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WHAT IS HAPPENING TO THE NEW GREEK NATIONAL ACCOUNTS DATA?

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Introduction

Data from national accounts have gained more relevance as a crucial set of information for policy, especially in the eurozone, since many indicators—like the size of the public deficit relative to GDP—depend on them. It is therefore crucial that these data provide a realistic description of the actual state of the economy: the quality of statistical information will impact its reliability and the confidence of international observers, as well as researchers, in the institution that produces such data.

For our analysis of the Greek economy, we rely on a structural macroeconometric model, which tends to be more robust for its complete and consistent treatment of national accounts—including some indicators that are often neglected in other macroeconomic models, such as the behavior of the price of investment goods relative to consumption goods, or the dynamics of foreign prices against domestic prices.

Models that aim at understanding the medium-term trajectory of an economy usually need to abstract from short-term volatility due to the seasonal behavior of some variables, like the price of agricultural goods, and it is therefore common practice to use seasonally adjusted data rather than the observed seasonal data.

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Using our model of the Greek economy, we recently noticed that the dynamics of relative prices, as measured by the ratios between the deflators of the different components of GDP, had an excess volatility, which made it more difficult to obtain meaningful econometric estimates of their determinants. We have therefore decided to investigate whether this excess volatility could be observed in the original seasonal data, and this note documents our results.

In 2020, the Hellenic Statistic Authority (ElStat) started a revision of the national accounts for Greece to bring them into line with the new European System of Accounts (ESA) 2010 (see Eurostat 2019), adopting 2015 as the benchmark year.

At the time of writing in January 2022, ElStat has released revised quarterly data both for national accounts and sector accounts from 2010 to the third quarter of 2021, while previous data covering the 1995–2009 period are still published with a methodological break, pending their revisions.[1]

For our exercises in modeling the Greek economy in order to produce medium-term projections, we use a stock-flow consistent (SFC) model, presented in Papadimitriou et al. (2013), which makes use of seasonally adjusted quarterly data from national accounts, both at current prices and chained prices, as well as data at current prices from the nonfinancial accounts of institutional sectors (also produced by ElStat).

One of the features of our model is that it consistently links the components of GDP measured at current and constant prices, using appropriate deflators that are computed from ElStat's seasonally adjusted data. Using uppercase letters to denote variables measured at current prices and lowercase letters for variables measured at constant prices, for each component of GDP (Xi) the corresponding deflator is given by

$$p_i = {}^{Xi}\!/_{xi} \qquad (1)$$

How are these components measured?[2] In principle, it should be easier to compute the current price values (X_i), which can be directly observed in most cases, and an appropriate price index (p_i), obtaining the constant price values (x_i) from the identity above.

The identity should hold both for "raw" observed data and be valid after all variables have been adjusted to remove the seasonal components.

In modeling the economy for producing medium-term projections it is usually preferable to work with seasonally adjusted time series, which is the choice we have made for the Levy Institute's model for Greece.

As we will discuss in detail in the next section, the deflators obtained from the seasonally adjusted ElStat series are too volatile with respect to those obtainable from unadjusted series, casting some doubts on the reliability of the seasonally adjusted series at constant prices at quarterly frequency.

The Deflators for the Components of GDP

For the purpose of our modeling exercises, we need to obtain seasonally adjusted series for the following variables through which we can decompose GDP from the demand side:

$$GDP = C + GFCF + DINV + G + XG + XS - MG - MS \qquad (2)$$

$$GFCF = GFCFD + GFCFS + GFCFO \qquad (3)$$

Where C is household consumption and nonprofit institutions serving households; GFCF is gross fixed capital formation; DINV is the change in inventories; G is public consumption; XG is the exports of goods; XS is the exports of services; MG is the imports of goods; and MS is the imports of services. In equation (3), gross fixed capital formation (GFCF) is split into (D)wellings, (S)tructures, and (O)ther.

For each of these variables—with the exception of the change in inventories—we need to use the implicit deflators: using again lowercase letters to denote variables at constant prices, the implicit deflators are computed using equation (1), as for $p_{GDP} = {}^{GDP}\!/_{gdp}$,$p_c = {}^{C}\!/_{c}$, etc.

