



Special Series on COVID-19

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Benchmarking and Rebasing National Accounts

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Given the acute economic shock caused by the COVID-19 pandemic in 2020, it is recommended that countries choose an alternative year to produce GDP benchmarks. Furthermore, it is not advisable to use 2020 as the base year for fixed-weighted estimates of GDP in constant prices. This guidance note focuses on outlining key considerations for choosing a benchmark and base year in national accounts. It provides guidance on how to check whether a particular year is a suitable candidate for benchmarking and rebasing. These considerations go beyond GDP and briefly discuss the source data used in the compilation of national accounts during a benchmark year.

I. INTRODUCTION

The periodic development of a GDP “benchmark”¹ is needed because in many countries, due to cost and resource constraints, annual and quarterly GDP estimates and its sub-aggregates are developed using incomplete source data and indicators. While this ensures timely estimates of economic growth, the use of these indicators over an extended period can result in a deterioration in the quality GDP.

The IMF recommends that countries produce benchmark estimates of GDP and its sub-components on a regular basis. The regular development of benchmark estimates of GDP ensures country compilers provide their users with accurate measures of the size and structure of the economy and appropriate weights for aggregating GDP-related volume indices.

The development of GDP benchmarks normally coincides with resource-intensive data collection activities. This includes the use of a range of tools such as censuses, enterprise surveys, household surveys, government, and

¹ A **benchmark estimate** is defined as the final vintage of a data point. It is the data point that was compiled using the highest quality source data and the most advanced methods. **Benchmark revisions** are a special case of annual revisions and are used to incorporate final vintages of source data. When undertaking a benchmark revision, a macroeconomic account program does not expect to receive any additional information it can use to improve the overall quality of the national account estimates. **Benchmarking** is a process by which an existing series is calibrated to a new higher quality series of the same or different frequency. Once benchmark estimates have been generated it will be necessary to undertake a benchmarking activity to ensure the existing time-series of information (annual or sub-annual) are coherent with the new benchmark estimates.

other administrative sources. These data provide a complete view of economic activity. Given the acute economic shock related to the COVID-19 pandemic, countries are seeking guidance as to whether data gathered for the 2020 reference year should be used to establish 2020 national accounts benchmark estimates of GDP. Countries should consider delaying the resource-intensive data collection activities until conditions warrant them recommencing. Further, countries are also seeking advice as to whether 2020 should be used as a base year for fixed-weighted constant price estimates of GDP. When a country switches weights from one year to another it is referred to as “rebasing”.²

II. SHOULD COUNTRIES CHOOSE 2020 AS A BENCHMARK YEAR FOR GDP?

The IMF recommends that countries produce benchmark estimates of GDP every 5 to 10 years (with 5 years the preferred interval). For some countries, their next scheduled benchmark year is 2020. It is recommended that countries choose an alternative year to produce GDP benchmarks. Furthermore, the shock may be prolonged and continue into 2021. Thus, it is advisable that countries that planned to produce benchmark estimates of GDP for the year 2021 consider adjusting their plans and likewise choose an alternate benchmark year if local conditions warrant.

The first reason for this is that the benchmark year should be representative. Developing benchmark estimates in a year when there is an acute or ongoing economic shock is inadvisable since the shock may cause significant temporary shifts in production and consumption patterns. When selecting a benchmark year, it is best if the year reflects “normal economic activity” for a given country. This is because countries often use their benchmark estimates as weights to aggregate detailed indexes to more aggregated indexes. These weights are often fixed for a period of time. If these weights are unusual then the aggregate results derived in subsequent years may understate or overstate growth rates.

Benchmark estimates also serve as interpolation points when generating a time-series. If poor interpolation techniques are used when one of the benchmarks is an outlier the compiler could introduce a smoothing effect that does not reflect economic reality. This will cause distortions in the measurement of the business cycle and tend to mute the rapidity of declines and the subsequent recovery. However, good interpolation techniques maintain turning points and reflect historical trends regardless of outlier observations.

