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Overhead labour and feedback effects between capacity utilization and income distribution: estimations for the USA economy

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ABSTRACT

Empirical studies on the USA have not reached a consensus on whether its demand is wage- or profit-led, leading many scholars to scrutinize what drives the empirical results. This article tests two possible explanations for profit-led results which are related to the presence of overhead labour. To do so, a vector autoregression model is estimated for the USA from 1964 to 2010 and the wage share is split between supervisors/managers and direct workers. The results support the argument that the income redistribution away from workers and towards managers increased the likelihood of profit-led demand and suggest that an increase in the workers' share of income would stimulate the economy. Also, increases in capacity utilization negatively affect the supervisors' share, so that short-run profit-led results may be capturing the cyclical behaviour of the profit share, but the effect becomes positive as time goes by, suggesting a complex determination of functional income distribution, as capacity utilization affects it in ambiguous ways.

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1. Introduction

Following the theoretical contributions to the Kaleckian economic growth and income distribution models (Bhaduri and Marglin 1990; Blecker 1989; Dutt 1984; Rowthorn 1981; Taylor 1985), several authors have analysed different economies to identify whether their demand regime is wage- or profit-led. There is not, however, a convergence between the results found by different studies on the same country, as discussed by Blecker (2016) and Lavoie and Stockhammer (2012). For the case of the United States, for instance, some studies conclude that it is wage-led, whereas others conclude that it is profit-led.

This lack of consensus has led some scholars to scrutinize what is driving the results. Two possible explanations for the profit-led demand results are related to the existence of overhead labour (managers and supervisors), which also receives wage income but is seldomly treated separately from direct labour, despite presenting different characteristics with respect to the latter. In this sense, Lavoie (2017) argues that profit-led results might be capturing the cyclical effect of overhead labour and Palley (2017) shows that

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a redistribution of wages towards managers (overhead labour) might increase the likelihood of a profit-led regime if compared to an economy with a higher workers' share of wages.

These studies are the motivation of the present article. Its aim is to evaluate the hypotheses put forward by these authors by analysing how overhead labour affects the demand and distribution schedules in the USA economy. The novelty of this study is to estimate a short-run model in which the wage share is split between the working and supervisory classes, something that has been largely ignored in the literature but that captures more accurately the class income distribution, especially because the income shares of these two classes have presented opposite trends in the last decades.[1] The advantage of the estimated model is also to treat income distribution as an endogenous variable, which is not always the case in the existing literature. The analysis considers the USA economy as, to the best of my knowledge, it is the only one with available data for the working and supervisory classes' shares of wages (Mohun 2014).

Besides this introduction, this article is organized into four other sections. Section 2 reviews the previous empirical studies on the USA demand regime. Section 3 discusses the implications of overhead labour to the empirical estimations. Section 4 presents the empirical model and results. Finally, Section 5 presents the concluding remarks.

2. Empirical studies on the USA demand regime

As it happens to other economies, empirical studies on the USA demand regime have not reached a consensus. Blecker (2016) notes that these studies apply different methodologies and that each approach has been more prone to finding either wage- or profit-led results. Thus, one may split most of them into two different approaches: the structural and the aggregative approaches.

On the one hand, the structural approach, introduced by Bowles and Boyer (1995) and applied by Hein and Vogel (2008) and Onaran and Galanis (2014), among others, estimates single equations for each private aggregate demand component (investment, consumption and net exports) and sums the partial effects of a functional income redistribution on each of them to calculate the overall effect on the economy. Stockhammer (2017b) observes that most of the followers of this method are Kaleckian authors and Blecker (2016) points out that they tend to find a wage-led regime for the USA.

Despite its widespread use, some methodological shortcomings of this approach have been pointed out in the literature. Particularly, the treatment of income distribution as an exogenous variable may add a simultaneity bias to these estimations[2] and the estimation of separate equations losses the systems aspect of the model[3] (Blecker 2016).

On the other hand, the aggregative approach consists of directly estimating a vector autoregressive model (VAR) with capacity utilization and the wage share as endogenous variables. According to Stockhammer (2017b), this approach is mostly used by neo-Goodwinian authors and is applied by Barbosa-Filho and Taylor (2006), Carvalho and Rezai (2015) and Diallo et al. (2011) for the USA economy. These studies tend to find a profit-led demand regime and a profit-squeeze distribution schedule, which are interpreted as a validation of the Goodwin's (1967) cycle mechanism.

In spite of being common in the literature, such reference to the Goodwin (1967) model may be misleading as it presents important differences with respect to Barbosa-Filho and

Taylor (2006) model. Both models are observing a similar stylized fact (counter-clockwise relation between capacity utilization and the wage share or between employment and the wage share), but they have different theoretical bases (von Arnim and Barrales 2015). While the Goodwin model relates employment and distribution in a supply-side model (with no investment function), the profit-led demand and profit-squeeze distribution narrative of Barbosa-Filho and Taylor (2006) aims at explaining the same observed stylized fact from both a demand-led and Kaleckian perspectives (von Arnim and Barrales 2015). Yet, von Arnim and Barrales (2015) argue that the Goodwinian perspective of the model is present in the idea of a profit-squeeze, which would be consistent with a Kaleckian model in which the mark-up changes over the cycle.[4]

Contrary to most of the aggregative approach studies on the USA regime, Petach (2019) has found evidence that this economy is strongly wage-led at the state level. This suggests that an inverted fallacy of composition argument may apply to within countries dynamics (as there is evidence of profit-led demand at the national level) and impose difficulties to the coordination of a wage-led strategy.[5,6]

As with the structural approach, some characteristics of the aggregative approach have also been subject to criticism in the literature. Blecker (2016) argues that because many studies use the deviation of actual GDP from a HP-filtered trend to measure capacity utilization they rule out the possibility of long-run relations and may be capturing only cyclical, short-run effects. The deviation from a HP-filtered trend forces the mean of the variable to be zero and creates a stationary variable. Even worse, it puts undue weight onto the latest observations (Barrales and von Arnim 2017) and may create spurious dynamics that have no relation to the actual data (Hamilton 2017). In addition, the aggregative approach estimations may be subject to omission bias as, in general, no control variables are added (Blecker 2016).

