WORKING PAPER 1814

On the "utilisation controversy": a comment

Santiago J. Gahn and Alejandro González

December 2018

POST-KEYNESIAN ECONOMICS SOCIETY

On the "utilisation controversy": a comment

Santiago José Gahn
Roma Tre University
santiagojose.gahn@uniroma3.it

Alejandro González
Universidad de Chile
agonzalezc@fen.uchile.cl

Abstract

In a recent contribution, Nikiforos (2016) has claimed that the FED data on capacity utilisation is stationary by construction, and thus, not suitable to test the Neo-Kaleckian model. He then proceeds to provide new series on capital utilisation, which he claims are non-stationary and provide, supposedly, support for the Neo-Kaleckian model. This comment presents two interrelated claims. First, the measurement error that Nikiforos claims to be I(1) in the FED series is I(0), and what is measured with error is only the level of the series. Thus, this series is suitable to test the Neo-Kaleckian model. Secondly, he does not provide unit root tests for the series he suggests as superior to the FED. When this exercise is carried out, almost all unit root tests decidedly reject the existence of a stochastic trend on his 3 proposed series, which, according to the author, do not lend support to the Neo-Kaleckian model. We conclude that measures of capacity utilisation based on FRB data are a reasonable source to test the implications of a wide variety of macroeconomic models.

JEL classification: E11, C22

Keywords: Neo-Kaleckian model, Capacity Utilisation, Stationarity, Workweek of Capital.

The authors would like to thank Michalis Nikiforos for his timely responses with regards to our requests and goodwill. They would also like to thank María Lorena Garegnani, Daniele Girardi and Riccardo Pariboni for their useful comments and suggestions. Finally, the authors wish to thank the FRB and the Census Bureau for their assistance in using the databases employed in this paper. Remaining errors are our sole responsibility.

1 Introduction

One of the most controversial features of the baseline Neo-Kaleckian model - which has become the workhorse model of Post-Keynesian economics - is the failure of the actual rate of capacity utilisation to converge to its desired or normal rate. Empirically, this might imply that capacity utilisation should be a non-stationary process, without any significant mean reversion.

The recent paper by Nikiforos (2016) has been a welcome and influential attempt to test rigorously this implication for U.S. data. The paper makes three key points. First, the author argues that the commonly employed Federal Reserve Board (FRB) data on capacity utilisation is "stationary by construction" (p. 2), and thus, they are "are not appropriate for answering whether or not the desired rate of utilisation is endogenous in the long run" (p. 2). Secondly, he argues that the average workweek of capital can be used an alternative measure of capacity utilisation, and claims that the series constructed in Orr (1989)[1], Shapiro (1986) and Beaulieu and Mattey (1998), which are supposed to reflect this concept, all present an upward trend. Finally, based on Orr's estimates, the author uses ARDL models to provide evidence of the endogenous adjustment of desired capacity to actual capacity.

This comment takes issues with these contributions. First, we show that the position taken by the author on the FRB data implies that this data has measurement error which is I(1), a statistically implausible assumption. We then show that the FRB data presents measurement error which shifts the *level* of the series, but not its *trend*. With regards to the second contribution, we show that standard unit root tests on the series of average workweek of capital which the author implies are superior to the FRB data are also unambiguously stationary; that is, they do not present a stochastic trend, as might be implied by the Neo-Kaleckian model. Finally, given that both the FRB data and the series proposed by Nikiforos are measuring the same underlying variable, the ARDL exercise he carries out is merely a regression of a variable into itself - hardly an informative empirical exercise.

Overall, while we are certainly sympathetic to the idea that the FRB data is built with measurement error - as almost all macroeconomic data are - and that to construct alternative measures of utilisation is useful to provide robustness checks of the empirical debate surrounding the Neo-Kaleckian model, we do not think that there is any evidence to claim

[1] Orr (1989) extends the estimates of Taubman and Gottschalk (1971). Although Nikiforos presents three series of average workweek of capital, his estimations are based on Taubman and Gottschalk (1971) and Orr's (1989) series "because it is the longer series among the different studies" (p. 20).

that the FED data is stationary by construction, nor to claim that alternative measures of utilisation present a unit root.

2 Measurement Error and the order of Integration

The central motivation for Nikiforos (2016) is the claim that capacity utilisation as measured by the FRB is stationary by construction. If this is true, then denoting by u_t real capacity utilisation, u_t^{FRB} the FRB capacity utilisation, and by ε_t measurement error, then the following relationship must hold:

$$u_t = u_t^{FRB} + \varepsilon_t$$

If the left hand side of the equation is $I(1)$, and u_t^{FRB} is $I(0)$ by construction - as claimed by Nikiforos - then ε_t must be $I(1)$ by construction. This implies that the measurement error that the FRB induces has a unit root! To the best of our knowledge, while its common to argue that macroeconomic series have many forms of measurement error, the only measurement error that could *generate* a unit root process is a substantial data revision on definitions of variables such as GDP or quantities of aggregate money (Duffy and Hendry, 2017; Hendry, 1995), which are already I(1) series. Since the $I(1)$ measurement error that Nikiforos attributes to the FRB data does not arise from this source, its reasonable to be sceptical of his claim.