Household Consumption

The deflator for household consumption does not seem to create any problems. In Figure 1, we report the deflator obtained from the seasonally adjusted (SA from now on) series, along with data obtained from the unadjusted series, and with the quarterly average from monthly data on the consumer price index (CPI).

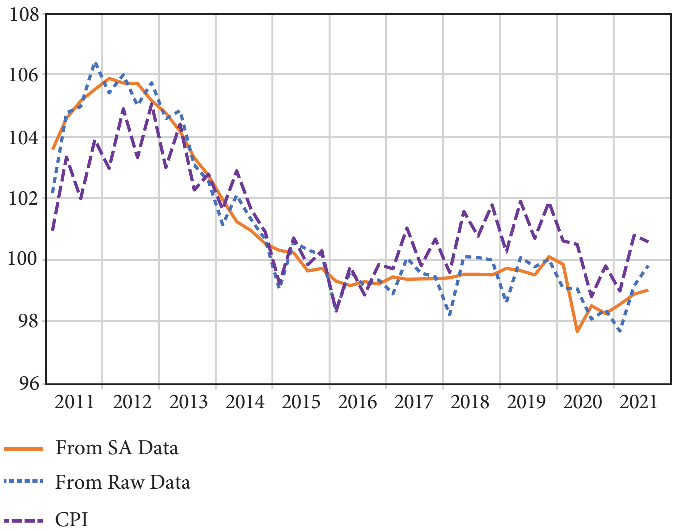
As expected, the SA deflator is smoother than that obtained from the unadjusted series, and the latter has the same seasonality of the CPI.

Gross Fixed Capital Formation

Possibly the major problem lies in the deflator for GFCF. In Figure 2 we report the deflator obtained from the SA series compared to that computed on the unadjusted series; the former has a large, unexpected seasonal volatility. Since GFCF has to be consistent with the sum of its components, it is useful to analyze them separately.

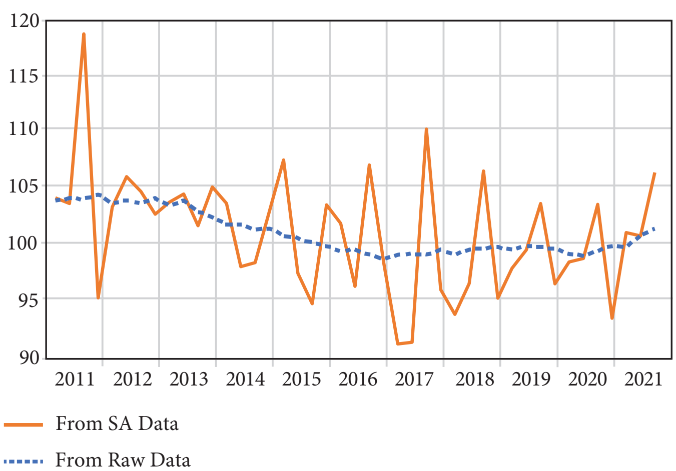
In Figure 3 and Figure 4 we report the deflator for GFCF in dwellings and other buildings, respectively, along with the "quarterly price index of work categories (PPI in construction)," which is used by ElStat to produce the data (ElStat 2016, 30). It is clear from both charts that the deflators obtained from the original series without seasonal adjustments have the same trend and volatility of the underlying price index, while the deflator obtained from the SA series has additional (spurious) seasonal volatility, which is more pronounced in the first part of the sample.