The second reason it is not advisable to use 2020 as a benchmark year is because the COVID-19 pandemic has had a major impact on data collection activities and therefore the source data used by compilers may be of inferior quality. In some cases, national statistical offices (NSOs) were unable to collect data from respondents because respondents were shutdown for a period of time or their offices were closed, and they were working from home and therefore difficult to contact. In many cases, the provision of data to NSOs took a back seat to more pressing priorities. Finally, the type of transactions taking place during this period are unusual and therefore are more susceptible to misrecording. Using these “inferior” data sources to establish benchmarks goes counter to the goal of establishing benchmarks in the first place. Governments invest heavily in their data operations in a benchmark year. If during the benchmark year there are widespread challenges in collecting or processing data then the investment would be better spent in another period.

The third reason is data collection activities for 2020 are more severely affected by intra-annual information, so even if the annual information used for the benchmark year were adequate, the estimation of quarterly

² **Rebasing** refers to the process by which constant price aggregates are updated using the prices of a more recent period. Rebasing is often confused with benchmarking. When national accounts programs undertake a comprehensive revision, it is often referred to as a rebasing exercise. Part of the confusion arises because national account programs often undertake a comprehensive revision and then subsequently use the benchmark estimates to rebase their constant price series.

“benchmark” series may be flawed. There are major disadvantages of having poor quarterly data in the benchmark year, including:

- These poor benchmark quarterly series will not be revised until the next benchmark year
- The first annual GDP estimate is generated from an extrapolation of quarterly series, so there may be a bias in the first signal and thus large revisions when the first annual compilation is produced
- Severe distortions in the quarterly series will hamper backwards linking, seasonal adjustment, and analyses.

III. SHOULD COUNTRIES CHOSE 2020 AS A BASE YEAR FOR CONSTANT PRICE ESTIMATES OF GDP?

Many countries produced fixed-weighted estimates of GDP in constant prices. These base year weights are used to produce estimates of total real GDP and its sub-aggregates each quarter and year until such time that a country has access to more recent high-quality detailed information. Rebasings (switching weights from one year to another) and the development of GDP benchmarks often occur at the same time because this coincides with the most comprehensive and high-quality source data. The periodic or fixed approach to weighting contrasts with the approach some countries employ—mainly advanced economies and selected developing countries primarily in francophone Africa³—where they update the weights every year and “link” the year-over-year changes to produce what is known as “chained-weighted” estimates of real GDP.

Given the shifts in production and consumption patterns in 2020, it is not advisable to use 2020 as the base year for fixed-weighted estimates of GDP in constant prices. The use of 2020 weights for estimates of real GDP will result in inferior estimates of growth in subsequent normal periods if the shock is deemed to be temporary. The underlying principle is to use a price structure that is most representative of the periods being covered, which is why more recent is usually better but not always in the case of a temporary shock. In addition, if these new weights are applied to prior periods there will be significant revisions to economic growth. Countries that use a chained-weighted methodology should continue this practice and use the 2020 weights when producing estimates of real GDP.

The rationale for not using 2020 weights when employing a fixed-weighted methodology is best explained using an example. Assume that country X produces oil as a main product, which is part of the mining sector.⁴ In all scenarios, the nominal (current price) value of oil output is obtained as a product of production volumes and prices. Scenario 1 is a baseline scenario with the base year 2015 and relative stability in the economic environment. In the base year, the current price output is the same as the constant price output. The indicators used in constructing oil are generally stable with oil prices about 40 currency units. However, the structure of the economy is gradually changing over time as the share of mining falls from 73.3 percent in 2015 to 64.4 percent in 2020. Under the fixed base year approach, the current price shares of the mining and “other” industry for 2015 are used as weights (73.3 percent and 26.7 percent, respectively) to aggregate the mining and other industries in subsequent years to derive an estimate of the total in constant 2015 prices. The further away from the base year the weights become less relevant because the structure of the economy is gradually changing.

Scenario 1: Baseline with 2015 base

	2015	2016	2017	2018	2019	2020	2021	2022	2023	
Oil production volume	1	186	188	196	200	206	210	215	219	223

³ The countries that use the Equilibre ressources emplois tableau entrées sorties (ERETES) system http://www.eretes.net/?page_id=125&lang=en

⁴ To keep the scenario simple, it is assumed that the only product within the mining sector is oil. All indicators in this example are hypothetical assumptions.

