



Conselho das Finanças Públicas
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COVID 19 AND LOSS OF PRODUCTION – AN ESTIMATE FOR PORTUGAL FROM ELECTRICITY CONSUMPTION

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Index

1	Introduction	4
2	Data and econometric estimate	4
3	Results	5
4	Conclusion.....	7
5	References.....	8



1 Introduction

The relationship between electricity consumption and economic activity has been widely studied ¹. It comes then as no surprise that the need to obtain a fast estimate for the GDP drop following the perceived devastating economic effects resulting from the Covid-19 pandemic would lead forecasting practitioners into exploiting this relationship². This drive is further explained, at least in the case of Portugal, by the fact that electricity consumption daily data are published almost in real-time as compared to delays in other potentially informative variables.

As usual, there is a trade-off between speed and estimate accuracy. Any result of this kind is not a suitable replacement for better and more complete information, and, in due time, complete and accurate measurements will be available. In the meantime, less precise but already available instruments provide us with some guidance and insight. This note reports on one of such instruments, and it is structured as follows. The second section, following this introduction, presents the data used and the econometric estimate results obtained. The third section presents the main results, and the fourth section concludes.

2 Data and econometric estimate

Although GDP is a flow variable, data for it is only available each quarter. A higher frequency is possible by means of a proper proxy, and fortunately enough this is available for Portugal – the coincident indicator from the Banco de Portugal³. In the following, this indicator is designated by CI, meaning the monthly homologous percent change of economic activity.

In a similar vein, EC stands for the monthly homologous percent change in electricity consumption, adjusted for working days and temperature. Electricity consumption is published every day at the Rede Elétrica Nacional (REN) website.

For econometric estimation purposes, the longest available period was used, from January 2007 to February 2020. Both variables passed a stationarity Augmented Dickey-Fuller test. The following equation was retained as a (kind of) aggregate

¹ See the surveys by Payne (2010), by Ozturk (2010) and by Tiba and Omri (2017) and Santos et al. (2018) for Portugal.

² See McWilliams and Zachmann (2020) as an example.

³ See Rua (2015) for a presentation. This indicator is published every month at the Banco de Portugal [website](#).

electricity demand expression:

$$EC_t = -0.075 + 0.561.EC_{t-1} + 0.303.CI_t \quad (1)$$

(-0,544) (8.594) (4.072)

where numbers within brackets are t-statistics. Adjusted R² equals 0.564. Residuals were successfully tested for no autocorrelation.

Equation (1) implies the following long-run relationship between economic activity and electricity consumption, imposing $EC_t = EC_{t-1} = EC$:

$$CI = 0.248 + 1.449.EC \quad (2)$$

meaning that an observed drop in electricity of 10 percent is consistent with a drop in economic activity of 14.2 percent.

3 Results

The elasticity relationship (2) is applied to this year monthly data in the following table.

Homologous percentage change in electricity consumption and economic activity

	Electricity consumption	Implied economic activity
jan/20	2.6	4.0
Feb/20	1.4	2.3
mar/20	-0.3	-0.2
Apr/20	-13.8	-19.7
May/20*	-11.2	-16.0