Figure 1 **Implicit Deflator: Consumption (2015=100)**



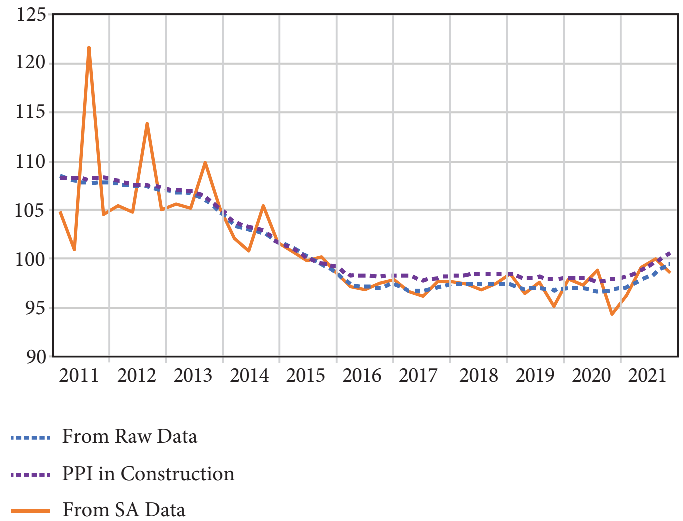
Source: ElStat

Figure 2 **Implicit Deflator: GFCF (2015=100)**



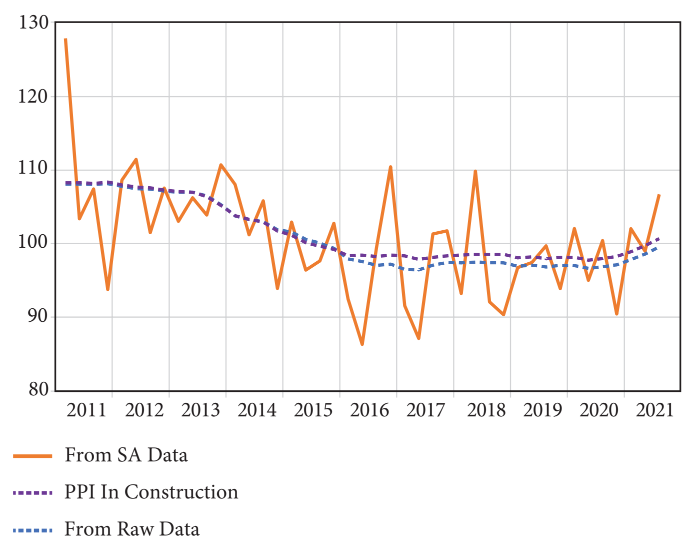
Source: ElStat

Figure 3 **Implicit Deflator: GFCF, Dwellings (2015=100)**



Source: ElStat

Figure 4 **Implicit Deflator: GFCF, Other Buildings (2015=100)**



Source: Elstat

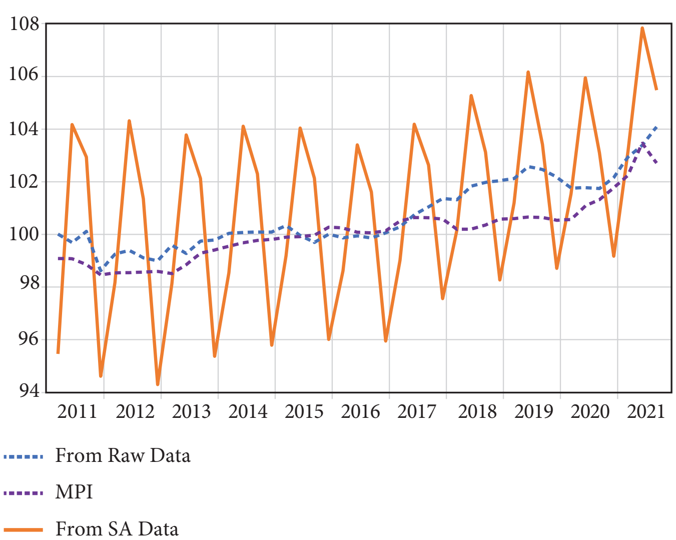
An even more severe problem with the SA data arises for GFCF in transport equipment (Figure 5). The comparison is now with the import price index in industry (MPI) for capital goods (ElStat 2016, 30). Excess volatility also applies to the deflator for GFCF in other machinery (Figure 6). The deflator for GFCF in information and communication technology equipment is also smoother when computed from raw data as compared to the SA data.

For the two remaining categories ("cultivated biological resources" and "intellectual property products") that ElStat publishes at quarterly frequency by interpolating data at annual frequency, the volatility of deflators from the raw and SA data is comparable: no series is smoother than the other.

