australia and South Africa. For Euroland countries, the average price of both markets is used whereas Australia has a 75-percent-weight in non-European OECD countries. For crude oil, in general Dubai, Brent and WTI prices are relevant. For Euroland countries solely the price of Brent is used while the average price is employed for all non-European OECD countries. Finally, European natural gas prices are used for Euroland countries while the average price in Europe and the US is employed for non-European OECD countries.

Table 3. Prices included in commodity index

	Commodity	Price
1	Barley	Barley Canada Lethbridge Feed Grain Bids (close low price)
2	Maize	Corn Pit Futures CBOT
3	Rice	Rice white 100% Grade B
4	Wheat	Wheat Hard Red Winter (HRW) USA Kansas Futures - Settlementprice
5	Soybeans	Soybean Pit Futures Chicago CBOT
6	Soybean meal	Soymeal Futures CBOT
7	Soya bean oil, crude	Soyoil Futures CBOT
8	Coconut oil, crude	MBI Coconut oil Philippines/Indonesia origin 3-4 % FFA CIF Rotterdam
9	Palm oil, crude	MBI Palm oil Malaysia/Indonesien max. 5 % FFA CIF Rotterdam
10	Sunflower seed oil	MBI Sunflower oil E.U. origin 2-3 % FFA FOB North European Port
11	Coffee	ICO Coffee Composite
12	Cocoa	ICCO Cocoa daily price
13	Tea	Tea Sri Lanka Colombo
14	Tea	Tea Kenya Primary CTC Auction Average
15	Tea	Tea India Kolkata CTC Leaf & Dust Auction
16	Sugar	Sugar No. 11 (raw cane sugar) FOB receiver's vessel ICE Futures
17	Cotton	Cotton No. 2 U.S. ICE Futures
18	Wool	Wool Australia Eastern Market Indicator (AWEX EMI)
19	Hides	Leather /Hides Heavy Native Steers, >53 pounds Chicago FOB wholesale price
20	Wood	2x4 western spruce-pine-fir (kiln dried) #2 and better
21	Rubber	Rubber SMR GP Malaysia FOB
22	Pulp	Northern Bleached Softwood Kraft Pulp (NBSK) Europe (Norexeco Fastmarkets FOEX PIX)
23	Aluminium	Aluminium High Grade LME cash official ring/kerb (Offer)
24	Aluminium	Aluminium High Grade LME cash official ring/kerb (Bid)
25	Lead	Lead official ring/kerb LME cash (Offer)
26	Lead	Lead official ring/kerb LME cash (Bid)
27	Copper	Copper Grade A cash official ring/kerb LME cash (Offer)
28	Copper	Copper Grade A cash official ring/kerb LME cash (Bid)
29	Nickel	Nickel official ring/kerb LME cash (Offer)
30	Nickel	Nickel official ring/kerb LME cash (Bid)
31	Zinc	Zinc High Grade official ring/kerb LME cash (Offer)
32	Zinc	Zinc High Grade official ring/kerb LME cash (Bid)
33	Tin	Tin official ring/kerb LME cash (Offer)
34	Tin	Tin official ring/kerb LME cash (Bid)
35	Iron Ore	SGX Iron Ore 62 % Fe China CFR import price OTC Swap
36	Steel scrap US	Steel scrap HMS 1 US East Coast FOB export price
37	Steel scrap EUROPE	Steel scrap HMS 1&2 (80:20 mix) ARA FOB Rotterdam
38	Coal AUS	Coal Australia Newcastle ICE Futures Settlement current month
39	Coal SA	Coal API4 South Africa Richard Bay ICE Futures Settlement current month
40	Crude oil Dubai	Crude Oil OPEC Dubai Fateh API 32 Index
41	Crude oil Brent	ICE Brent Crude Oil Futures (Settlement Previous Day)
42	Crude oil WTI	ICE WTI Crude Oil Futures
43	Natural gas US	Natural Gas USA Henry Hub NYMEX Futures
44	Natural gas EUROPE	UK Natural Gas Index (NBPI) (until 2018-04-10)
45	Natural gas EUROPE	EEX Spot Market Gas Netherlands (TTF) Day-Ahead (from 2018-04-11)

A detailed description of the employed price data is presented in Table 3. The price data is collected on a daily basis from the data provider Matflinx. The necessary time series are available

since 1st September 2014. The newest data points are collected every single day at noon. It is important to note that the different time series of price data are published with differing time lags, ranging in between one day and sometimes up to eight weeks.

6 Time series

As a consequence of the mentioned publication lags of the relevant price data, the HWWI commodity price index time series are published in three different versions: as historical time series, as time series of real time data and as daily revised time series. The three versions of the index series serve different purposes, which shall be explained in more detail in the following.

First, the HWWI indices are published as historical time series. The aim of this variant is to reflect the development of commodity as precise as possible from an ex-post perspective. In order to do so, the index is only calculated for days, for which all price information of all commodities is complete. The historical time series starts on 1st September 2014. As the longest price publication lag amounts to several weeks, the historical time series ends several weeks before the current date. The historical time is recommended for empirical analyses aiming at detecting correlations between commodity prices and other economic variables. Here it is important that the employed time series of commodity prices is highly precise and includes all relevant information which is ex-post available.