*computed from daily consumption till the 21st may

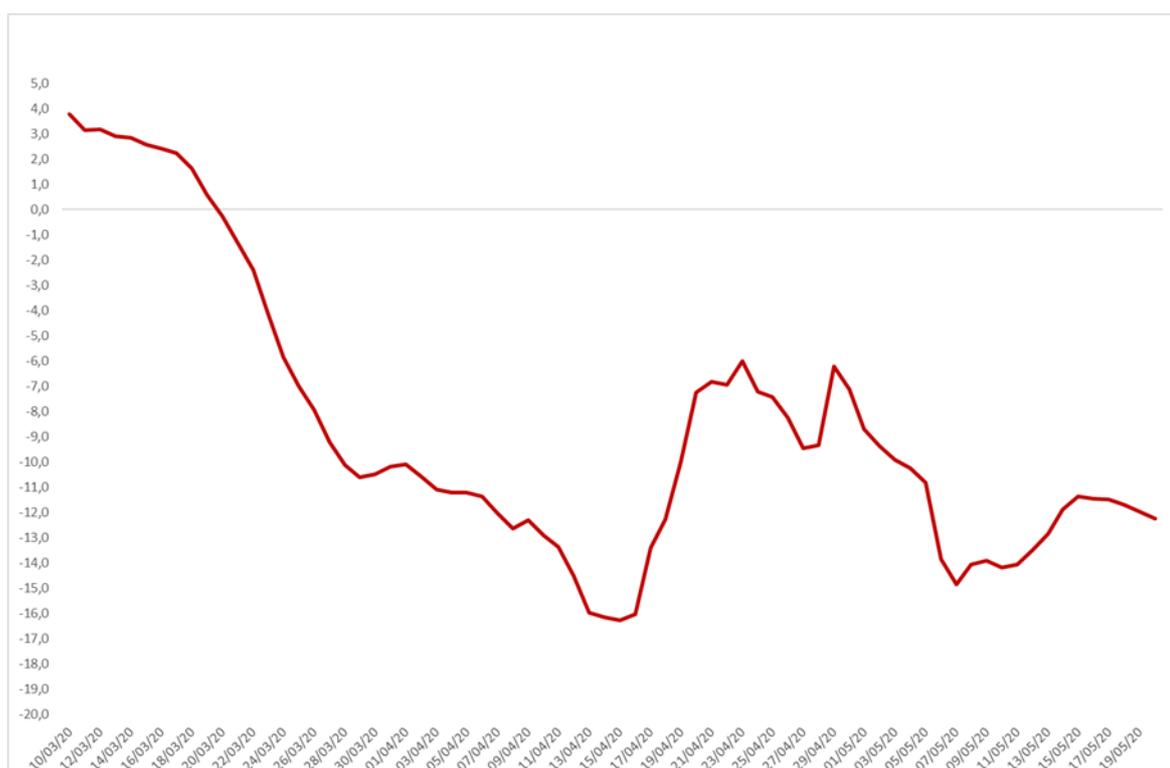
A state of emergency was imposed in Portugal from the 23rd March till the 2nd May, so April was a complete month of lockdown decreed by law. From the 3rd May

Portugal lived under less stringent state of public calamity with some gradual lifting of restrictions to economic and social activity.

In rough terms, the loss of production due to the Covid pandemic is therefore estimated to range between 16 and 19.7 percent, the figures for April and May 2020, respectively. However, these figures should be interpreted with care. In the estimation framework, they mean that economic activity in March 2020 consistent with observed electricity consumption, is below 19.7 the level observed in March 2019.

It is interesting to directly analyse the recent evolution of electricity consumption in a higher frequency. The following graph depicts the last seven days average of the daily homologous change in electricity consumption. It is worth noting the following:

Daily homologous change in electricity consumption
(average of last seven days)



- The fall in electricity consumption, and, one would infer, in economic activity, started before the legal lockdown. This is consistent with the idea that the lockdown started happening before a government or presidential decision. In fact, on the week ending on the 22nd March, consumption was



already -2.4 percent below the corresponding week of 2019. This drop would continue till a trough of -16.3 percent in the week ending on the 15th April.

- It is not evident from this picture that any recovery in economic activity is significantly taking place already in May, after the easing of some legal restrictions. The difference between March and April points toward a quite small recovery (+3.7 percentage points). However, if one takes the average of the last week data is available at the time of writing, the week ending on the 21st May, electricity consumption is consistent with a homologous yearly drop in economic activity of -17.5 percent.

4 Conclusion

Econometric estimates point toward an elasticity of electricity consumption with respect to economic activity of about 1.42. Based on this estimate, it is possible to compute a drop in economic activity in the order of about 17.9 percent (the average of March and May⁴). Considering the bulk of the pandemic effects in Portugal is taking place for two months till the time of writing, a rough point estimate for the drop in annual GDP already occurred would be -3 percent (one sixth of 17.9 percent).

⁴ Recall that the month of May was considered till the 21st only. Some recovery effects could possibly occur in the last third of the month.

5 References

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