Besides these two approaches, alternative methods have also been applied to analyse the USA demand regime. For instance, Barrales and von Arnim (2017) perform a wavelet analysis that provides some information on the USA long-run demand regime. They show that a profit-led demand (captured by three different variables: output gap, income-capital ratio and employment rate) and profit-squeeze income distribution would be present in the USA short- and medium-run cycles. In the long-run, however, they show that this Goodwin-type of cycle was observed only until 1980, so the profit-led dynamics may only pertain to the short-run thereafter. Such analysis suggests that demand may behave differently in the short- and long-run, as argued by Blecker (2016).

In sum, most studies on the USA demand regime fit into either the aggregative or the structural approaches. These approaches use different methods and variables, differ in their shortcomings and capture different dynamics. Consequently, some conclude that the USA demand regime is wage-led, while others conclude that it is profit-led.

3. Overhead labour and empirical estimations

This lack of convergence between the studies on the demand regime of the USA motivated several analyses on what is driving the econometric results and, in particular, what mechanisms may explain the profit-led conclusions. The implications of having two classes that receive wage income but differ with respect to important characteristics has been pointed out as a possibility for explaining these results. While overhead labour

(proportional to production capacity and represented by the managerial or supervisory class) receives a higher average income, direct labour (proportional to actual output and represented by the working class) tends to earn a lower average income level. Theoretical models that incorporate the differentiation between these two classes suggest two mechanisms that may explain why some empirical studies find profit-led regimes.

Before exploring these mechanisms, it is worthwhile mentioning that an alternative explanation for profit-led results is offered by Blecker (2016), who explores how the economy behaves in the long- and short-run and how econometric methods may capture these different time dimensions. The author suggests that some studies may find a profit-led regime because they are only capturing a short-run effect, whereas the economy would be more prone to be wage-led in the long-run. The author argues that while investment and net exports would react more strongly in the short-run, the effect of an income distribution on consumption would be a longer-run phenomenon. Albeit not clearly stated this way, his analysis focuses on the behaviour of the level of activity, so it does not necessarily concern the long-run behaviour of capacity utilization.

3.1. Overhead labour and cyclical effects

The first mechanism is inspired by the theoretical model with overhead labour as in Rowthorn (1981), who showed that an increase of demand (leading to a higher rate of capacity utilization), will increase the profit share because unit labour costs decrease, as total direct labour costs increase proportionally with production, but total overhead labour costs remain constant.[7] Thus, as argued by Kalecki (1971, ch. 6), workers' share of income would be constant during the business cycle, but supervisors' share (and, consequently, the wage share) would be countercyclical. This is also considered by Asimakopulos (1975) in his analysis on the determinants of income distribution, in which one of the determinants of the profit share is the capacity utilization rate. Indeed, data calculated by Weisskopf (1979) shows that the profit share can vary because of changes in labour strength as well as changes in capacity utilization (through the effect of overhead labour). The author argues that the profit share does not move in line with capacity utilization only by the late expansion, when it falls due to the increase in labour strength, so it would be pro-cyclical during most of the cycle.

According to Lavoie (2017), this means that empirical studies might be biased towards finding profit-led regimes (i.e. a positive relation between the profit share and capacity utilization) that are actually determined by the presence of overhead labour. Indeed, Lavoie (2014, ch. 6) shows that the slope of the demand curve is not a reliable indicator of the demand regime if the effect of overhead labour is not controlled. Thus, empirical studies that find a profit-led regime and do not explicitly include overhead labour may be capturing a positive correlation between the profit share and capacity utilization which arises from the existence of overhead labour costs; but does not necessarily mean that the profit share is driving the economic cycle or that higher real wages would harm economic activity.

3.2. Overhead labour and demand regimes

The second mechanism is based on the idea that inequality among wage earners also matters and affects the overall demand regime, as there are different consumption

behaviours among wage earners. This is the case because the existence of different individual income levels makes wage earners a heterogeneous group and because propensities to save are expected to increase with income levels. Data by Mohun (2014, 2016) reveals a high level of within-wage inequality in the USA, with supervisors earning higher average incomes than workers (in 2010, for instance, supervisors represented 17.9% of employment but received 46.6% of wages), suggesting that the wage share is not a precise measure of inequality.

This has also important implications to the empirical models. Palley (2017) shows that, if workers have a lower propensity to save than supervisors, a wage income distribution towards the latter and away from the former might increase the likelihood of a profit-led regime as the stimulus on consumption of increasing the wage share diminishes. More precisely, an economy with a higher supervisors' share of wages will be more likely to be profit-led than an economy in which their share of wages is lower. Thus, Palley's (2017) argument applies to the comparison of two different equilibria or economies. In an economy developing over time, however, a redistribution of wages towards workers (away from managers) at the same time as a fall in the wage share may suggest a profit-led regime in what would actually be a wage-led regime. This is so because, depending on the extent of the distributional shifts, the higher participation of workers in the wage bill may compensate the negative effect of a higher profit share.[8] Palley's (2017) model also shows that increasing the share of direct labour on wages while maintaining the wage share will always increase growth and capacity utilization even if the economy is profit-led.