Government Consumption

The two deflators for government consumption are reported in Figure 7, along with the CPI, which is one of the two price indices used by ElStat.[3] As for household consumption, the deflator obtained from the raw data is more volatile than the one computed from the SA data. It is curious, however, that the correlation coefficient of the SA deflator to the CPI is higher than the correlation coefficient between the deflator obtained from raw data and the CPI. In other words, seasonal adjustment has not completely removed the seasonality from the deflator for government expenditure.

Figure 5 **Implicit Deflator: GFC, Transport Equipment**

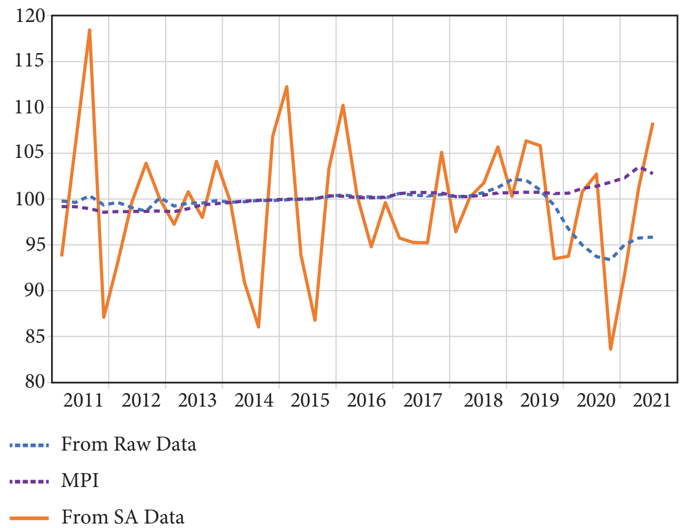


Source: Elstat

Exports

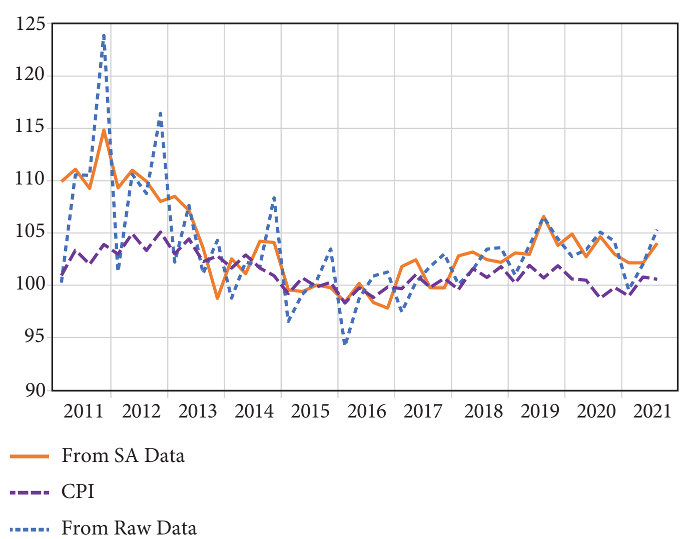
The deflators for exports of goods are reported in Figure 8. Their behavior is similar, but the deflator obtained from the non-SA series is less volatile and has a higher correlation with the producer price index (PPI) for nondomestic markets, which is the reference price index for ElStat.[4]

Figure 6 **Implicit Deflator: GFCF, Other Machinery (2015=100)**



Source: Elstat

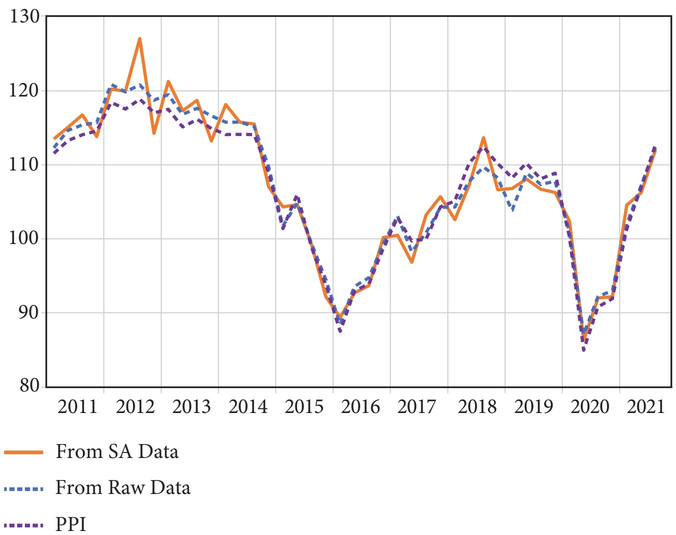
Figure 7 **Implicit Deflator: Government Expenditure (2015=100)**