One way to investigate this claim would be to provide a reliable series for u_t, then subtract u_t^{FRB} and analyse the order of integration of the resultant putative measurement error (Hendry, 1995). We will concede Nikiforos his measure of u_t, the average workweek of capital, does not contain any form of measurement error. Figure 1 plots the difference between these series and the capacity utilisation series reported by the FRB.

As it can be readily seen, the presumed measurement error taken by the FRB does not have any clear trend. Furthermore, a unit root tests on both series reveals that the series is stationary (see Table 1[2][3]). This implies that what the FRB data measures with error is the *level* of capacity utilisation, but not its *trend*. As such, this does not invalidate the FRB

[2]We perform the following Unit Root tests with an intercept and no deterministic trend: Augmented Dickey-Fuller (ADF), Dickey-Fuller GLS (ERS), Phillips-Perron (PP), Kwiatkowski-Phillips-Schmidt-Shin (KPSS), Elliot-Rothenberg-Stock Point-Optimal (ERS-PO) and Ng-Perron (NP).

[3]Something that must be clarified is that stationarity tests (e.g. KPSS) "should be taken with caution when they reject the null hypothesis, because they are subject to size distortions in the vicinity of the alternative hypothesis of a unit root" (Choi, 2015, p. 136).

data and its widely known stationary properties as legitimate tests of the Neo-Kaleckian model.

Figure 1: Time series difference: AWW - FRB

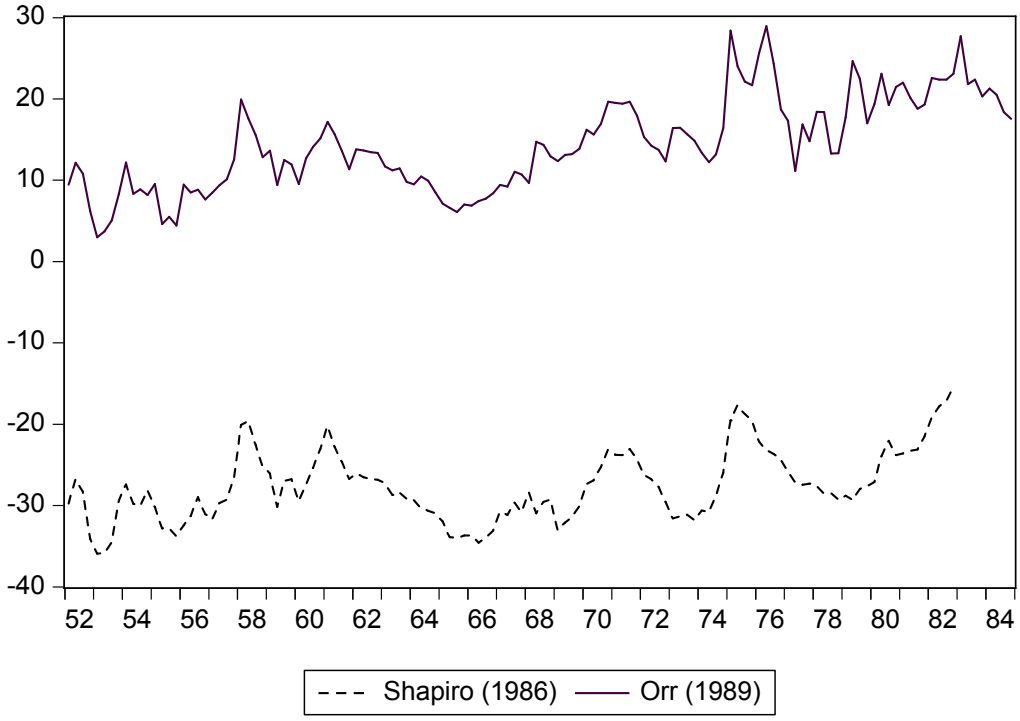

Table 1: Unit root tests for $\varepsilon_t = u_t - u_t^{FRB}$

	Shapiro (1952Q1-1982Q4)	Orr (1952Q1-1984Q4)
ADF	-2.7*	-2.8**
DF-GLS	-2.5**	-2.3**
PP	-2.3	-2.6*
KPSS	0.46**	1.0***
ERS-PO	2.6**	2.8**
NP	2.4**	4.8

Notes: *=pval<0.1, **=pval<0.05, ***=pval<0.001. All alternative hypothesis include a constant and exclude deterministic terms. The lag order is selected with the BIC criteria; in the NP case, with the MAIC criteria.