Albeit in a different manner, the conclusions derived from Tavani and Vasudevan's (2014) model, which also includes three classes, have a similar essence to those by Palley (2017). Tavani and Vasudevan (2014) present a dynamic model in which capacity utilization depends on wage inequality and the latter depends on the former. In one of their investment regimes, an increase in the workers' share would lead to higher capacity utilization rate at any level of inequality, but the movement along the distribution curve makes that the final equilibrium is one with a lower capacity utilization and lower inequality level.

The deepening of financialization makes the separation between workers and supervisors even more relevant. The USA economy has experienced a strong income redistribution towards profits and towards the managerial class in the last decades (Mohun 2006, 2014, 2016), increasing the inequality among wage earners. This has been so strong that, despite a decreasing wage share, there has been an increase of the supervisors' wage share on national income, meaning that workers' wages have been squeezed both by profits and by supervisors. Such dynamics are perceived as one of the distributional aspects of financialization, along with the increase in the profit share (Hein 2014; Stockhammer 2017a).

From a historical perspective, the rise of finance and political decisions since the Reagan era altered the terms of the class struggle (Mohun 2006) and led to the process of income concentration in the USA. The association of managers' concerns with those of capitalists through the ideology of shareholder maximization has mobilized them to control workers' compensation shares (Guttmann 2016), while they have also succeeded to increase their share in the surplus value, both as higher salaries and as executive stock options (Lazonick and O'Sullivan 2000), because of their position as supervisors

(Mohun 2006). Thus, Duménil and Lévy (2015, 72) interpret neoliberalism 'as the expression of an alliance between capitalist and managerial classes', arguing that an important characteristic of the period is that high wages became the main channel of income concentration.

Consequently, the income redistribution away from workers and towards both the capitalist and managerial classes that has taken place in the USA economy since the Reagan era may have increased the likelihood of a profit-led demand regime because the higher supervisors' share on wages may have increased the propensity to save out of wage income, as argued by Palley (2017).

4. Empirical estimations

The expressive income inequality among wage earners suggests that they ought to have very different consumption behaviours. Thus, a more precise analysis of the effects of income redistribution on demand would have to account for the within-wage inequality. In this section, I undertake this approach by splitting the wage share between two wage earners classes (workers and supervisors). By doing so, a more accurate class perspective is introduced to the model and the cyclical effect of overhead labour suggested by Lavoie (2014, 2017) may be captured.

A caveat must be added before proceeding to the empirical analysis. The presence of non-linearities in the demand and distribution schedules has gained increasing importance in the literature. Nikiforos and Foley (2012) provide evidence of a non-linear distribution schedule in the USA and Nikiforos (2016a) presents a theoretical model in which non-linearities in the demand and distribution schedules makes the relationship between income distribution and growth oscillate between wage- and profit-led regimes. The linear specification of the current model is unable to capture these nuances in the demand and distribution regimes, thus reporting the average values. Yet, the aim of this article is to test some explanations for profit-led results from linear estimations, so the main conclusions may hold even if non-linearities are present in the regimes.

4.1. Methodology

In order to analyse the effect of splitting the wage share, two different specifications are estimated. The estimation strategy builds on Barbosa-Filho and Taylor (2006) and Carvalho and Rezai (2015), who estimate a VAR model including capacity utilization and the wage share in logarithm as endogenous variables (Y_t= [$ln(u_t)$, $ln(ws_t)$]). While the first model is similar to this one, the second one splits the wage share into the workers' share (*wc*) and the supervisors' share of income (*nwc*, standing for 'non-working-class') rendering the Y_t= [$ln(u_t)$,$ln(wc_t)$,$ln(nwc_t)$] vector of endogenous variables (all in logarithm). This allows the model to capture how capacity utilization reacts to changes of the profit share that are due to a change in the workers' share or due to a change in the supervisors' share: it is expected that the impact of an increase in the workers' share leads to a larger increase (or a smaller decrease) in capacity utilization than an increase in the supervisors' share.

As all variables are treated as endogenous, this method estimates both a demand and a distribution schedules. The demand schedule concerns the sign of the derivative

of capacity utilization with respect to the wage-share, as shown in Equation 1 (Bhaduri and Marglin 1990), where I_π and S_π are respectively the derivatives of investment and saving with respect to the profit share (π) and S_u and I_u are respectively the derivative of investment and saving with respect to capacity utilization (u). The basic rationale of the Kaleckian growth and distribution models in a closed economy is that if increases in the wage share lead to increases in consumption that overcompensate the negative stimulus of lower profitability on investment, the economy will be wage-led and the sign of Equation 1 will be negative (assuming that the Keynesian stability condition holds, so $S_u - I_u > 0$).[9]

$$\frac{du}{d\pi} = \frac{I_\pi - S_\pi}{S_u - I_u} \tag{1}$$

As suggested by Palley (2017), increases in the wage share that result from increases in the workers' wage share are likely to enhance the positive effect of the wage share on consumption, thus increasing the likelihood of an overall positive effect on aggregate demand (or, at least, diminishing the negative effect). Conversely, if the increase in the wage share is due to an increase in the income share of overhead labour, the impact on consumption is likely to be weaker. Thus, one would expect S_π to be larger and $\frac{du}{d\pi}$ to be lower in case the increase in the profit share results from a decrease in the workers' share in income than if it results from a decrease of the supervisors' share, rendering a wage-led regime more likely in the former case.