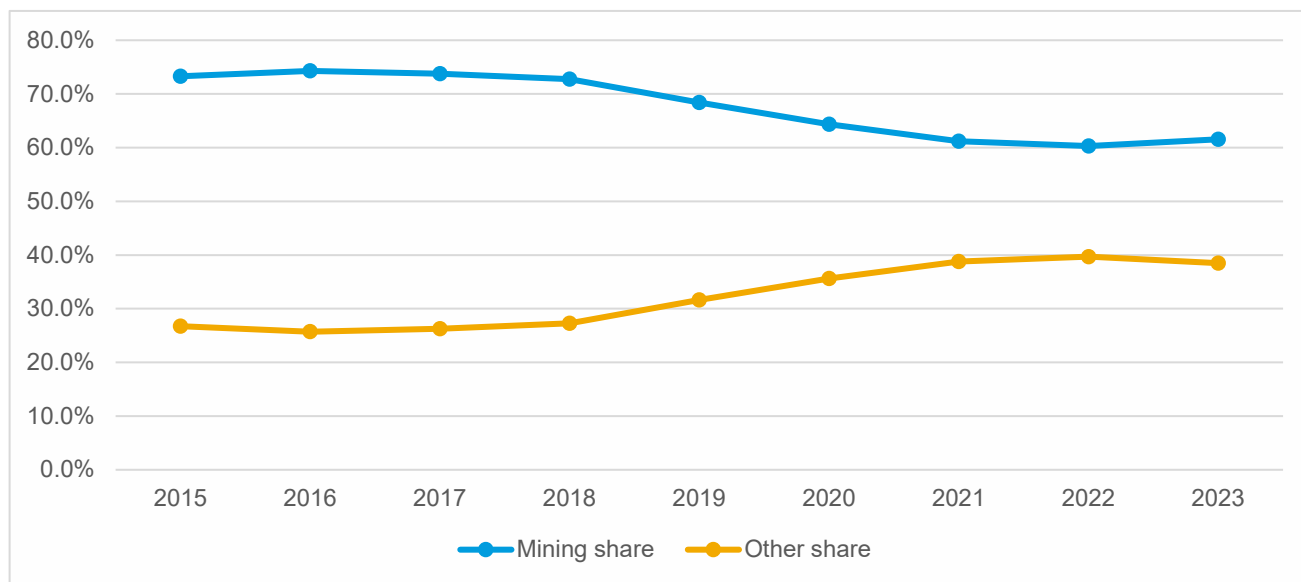
		2015	2016	2017	2018	2019	2020	2021	2022	2023
unit price	2	39	41	40	40	42	43	44	43	47
Oil production value	3=1x2	7,254	7,708	7,840	8,000	8,652	9,030	9,460	9,417	10,481
Current price										
Mining	4=3	7,254	7,708	7,840	8,000	8,652	9,030	9,460	9,417	10,481
Other	5	2,650	2,670	2,790	3,000	4,000	5,000	6,000	6,200	6,550
Total	6	9,904	10,378	10,630	11,000	12,652	14,030	15,460	15,617	17,031
Current price shares										
Mining	7=4/6*100	73.2%	74.3%	73.8%	72.7%	68.4%	64.4%	61.2%	60.3%	61.5%
Other	8=5/6*100	26.8%	25.7%	26.2%	27.3%	31.6%	35.6%	38.8%	39.7%	38.5%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%
Volume indices										
Mining	9	100	101	105	107	111	113	115	118	120
Other	10	100	102	103	105	109	116	117	118	119
Constant 2015 prices⁵										
Mining	11	7,254	7,332	7,644	7,800	8,034	8,190	8,385	8,541	8,697
Other	12	2,650	2,706	2,734	2,789	2,901	3,068	3,096	3,124	3,152
Total	13	9,904	10,038	10,378	10,589	10,935	11,258	11,481	11,665	11,849
Growth rate										
Mining	14		1.1%	4.3%	2.0%	3.0%	1.9%	2.4%	1.9%	1.8%
Other	15		2.1%	1.0%	2.0%	4.0%	5.8%	0.9%	0.9%	0.9%
Total	16		1.4%	3.4%	2.0%	3.3%	3.0%	2.0%	1.6%	1.6%

Note: Data are fictitious and are for illustrative purposes.