3 Alternative measures of utilisation

The author then proceeds to provide alternative measures of utilisation, which are based on the average workweek of capital. These series are taken from Shapiro (1986), Orr (1989) and Beaulieu and Mattey (1998). This section takes issue with the claim that these series present a stochastic trend, that is, a unit root process.[4]

The series constructed by all three authors try to measure the average workweek of capital. Given that the precise workweek of capital is hardly ever measured in surveys, these authors propose to derive estimates of this measure by assuming that the workweek of capital is fixed for different shift systems that the firm might adopt. The precise equation for this measure is the following:

$$AWW = \frac{(H(E1 - E2) + 80(E2 - E3) + 120(E3))}{E1}$$

Where "AWW is the average workweek of capital (in hours), H is the average weekly hours worked by production workers on the first shift, and E1, E2, and E3 are the number of production workers employed on the first, second and third shifts, respectively" (Orr, 1989, p. 89). Thus, the series goes between 0 and 120 hours of the average workweek of capital.

Nikiforos then proceeds to plot these three series and inspect them visually (Nikiforos, 2016, Figure 3, p. 14). Unfortunately, he does not implement any stationary tests on his preferred series. This is worrisome, given that it is widely known that in small samples, highly persistent but stationary process and non-stationary process can produce time series which look almost identical to the eye (Hamilton, 1994). Formal unit root tests of all the mentioned series are presented in Table 2. Whenever possible, we select the lag order of the autoregressive process with the BIC information criteria, due to its consistency properties.

As the results show, both the Shapiro (1986) and Orr (1989) series present very strong rejections of the unit root hypothesis, implying that the both series are stationary. While results for the Beaulieu and Mattey's (1998) estimation are mixed, this short series only spans scarcely 19 annual observations therefore nothing reliable can be concluded at the aggregate level.[5] All in all, we think it's clearly reasonable to claim that these alternative

[4]While deterministic trends could be also present, one could strongly argue that the correct tests for the Neo-Kaleckian model - as pointed out by the author itself - is whether it has a stochastic trend, not a deterministic one.

[5]Fortunately, these authors present a panel data set with 20 industries which allows to test the non-stationary character of capital utilisation using a reasonable sample size - 380 observations -. Our estimations

Table 2: Unit root tests for the Average Workweek Capital

	Shapiro (1986) (1952Q1-1982Q4)	Orr (1989) (1952Q1-1984Q4)	Beaulieu and Mattey (1998) (1974-1992)
ADF	-3.789***	-3.929***	-2.188
DF-GLS	-3.809***	-3.473***	-2.237**
PP	-3.886***	-3.852***	-2.204
KPSS	0.236	0.906***	0.258
ERS-PO	1.032***	1.369***	3.810*
NP	1.048***	14.661	3.987*

Notes: *=pval<0.1, **=pval<0.05, ***=pval<0.001. All alternative hypothesis include a constant and exclude deterministic terms. The lag order is selected with the BIC criteria; in the NP case, with the MAIC criteria.

measures of utilisation are unequivocally stationary, thus rejecting what might be a key implication of the Neo-Kaleckian model.

4 Conclusion

This short note presents two interrelated comments on Nikiforos' (2016) paper. First, from a theoretical point of view, the measurement error that Nikiforos claims to be I(1) in the FED series is I(0), and what is measured with error is only the level of the series; therefore, this series is suitable to test the Neo-Kaleckian model. Secondly, we provide unit root tests for the series he suggests as superior to the FED and almost all unit root tests decidedly reject the existence of a stochastic trend on his 3 proposed series. Taking our theoretical and empirical results into account, we conclude that researchers who choose to employ the FED data to test the empirical implications of a wide variety of macroeconomic models are making a reasonable choice.

of panel data unit root tests reject strongly the null hypothesis, however, given the somewhat complicated nature of panel unit root tests - where heterogeneity and cross-sectional dependence are common - and the issue that these results are matter of a future research, they are readily available upon request.

5 Bibliography

Beaulieu, J. J. and Mattey, J. (1998). The workweek of capital and capital utilization in manufacturing. Journal of Productivity Analysis, 10(2), 199-223.

Choi, I. (2015). Almost all about unit roots. Cambridge Books.

Duffy, J. A. and Hendry, D. F. (2017). The impact of integrated measurement errors on modeling long-run macroeconomic time series. Econometric Reviews, 36(6-9), 568-587.

Hamilton, J. D. (1994). Time series analysis. Princeton: Princeton university press.

Hendry, D. F. (1995). Dynamic econometrics. Oxford University Press on Demand.

Nikiforos, M. (2016). On the utilisation controversy: a theoretical and empirical discussion of the Kaleckian model of growth and distribution. Cambridge journal of economics, 40(2), 437-467.

Orr, J. A. (1989). The average workweek of capital in manufacturing, 19521984. Journal of the American Statistical Association, 84(405), 88-94.

Shapiro, M. D. (1986). Capital utilization and capital accumulation: Theory and evidence. Journal of Applied Econometrics, 1(3), 211-234.

Taubman, P. and Gottschalk, P. (1971). The average workweek of capital in manufacturing. Journal of the American Statistical Association, 66(335), 448-455.