Additionally, the distribution schedule allows the model to capture the effect of overhead labour on the income distribution and thus test whether the profit share behaves pro-cyclically. Barbosa-Filho and Taylor (2006) and Carvalho and Rezai (2015) find a positive derivative for the wage share with respect to capacity utilization, suggesting a profit-squeeze distribution schedule, which is explained by the increase in the bargaining power of labour as capacity utilization increases. Yet, Lavoie (2014, 2017) suggests that because total overhead labour costs do not increase with capacity utilization, the profit share behaves pro-cyclically. The analysis of the response of the wage, workers' and supervisors' shares allows the analysis of the interaction of these two mechanisms and provides some insights on which of them prevails.

4.2. Data

Given the data availability, our sample consists of 44 annual observations, covering the period from 1967 to 2010.[10] For the capacity utilization rate, I take the Industrial Capacity Utilization Index provided by the Federal Reserve (2017), which captures the short-run behaviour of capacity utilization (Nikiforos 2016b).[11] The wage share is provided by AMECO (2017) and represents the adjusted sum of compensation of employees (wages and salaries) and employers' social contributions divided by GDP at factors' costs. Mohun's (2014) data provides the share of production (proxy to workers) and supervisory (proxy to overhead) labour on total compensation of employees of the private sector. The author defines the working-class through the criterion of control: it is the class 'whose work is controlled by others' (Mohun 2014, 360). To have the ratio of each of these income categories in GDP at factors' cost, the shares from Mohun (2014) are multiplied by the wage share from AMECO (2017).[12]

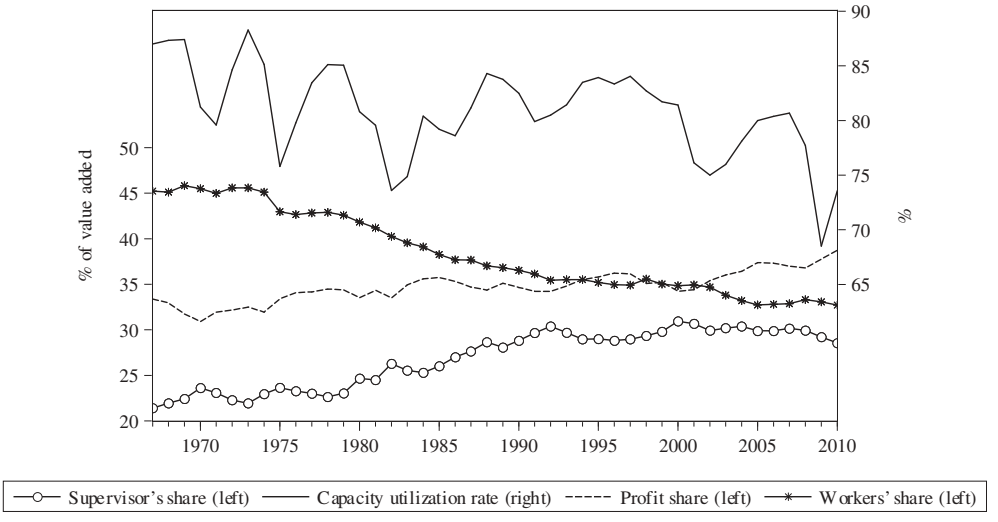

Figure 1. Income distribution and capacity utilization in the USA from 1967 to 2010 (%).
Sources: AMECO (2017), Federal Reserve (2017) and Mohun (2014). Author's own elaboration.

Figure 1 reports our series and allows the description of some stylized facts of the USA economy from 1967 to 2010. Firstly, regarding the workers' income share, it is not possible to identify a cyclical dynamic, especially because it has a strong negative trend during the period and shows little volatility during the business cycle. Secondly, the supervisors' share shows a clear positive trend from 1967 to 2007 as well as cyclical fluctuations. Overall, when capacity utilization is high, the supervisors' share is low, and the converse happens when capacity utilization is low. This reflects the fact that supervisors' income is proportional to capacity, so when output grows, it does not grow proportionately. Finally, the profit share has an upward trend and seems to follow a pro-cyclical behaviour as suggested by Lavoie (2017).

4.3. Estimation results

The assessment of the integration order of each series follows the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests (results reported in Table A1 in the appendix section). At the 10% significance level, there is evidence that the wage, workers' and supervisors' shares have one unit root, so they are taken in first difference (*D(ln(ws)), D(ln(wc))* and *D(ln(nwc))* respectively). The tests diverge with respect to the capacity utilization series: at the 10% significance level, the ADF test suggests that the series is stationary, while the PP and KPSS tests suggest that it is non-stationary. As it may be the case that some tests identify a unit root because the series has a structural break (Perron 1989), I include a structural break in the test equation, which suggests that the series is stationary (at the 10% significance level). Therefore, capacity utilization is taken in level and a dummy variable defined in Equation 2 is added as an exogenous variable.[13]

$$Dum = \begin{cases} 0, & if\ t \leq 1999 \\ 1, & if\ t > 1999 \end{cases} \quad (2)$$

Both specifications are reported in Table 1.[14] All reported models respect the assumptions underlying the econometric methods applied, so they have white noise residuals and are dynamically stable, but none of the models has normal standard errors (all tests are reported in Table A2 in the appendix). In the first specification, the wage share and capacity utilization were included as endogenous variables and the dummy and a constant as exogenous variable. The Schwarz (SC) and Hannan-Quinn (HQ) information criteria suggest a lag length of one. However, more lags were added in order to have white noise residuals, so the final model has four lags. In the second specification, the workers' share, supervisors' share and capacity utilization are added as endogenous variables and the dummy and a constant are added as exogenous variable. In this case, the SC and HQ information criteria suggest a lag length of 0 and 1, respectively. As the model with one lag presents white noise residuals, this is the final model.