In scenario 2 country X decides to update the base year from 2015 to 2020 because it is the most recent benchmark year where more complete source data are available. Doing this means that the weights use the 2020 current price shares (64.4 percent for mining and 35.6 percent for “other”) to derive an estimate of the total in constant 2020 prices. Figure 1 illustrates how the economic structure of country X has evolved between 2015 to 2020. In 2020, the mining industry has a lower share of economic activity than in 2015.

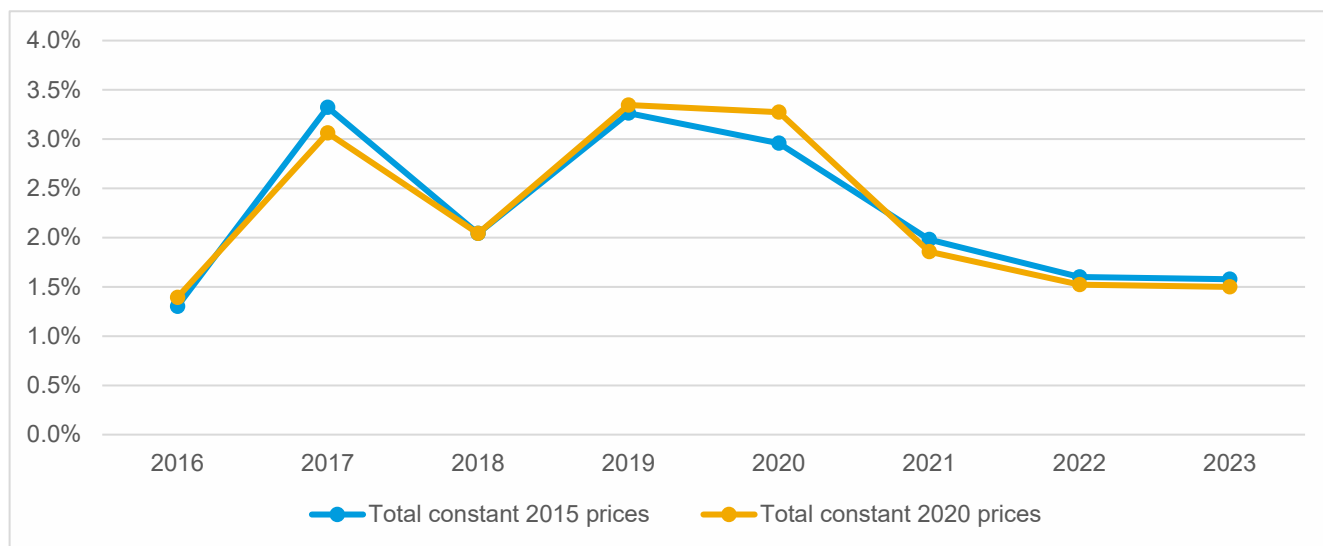
⁵ To estimate the constant 2015 price value for the year 2016 for the mining; $7254 * (101.07/100) = 7332$.

FIGURE 1. Percentage Share of GDP at Current Prices



The increased weight for "other" in the new base year means that growth in the volume of other industries has a much larger effect on the total growth in constant prices. As a result, the total in constant prices is revised (Figure 2) even though the underlying mining and other industry volume growth rates have not changed.

FIGURE 2. Percent Change in Total at Constant Prices



Scenario 2: New Benchmark and Base Year 2020.

		2015	2016	2017	2018	2019	2020	2021	2022	2023
Oil production volume	1	186	188	196	200	206	210	215	219	223
unit price	2	39	41	40	40	42	43	44	43	47