Source: Elstat

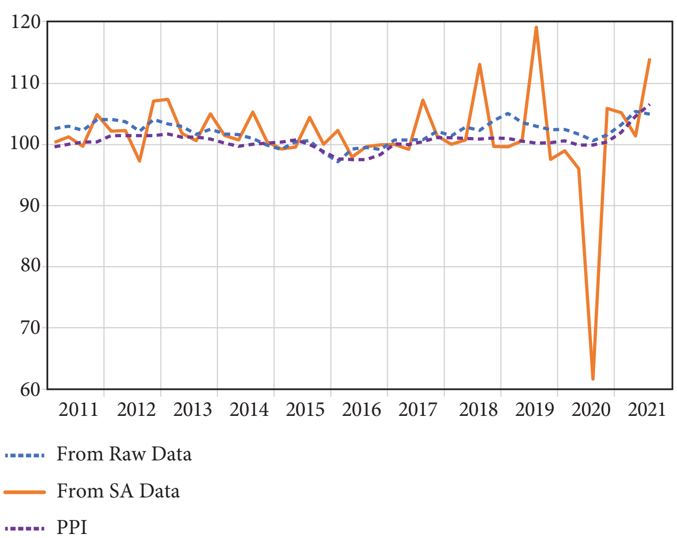
A very serious problem emerges for the deflator of exports of services (Figure 9), which, in addition to a greater volatility when computed from the SA series, also exhibits an outlier in which the strongest impact from the pandemic shows up in the third quarter of 2020. The reference price index for ElStat in this case is the PPI for nondomestic market excluding energy.