In both specifications, the dummy variable is negative and significant at the 10% significance level for the capacity utilization series. This may be capturing an average lower capacity utilization in the 2000s due to the effect of the 2007/2008 crisis. The parameters associated with the endogenous variables in Table 1 refer only to the lagged variables, but the contemporaneous relation between the variables can be retrieved by adding restrictions to this relation (Cholesky ordering). Therefore, the results of the

Table 1. Model output.

	Specification 1		Specification 2		
	ln(u)	D(ln(ws))	ln(u)	D(ln(wc))	D(ln(nwc))
ln(u)(−1)	0.81***	0.15***	0.61***	0.06	0.26**
	(0.18)	(0.05)	(0.15)	(0.05)	(0.1)
ln(u)(−2)	−0.56*	−0.13*			
	(0.29)	(0.07)			
ln(u)(−3)	0.23	0.14*			
	(0.3)	(0.08)			
ln(u)(−4)	−0.02	−0.08			
	(0.24)	(0.06)			
D(ln(ws)(−1))	−0.83	−0.04			
	(0.69)	(0.18)			
D(ln(ws)(−2))	−0.08	0.03			
	(0.68)	(0.18)			
D(ln(ws)(−3))	−0.62	−0.17			
	(0.67)	(0.17)			
D(ln(ws)(−4))	0.71	0.01			
	(0.68)	(0.18)			
D(ln(wc)(−1))			−0.92*	0.00	−0.27
			(0.56)	(0.2)	(0.4)
D(ln(nwc)(−1))			−0.68***	−0.11	0.02
			(0.23)	(0.08)	(0.16)
Constant	2.42**	−0.35	1.74***	−0.28	−1.14**
	(1.13)	(0.29)	(0.64)	(0.22)	(0.46)
Dummy	−0.03**	0.00	−0.03**	0.00	0.00
	(0.02)	(0.00)	(0.01)	(0.01)	(0.01)
Number of observations	44		44		
R-squared	0.62	0.35	0.57	0.11	0.20
Adj. R-squared	0.50	0.14	0.52	0.01	0.11

Note: Standard errors in parenthesis. Significance levels: * p <0.1, ** p <0.05, *** p <0.01.

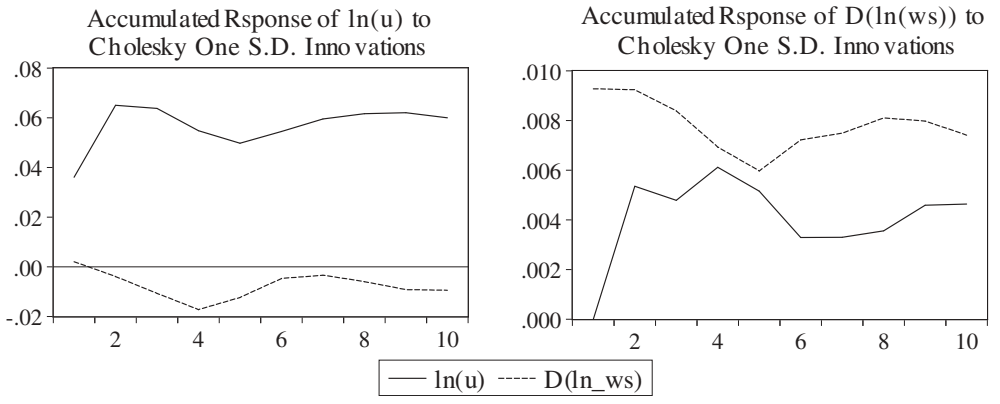

Figure 2. Accumulated impulse-response functions: specification 1.
Note: Cholesky ordering: D(ln(ws)), ln(u).

models ought to be interpreted through the accumulated impulse-response functions (AIRF), as they consider both the lagged and the contemporaneous parameters.

The AIRF for the first specification are reported in Figure 2. The distribution schedule suggests that the wage share is positively affected by a shock on capacity utilization, while the demand schedule suggests that there is a negative impact of the wage share on capacity utilization. As the estimated coefficients are elasticities, the AIRF suggest that, on average and after 10 periods, a 1% increase in capacity utilization would lead to a 0.129% increase in the wage share and that a 1% increase in the wage share would lead to a 1.024% decrease of capacity utilization.

Granger-causality tests for specification 1 are reported in Table 2. It is not possible to reject the hypothesis that the wage share does not Granger-cause capacity utilization at the 10% significance level. On the other hand, there is evidence at the 10% significance level that capacity utilization Granger-causes the wage share.

Thus, this first specification suggests a profit squeeze distribution regime and profit-led demand regime, although no Granger-causality from the wage share to capacity utilization was identified. Overall, these results are in line with previous aggregative approach estimations for the USA economy, as discussed in Section 2.

Yet, as argued by Lavoie (2014, 2017) and Palley (2017), it may be the case that the profit-led result arises due to the presence of overhead labour. In order to verify whether this may be the case, the results from the second specification, in which the wage share was split between the workers' share and the supervisors' share, are analysed.

Figure 3 reports the AIRF for the second specification. They show that a positive shock of the workers' share will lead to a decrease in the supervisors' share and to an increase in capacity utilization. A positive shock on the supervisors' share will lead to a decrease in

Table 2. Granger-causality: specification 1.