		2015	2016	2017	2018	2019	2020	2021	2022	2023
Oil production value	3=1x2	7,254	7,708	7,840	8,000	8,652	9,030	9,460	9,417	10,481
Current price										
Mining	4=3	7,254	7,708	7,840	8,000	8,652	9,030	9,460	9,417	10,481
Other	5	2,650	2,670	2,790	3,000	4,000	5,000	6,000	6,200	6,550
Total	6	9,904	10,378	10,630	11,000	12,652	14,030	15,460	15,617	17,031
Current price shares										
Mining	7=4/6*100	73.2%	74.3%	73.8%	72.7%	68.4%	64.4%	61.2%	60.3%	61.5%
Other	8=5/6*100	26.8%	25.7%	26.2%	27.3%	31.6%	35.6%	38.8%	39.7%	38.5%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%
Volume indices										
Mining	9	100	101	105	107	111	113	115	118	120
Other	10	100	102	103	105	109	116	117	118	119
Constant 2020 prices										
Mining	11	7998	8,084	8,428	8,600	8,858	9,030	9,245	9,417	9,589
Other	12	4,318	4,409	4,455	4,545	4,727	5,000	5,045	5,091	5,136
Total	13	12,316	12,493	12,883	13,145	13,585	14,030	14,290	14,508	14,725
Growth rate										
Mining	14		1.1%	4.3%	2.0%	3.0%	1.9%	2.4%	1.8%	1.9%
Other	15		2.1%	1.0%	2.0%	4.0%	5.8%	0.9%	0.9%	0.9%
Total	16		1.4%	3.1%	2.0%	4.4%	3.3%	1.9%	1.5%	1.5%

Note: Data are fictitious and are for illustrative purposes.

In scenario 3 country X experienced production and price shocks. Assume that in 2020, due to COVID-19, oil production dropped, and prices fell from 42 unit price to 20 unit price. As a result, the mining current price share dropped from 68.4 percent in 2019 to 37.5 percent in 2020. Assuming that this is a temporary shock—therefore, not representative as to what will happen in the future—and mining production resumes to a “normal” level in 2021, if the 2020 weights are used for the subsequent years mining will be underweighted and thus its impact on the total growth rate will be muted (Figure 3).

Scenario 3: Benchmarked to 2020 with Production and Oil Price Shocks.

		2015	2016	2017	2018	2019	2020	2021	2022	2023
Oil production volume	1	186	188	196	200	206	150	215	219	223
unit price	2	39	41	40	40	42	20	44	43	47
Oil production value	3=1x2	7,254	7,708	7,840	8,000	8,652	3,000	9,460	9,417	10,481
Current price										
Mining	4=3	7,254	7,708	7,840	8,000	8,652	3,000	9,460	9,417	10,481
Other	5	2,650	2,670	2,790	3,000	4,000	5,000	6,000	6,200	6,550
Total	6	9,904	10,378	10,630	11,000	12,652	8,000	15,460	15,617	17,031
Current price shares										
Mining	7=4/6*100	73.2%	74.3%	73.8%	72.7%	68.4%	37.5%	61.2%	60.3%	61.5%
Other	8=5/6*100	26.8%	25.7%	26.2%	27.3%	31.6%	62.5%	38.8%	39.7%	38.5%
Total		100%	100%	100%	100%	100%	100%	100%	100%	100%
Volume indices										
Mining	9	100	101	105	107	111	81	115	118	120
Other	10	100	102	103	105	109	116	117	118	119
Constant 2020 prices										
Mining	11	3,720	3,760	3,920	4,000	4,120	3,000	4,300	4,380	4,460
Other	12	4,318	4,409	4,455	4,545	4,727	5,000	5,045	5,091	5,136
Total	13	8,038	8,169	8,375	8,545	8,847	8,000	9,345	9,471	9,596
Growth rate										
Mining	14		1.1%	4.3%	2.0%	3.0%	-27.2%	43.3%	1.9%	1.8%
Other	15		2.1%	1.0%	2.0%	4.0%	5.8%	0.9%	0.9%	0.9%
Total	16		1.6%	2.5%	2.0%	3.5%	-9.6%	16.8%	1.3%	1.3%

Note: Data are fictitious and are for illustrative purposes.

FIGURE 3. Percent Change in Total at Constant 2020 Prices



Under scenario 3, a country that would benchmark in 2020 because of availability of comprehensive source data may consider delaying the benchmarking and rebasing exercise to a year in which economic conditions will be viewed as representative. Based on the domestic circumstances, statistical compilers could explore the following possibilities: (1) if an alternative year, such as 2019, is deemed to have high-quality and comprehensive data then consider choosing the most recent year with high-quality data; (2) delay the benchmarking and rebasing exercise until conditions are deemed to be representative and high-quality and comprehensive data are available.