Second, the commodity price index is published as a time series of real-time data. The aim of this version is to capture which information was available on commodity prices on the reporting days. Often decisions have to be made under real-time conditions, i.e. on the basis of incomplete information. While these decisions might turn out to have been sub-optimal from an ex-post perspective, they still might have been the best possible decisions, given the information available at the time. In order to provide a real-time perspective on commodity prices, the daily time series is extended every single day by the most actual value, as calculated from the then available price information. However, former values of the time series are never revised, even when new price information arrives. Naturally, the series of real-time data start on the first day after the latest revision of the HWWI commodity price index, i.e. on 1st September 2023.

Third, the commodity price index is provided as daily revised time series. This version of the index is intended to be used for forecasting purposes. While the newest data point coincides with the real-time data, all earlier values of the time series are revised whenever new price information even for single commodities arrives. This comes at the advantage that the time series always contains all information, which is currently available. This time series differs from the historical time series only by delivering also information on the development of the indicator since the last observation with full price information, i.e. all prices for all commodities.

7 Available exchange rates

In order to be able to compute a price index, consisting of prices quoted in various different currencies, a common denominator has to be used. Whenever the currencies in which the prices are quoted have floating exchange rates, the choice of the denominator currency affects the index values. Morningstar exchange rates are provided by the data supplier Matflinx. As in the previous version the index values are provided for US Dollar and Euro as currency denominator. It is recommended to use US Dollar when taking the OECD perspective whereas opting for Euro as denominator is more appropriate when considering the European perspective.

8 Available data frequencies

The HWWI commodity index, all subindices and variants are available in four different frequencies: annual, quarterly, monthly and daily. Basically, all calculations are based on daily data. The other

frequencies are constructed via averaging over the daily data.

9 Comparison of revised index with former version

The revision of the HWWI commodity price index is not without effect on the results. In order to visualize these differences, we show the index values using OECD weights for the weighting period 2017 to 2019 in USD for the former and the revised index in Figure 4 since 1st September 2014. In addition, Figure 5 shows the referring differences between revised and the former index time series.