Null hypothesis	Chi-sq	df	Prob.
D(ln(ws)) does not Granger-cause ln(u)	4.58	4.00	0.33
ln(u) does not Granger-cause D(ln(ws))	11.32	4.00	0.02

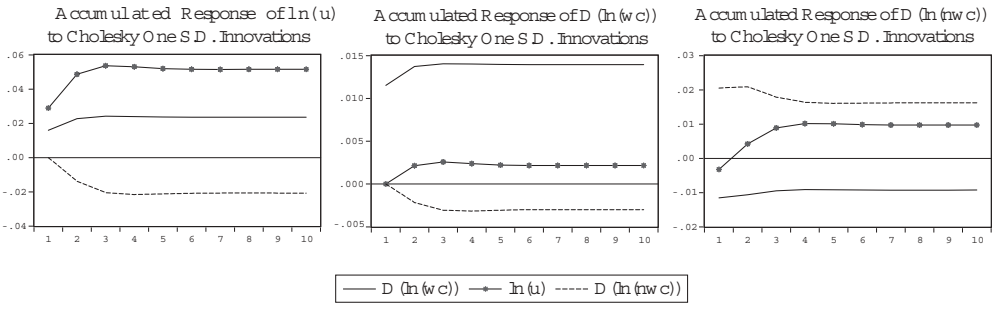

Figure 3. Accumulated impulse-response functions: specification 2.
Note: Cholesky ordering: D(ln(wc)), ln(u), D(ln(nwc)).

both the workers' share and in capacity utilization. Finally, a positive shock in capacity utilization will lead to an increase in both the workers and the supervisors' share, but in the first period, there is a small decrease in the latter.

The elasticities from the accumulated response functions suggest that, on average and after 10 periods, an increase of the workers' share by 1% will lead to an increase of capacity utilization of 2.04%, while an increase of 1% in the supervisors' share will lead to a decrease of capacity utilization by 1.01%. On the other hand, an increase in capacity utilization by 1% will lead to an average increase of 0.07% of the workers' share and 0.34% of the supervisors' share.

Granger-causality tests are also applied to the model in specification 2 and reported in Table 3. At the 10% significance level, there is evidence that both the workers' and supervisors' shares Granger-cause capacity utilization and that capacity utilization Granger-causes the supervisors' share. Interestingly, when the two income shares are split, there is evidence that they Granger-cause capacity utilization, while this was not the case in the previous specification.

Overall, the results of the second specification allow for a better understanding of the dynamics underlying the relationship between functional income distribution and capacity utilization. The profit-squeeze conclusion still holds in this case, as increases in capacity utilization leads to a decrease in the profit share. The decrease of the supervisors' share by the first period and its increase in the following periods might be the result of two phenomenon discussed in the literature. On the one hand, the supervisors' income, because of its overhead characteristic, is expected to be roughly stable through the cycle, so increases in capacity utilization will render a lower participation of this class in national income (Lavoie 2014, 2017). On the other hand, firms

Table 3. Granger-causality: specification 2.

Null hypothesis	Chi-sq	df	Prob.
D(ln(wc)) does not Granger-cause ln(u)	2.72	1	0.10
D(ln(nwc)) does not Granger-cause ln(u)	8.80	1	0.00
ln(u) does not Granger-cause D(ln(wc))	1.50	1	0.22
D(ln(nwc)) does not Granger-cause D(ln(wc))	1.77	1	0.18
ln(u) does not Granger-cause D(ln(nwc))	6.21	1	0.01
D(ln(wc)) does not Granger-cause D(ln(nwc))	0.43	1	0.51

are likely to be more prone to increase supervisors' wages in the boom phase of the cycle (Lavoie 2009). Considering the magnitude of the increase in the supervisors' share over the period under analysis, as discussed in Section 3, it is quite likely that this has taken place and possibly overcame the first phenomenon. For the workers' share, only the effect of a higher bargaining power with increases in capacity utilization would be present. As no Granger-causality was identified from capacity utilization to the workers' share, it seems that changes in the former did not have a strong effect on the latter's dynamic, which corroborates the analysis of Figure 1 and Kalecki's (1971, ch. 6) statement that the workers' share ought to be more stable during the cycle.

Regarding the demand regime, the results from the second specification suggest that increases in the workers' share would lead to increases in capacity utilization, but there would be a decrease in the latter following an increase in the supervisors' share. Thus, there is evidence that an increase in the workers' share of income would lead to higher capacity utilization rates even in a profit-led regime. Also, the results provide evidence that the increasing supervisors' share may have increased the likelihood of profit-led demand in the USA (Palley 2017).

5. Conclusions

The presence of overhead labour has been suggested as a possible explanation for the profit-led demand results found in some empirical studies on the USA. The contribution of this article was to test whether these arguments have empirical ground by estimating the demand and distribution schedules for the USA economy and splitting the wage share into supervisors and workers.

The results offer some empirical support for Palley's (2017) argument that the redistribution of income from workers to supervisors has increased the likelihood of a profit-led demand regime in the USA. Indeed, despite of a profit-led demand regime, an increase in the workers' share of income would have a positive impact on capacity utilization. This suggests that, even if the demand regime in the USA is profit-led, there is no trade-off between improving equality (higher workers' share) and higher levels of economic activity. Also, as argued by Palley (2017), economic policies motivated by the profit-led results that aim to increase the profit share at the expense of workers may fail to stimulate the economy. Given the current state of inequality in the USA and the low workers' share as reported by Mohun (2014), the evidence provided by this article suggests that these aspects of this economy can be addressed, and doing so may even offer a positive stimulus to economic activity.