Figure 8 **Implicit Deflator: Exports of Goods (2015=100)**



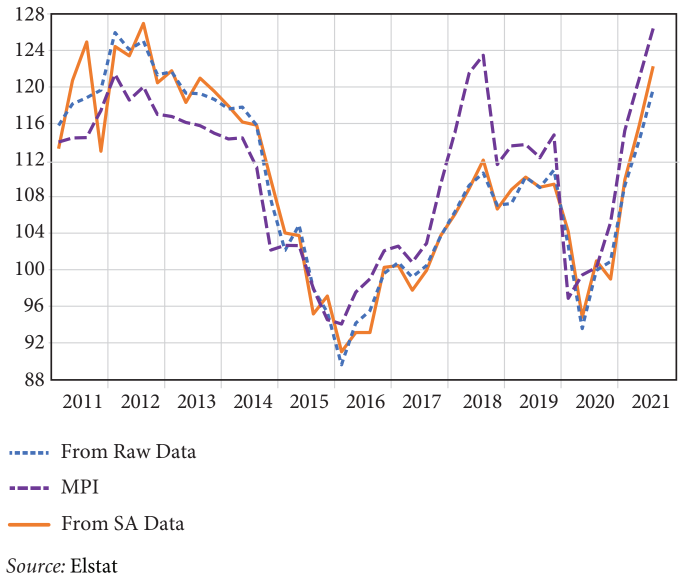
Source: Elstat

Figure 9 **Implicit Deflator: Exports of Services (2015=100)**



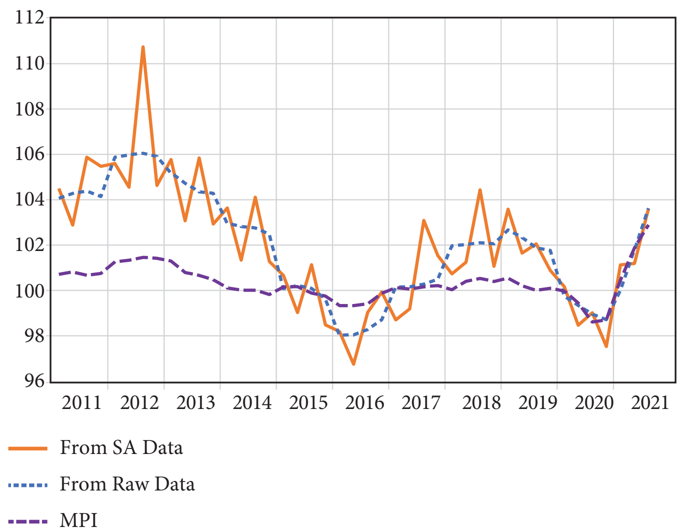
Source: Elstat

Figure 10 **Implicit Deflator: Imports of Goods (2015=100)**



Source: Elstat

Figure 11 **Implicit Deflator: Imports of Services (2015=100)**



Source: Elstat

Imports

The deflators for imports of goods, reported in Figure 10, are similar for the SA and raw series. We compare them with the MPI, which is the price index mentioned by ElStat (2016, 32).

Finally, the deflator for imports of services from raw data is again much smoother than that obtained from the SA data (Figure 11). The price index reported for comparison, as mentioned in ElStat (2016, 32), is the MPI excluding energy.

Summing up, the procedure currently adopted by ElStat for the publication of seasonally adjusted time series for the components of GDP at quarterly frequency imply erratic behavior for the implied deflators, with the only exceptions being household and government consumption. By "erratic behavior" we refer to the volatility or seasonality that appears in the deflators obtained from the SA series for values and volumes, when such volatility does not appear in the deflators obtained from unadjusted time series.

We note that a similar problem, albeit less severe and for a smaller number of variables, was already present in the time series for quarterly national accounts after 2010 that were published before the latest change in methodology.

Our Alternative Estimates of Quarterly Time Series, 2011–21

The analysis above suggests deriving deflators for each series from unadjusted data, with the exceptions of private and public consumption expenditures. We will therefore:

1. Adopt the deflators obtained from the SA series for public and private consumption, and adopt the deflators obtained from unadjusted data for the components of GFCF and trade.
2. Compute the (SA) volumes of the components of GDP by dividing the corresponding values by the appropriate deflators.
3. Obtain the aggregate volumes of GDP, GFCF, imports, and exports with the same procedure. Given the method for computing the deflators, the volume of an aggregate will not match the sum of its components. Our chosen procedure will therefore have the benefit of having aggregate volumes (GDP in particular) that are as close as possible to the published series, but we will need a residual variable to fill the gap between the aggregate and the sum of its components.

The resulting series at constant prices, when summed up to obtain annual figures, are in line with those published by ElStat, with a discrepancy usually below 1 percent.[5]

Finally, we have verified the properties of the GFCF deflators obtainable from seasonally adjusted and unadjusted series for the German, French, and Italian economies, starting from the database available from Eurostat. In all cases, GFCF was highly seasonal in both values and volumes, but the deflator obtained from the SA series almost overlapped with that obtained from unadjusted series, with a (seasonal) discrepancy never exceeding 1 percent in each quarter.

We suspect that ElStat has adopted a seasonal adjustment procedure that is not appropriate for national accounting data, since the results we obtained for Greece are not present in the national accounts of other countries. As our results cast some doubts on the quality of Greek national accounts, we hope our contribution will help to improve the quality of Greek statistics, and therefore their reliability.

Notes

1. We note that ElStat makes available previous data releases for the time series it publishes. However, this feature is currently (February 2022) not working for quarterly national accounts, such that only the last release is available.
2. Details are provided in ElStat (2016).
3. See ElStat (2016, 29). The other index is obtained "from the value index of the annual changes in the compensation of employees and the volume index of the annual change in the number of employees of the General Government."
4. See ElStat (2016, 32).
5. A notable exception is exports of services at constant prices, which in our calculation is 8 percent lower in 2020 with respect to the ElStat measure.

References

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