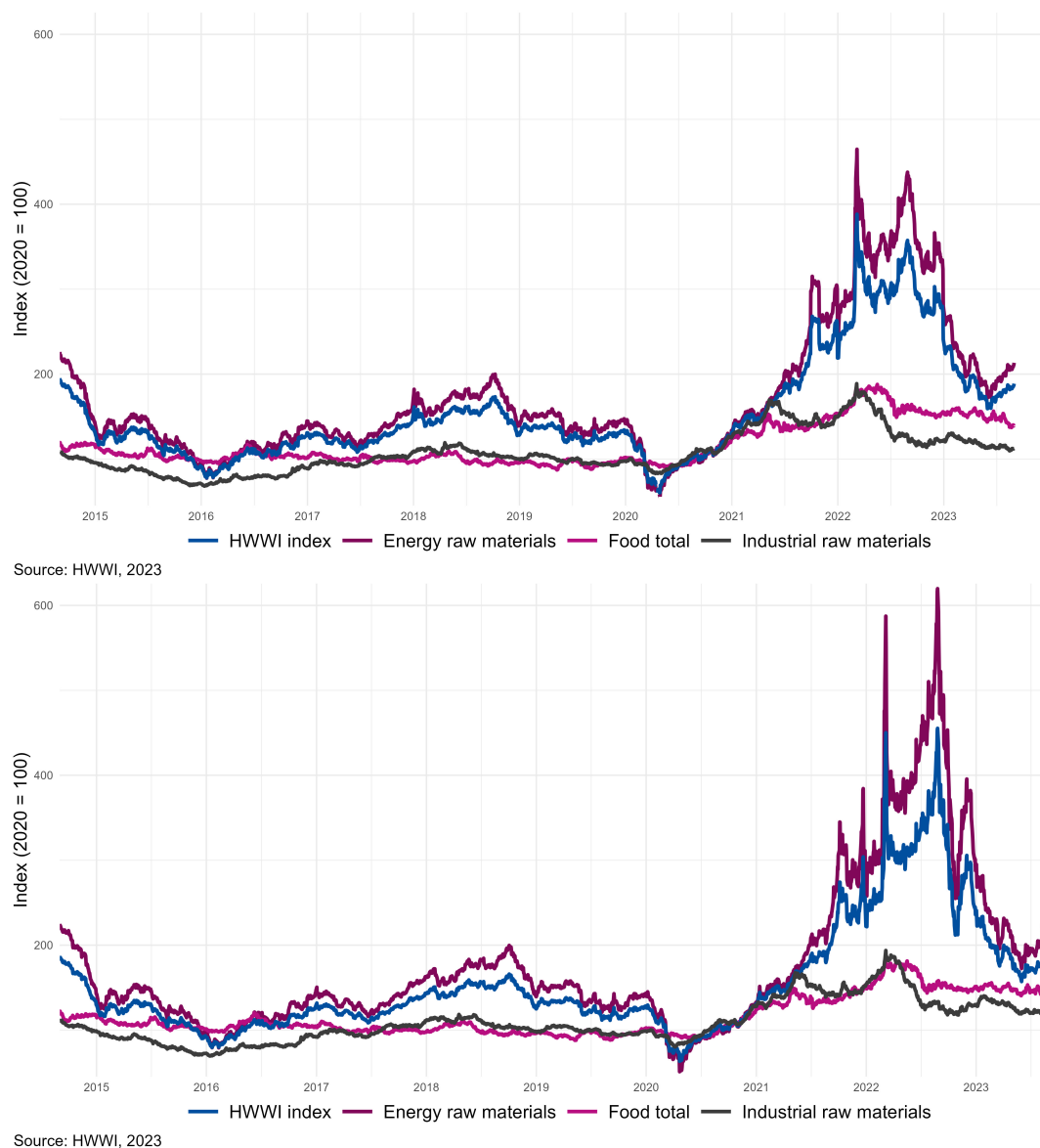


Figure 4. Former (upper chart) and revised (lower chart) HWWI Index, OECD, USD, weighting period: 2017-2019

It is easy to see that the differences between the resulting index values are small until early in 2021 for the total index as well as for the three subindices for energy raw materials, food and industrial raw materials. While the resulting subindices for food and industrial raw materials turn out to be very similar even since 2021, this does not hold true for the index of energy raw materials (and thus also for the total index). Especially over the entire year 2022 the revised index values turn out to be systematically higher as in the former index version. Moreover, the differences between the two index versions temporarily amounted to more than a hundred index points. This temporary

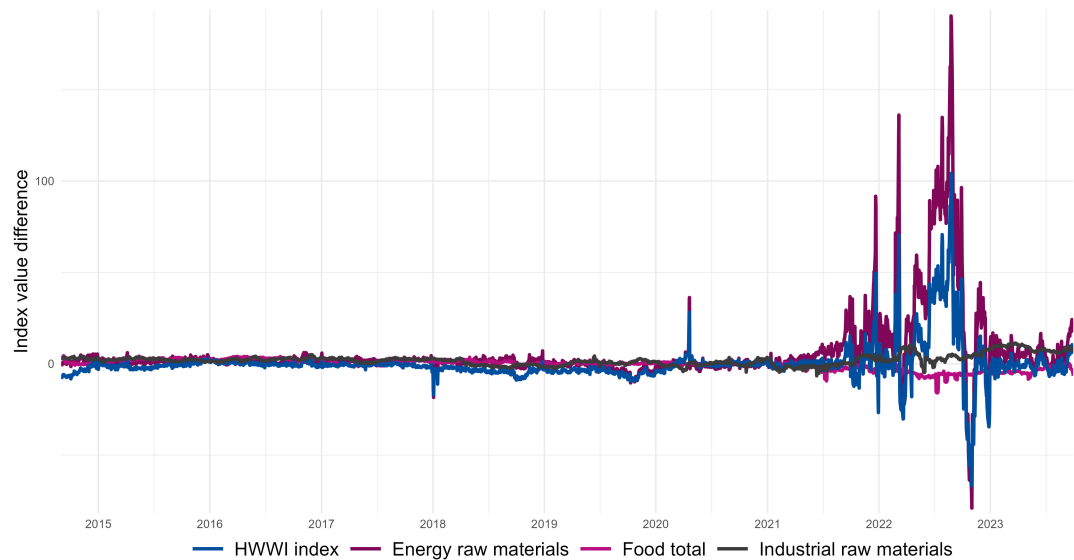


Figure 5. Difference between former and revised index values - OECD, USD, Weighing period: 2017-2019

deviation is almost exclusively due to the decision to use the EEX Spot Market Gas Netherlands (TTF) day-ahead price in the revised version of the index rather than employing the formerly used UK Natural Gas Index (NBPI). In the light of the fact that the TTF became the supreme traded gas hub in Europe over the last decade and accounted for 79% of the trading volume already in 2019 (Heather 2020) made this switch reasonable and somewhat inevitable. Over the crises periods and especially over the entire year 2022 the NBPI and TTF prices diverged significantly. The major explanation for this price divergence are the large LNG supplies to the UK, which caused prices at the NBP hub to fall to sometimes half of the TTF price (European Commission 2022).

Regardless of the significant temporary level differences between the former and the revised HWWI commodity price index, both time series turn out to be highly correlated (the Pearson correlation coefficient turns out to be as high as 0.988).

10 Data provision and usage

The HWWI commodity price indices are normalized to 100 for the base year 2020. All variants of the HWWI commodity price index can be downloaded via the data dashboard of Hamburg Institute of International Economics, which is part of the internet appearance of the institute. Downloads via API are technically supported.

The institute provides all indices in annual and quarterly frequency for free after completing a registration procedure. Data in monthly or daily frequency can be downloaded only with a paid subscription. Further dissemination of the free or paid data is only permitted with the explicit permission of the institute. The conditions for subscriptions are displayed in the institute's data dashboard. For journalists and academic researchers, exceptions might apply. Please contact the institute for referring requests.

Whenever the HWWI commodity price index is used in scientific work, citing this article is required.

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