In addition, the results suggest a negative response of the supervisors' share to increases in capacity utilization in the first period, which is expected because of its overhead characteristic. This means that there might be an increase in the profit share as capacity utilization rises. If this is the case, there is ground to affirm that studies that only focus in the short-run might be capturing a positive correlation between the profit share and capacity utilization that can be explained by the cyclical impact of overhead labour (Lavoie 2014, 2017). This effect must have become stronger with the increase in the supervisors' share during the period of analysis, as it represents an increase of overhead costs.

However, the model that only includes the wage share suggests that, on average, there would be an increase of the wage share along with capacity utilization (profit-

squeeze dynamics). This suggests that labour strength also plays some role in determining functional income distribution, which is also one of the conclusions by Weisskopf (1979). Also, the results suggest that the workers' share presents a weak response to capacity utilization, so some characteristics of the USA labour market may limit the possibility of workers benefiting from increases in capacity utilization as much as managers.

As the results express the average relation between the variables, they cannot capture which effect is likely to prevail in each phase of the cycle, despite suggesting that both are important. Overall, they suggest a more nuanced relation between capacity utilization and income distribution than usually considered in the literature, as the profit share is affected by capacity utilization in an ambiguous way. Moreover, the results suggest that overhead labour plays an important role in the behaviour of functional income distribution (i.e. wage and profit shares) over the business cycle.

Notes

1. The study closer to the present one is that by Carvalho and Rezai (2015), which includes personal income distribution but does not undertake a class perspective. Even if income groups reflect social classes to some extent, splitting wage earners into workers and supervisors shows how this particular income group encompasses very different social classes.
2. Indeed, Barrales and von Arnim (2017) find Granger causality between capacity utilization and the wage share in both directions, which suggests that the wage share is endogenous.
3. The model does not capture the restriction that the aggregate demand components add up to GDP (Onaran and Galanis 2014, 2495).
4. One may also point out that, while Barbosa-Filho and Taylor (2006, 392) argue that the main difference of their model to Goodwin's model is that they 'substitute the global rate of capacity utilization for the employment rate' on the claim that the former would be a good proxy to the latter, Skott (2015) argues that there is no theoretical or empirical ground for this assumption. Also, while Barbosa-Filho and Taylor (2006) model is interpreted as a short-run model, with reasonable parameters Goodwin's model would generate a cycle of 16–22 years (Atkinson 1969), which would hardly fit the short-run definition. I thank an anonymous referee for point out the shortcomings of the reference to Goodwin's model.
5. The fallacy of composition argument pertains to the idea that even if all economies are individually profit-led due the positive impact of lower wages on net exports, if all economies reduce their real wages seeking to gain price competitiveness and increase their utilization rates, the result would be detrimental to the world economy (Blecker 1989; Lavoie 2014, ch. 1).
6. It is worthwhile mentioning that Petach (2019) uses the minimum wage at the state level as an instrumental variable to the labour share and estimates a non-parametric distributive curve that presents strong non-linearities. However, the estimated distributive curve has a different shape to that estimated by Nikiforos and Foley (2012).
7. In this case, labour productivity would also be procyclical. For other implications of the model with overhead labour, see Lavoie (2009, 2014, ch. 5).
8. I thank an anonymous referee for pointing this out.
9. In an open economy the mechanisms would be more complex, but, to some extent, the same rationale holds. See Blecker (1989, 2002) for instance.
10. The main restriction to the sample's size derives from the wage income shares data. This leads to a rather limited number of observations, but empirical studies on the topic have similar sample sizes (Hein and Vogel 2008; Onaran and Galanis 2014; Onaran and

Stockhammer 2005), as this restriction arises from the type of data required for these studies. While some authors opt to interpolate the data in order to achieve a higher number of observations (Carvalho and Rezai 2015), this requires additional assumptions on the series' behaviour. Given the lack of information on the quarterly behaviour of the two wage income shares that would allow them to be interpolated in order to have quarterly series, I opt to use the annual series.

11. Despite avoiding some of the shortcomings derived from the use of a HP-filter, the Federal Reserve capacity utilization may also be only capturing short-run relations due to how it is constructed (Nikiforos 2016b).
12. Thus, it is assumed that public sector wages are split in the same way as in the private sector.
13. Following an alternative specification of the breakpoint unit root test, as reported in Table A1, the break would be in 1985. Both specifications were tested including a dummy which assumes zero until 1985 and one after 1986. The conclusions of the reported model hold in the specification with this alternative dummy variable.
14. The Eviews file is available from the author upon request.

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References

AMECO. 2017. "Annual Macro-Economic Database of the European Commission's Directorate General for Economic and Financial Affairs." http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

Asimakopulos, A. A. 1975. "A Kaleckian Theory of Income Distribution." *Canadian Journal of Economics* 8 (3): 313–333. doi:10.2307/134236.

Atkinson, A. B. 1969. "The Timescale of Economic Model How Long Is the Long Run?" *The Review of Economic Studies* 36 (2): 137–152. doi:10.2307/2296833.

Barbosa-Filho, N. H., and L. Taylor. 2006. "Distributive and Demand Cycles in the US Economy a Structuralist Goodwin Model." *Metroeconomica* 57 (3): 389–411. doi:10.1111/j.1467-999X.2006.00250.x.

Barrales, J., and R. von Arnim. 2017. "Longer-Run Distributive Cycles: Wavelet Decompositions for the US, 1948–2011." *Review of Keynesian Economics* 5 (2): 196–217. doi:10.4337/roke.
Bhaduri, A., and S. Marglin. 1990. "Unemployment and the Real Wage: The Economic Basis for Contesting Political Ideologies." *Cambridge Journal of Economics* 14 (4): 375–393. doi:10.1093/oxfordjournals.cje.a035141.
Blecker, R. A. 1989. "International Competition, Income Distribution and Economic Growth." *Cambridge Journal of Economics* 13 (3): 395–412.
Blecker, R. A. 2002. "Distribution, Demand and Growth in neo-Kaleckian Macro-Models." In *The Economics of Demand-Led Growth: Challenging the Supply-Side Vision of the Long Run*, edited by M. Setterfield, 129–152. Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Blecker, R. A. 2016. "Wage-Led versus Profit-Led Demand Regimes: The Long and the Short of It." *Review of Keynesian Economics* 4 (4): 373–390. doi:10.4337/roke.
Bowles, S., and R. Boyer. 1995. "Wages, Aggregate Demand, and Employment in an Open Economy: An Empirical Investigation." In *Macroeconomic Policy after the Conservative Era*, edited by G. A. Epstein and H. M. Gintis, 143–173. Cambridge, UK: Cambridge University Press.
Carvalho, L., and A. Rezai. 2015. "Personal Income Inequality and Aggregate Demand." *Cambridge Journal of Economics* 40 (2): 491–505. doi:10.1093/cje/beu085.
Diallo, M. B., P. Flaschel, H.-M. Krolzig, and C. R. Proaño. 2011. "Reconsidering the Dynamic Interaction between Real Wages and Macroeconomic Activity." *Research in World Economy* 2 (1): 77–93.
Duménil, G., and D. Lévy. 2015. "Neoliberal Managerial Capitalism: Another Reading of the Piketty, Saez, and Zucman Data." *International Journal of Political Economy* 44 (2): 71–89. doi:10.1080/08911916.2015.1060823.
Dutt, A. K. 1984. "Stagnation, Income Distribution and Monopoly Power." *Cambridge Journal of Economics* 8 (1): 25–40.
Federal Reserve. 2017. "Industrial Production and Capacity Utilization - G.17." https://www.federalreserve.gov/releases/g17/Current/default.htm
Goodwin, R. M. 1967. "A Growth Cycle." In *Socialism, Capitalism and Economic Growth*, edited by C. H. Feinstein, 54–58. Cambridge, UK: Cambridge University Press.
Guttmann, R. 2016. *Finance-Led Capitalism: Shadow Banking, Re-Regulation, and the Future of Global Markets*. Houndmills, Basingstoke, Hampshire; New York, NY: Palgrave Macmillan.
Hamilton, J. D. 2017. "Why You Should Never Use the Hodrick-Prescott Filter." *Review of Economics and Statistics* (Available online). doi:10.1162/rest_a_00706.
Hein, E. 2014. *Distribution and Growth after Keynes: A Post-Keynesian Guide*. Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Hein, E., and L. Vogel. 2008. "Distribution and Growth Reconsidered: Empirical Results for Six OECD Countries." *Cambridge Journal of Economics* 32 (3): 479–511. doi:10.1093/cje/bem047.
Kalecki, M. 1971. *Selected Essays on the Dynamics of the Capitalist Economy 1933–1970*. Cambridge: Cambridge University Press.
Lavoie, M. 2009. "Cadrisme within a post-Keynesian Model of Growth and Distribution." *Review of Political Economy* 21 (3): 369–391. doi:10.1080/09538250903073396.
Lavoie, M. 2014. *Post-Keynesian Economics: New Foundations*. Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Lavoie, M. 2017. "The Origins and Evolution of the Debate on Wage-Led and Profit-Led Regimes." *European Journal of Economics and Economic Policies: Intervention* 14 (2): 200–221.
Lavoie, M., and E. Stockhammer. 2012. "Wage-Led Growth: Concept, Theories, and Policies." In *International Labour Office, Conditions of Work and Employment Series no. 41*. Geneva: ILO.
Lazonick, W., and M. O'Sullivan. 2000. "Maximizing Shareholder Value: A New Ideology for Corporate Governance." *Economy and Society* 29 (1): 13–35. doi:10.1080/030851400360541.
Mohun, S. 2006. "Distributive Shares in the US Economy, 1964–2001." *Cambridge Journal of Economics* 30 (3): 347–370. doi:10.1093/cje/bei065.

Mohun, S. 2014. "Unproductive Labor in the U.S. Economy 1964–2010." *Review of Radical Political Economics* 46 (3): 355–379. doi:10.1177/0486613413506080.
Mohun, S. 2016. "Class Structure and the US Personal Income Distribution, 1918–2012." *Metroeconomica* 67 (2): 334–363. doi:10.1111/meca.12107.
Nikiforos, M. 2016a. "Distribution-Led Growth in the Long Run." *Review of Keynesian Economics* 4 (4): 391–408. doi:10.4337/roke.
Nikiforos, M. 2016b. "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. doi:10.1093/cje/beu076.
Nikiforos, M., and D. K. Foley. 2012. "Distribution and Capacity Utilization: Conceptual Issues and Empirical Evidence." *Metroeconomica* 63 (1): 200–229. doi:10.1111/meca.2012.63.issue-1.
Onaran, Ö., and E. Stockhammer. 2005. "Two Different Export-Oriented Growth Strategies: Accumulation and Distribution in Turkey and South Korea." *Emerging Markets Finance and Trade* 41 (1): 65–89. doi:10.1080/1540496X.2005.11052596.
Onaran, Ö., and G. Galanis. 2014. "Income Distribution and Growth: A Global Model." *Environment and Planning A* 46 (10): 2489–2513. doi:10.1068/a46265.
Palley, T. I. 2017. "Wage- Vs. Profit-Led Growth: The Role of the Distribution of Wages in Determining Regime Character." *Cambridge Journal of Economics* 41 (1): 49–61. doi:10.1093/cje/bew004.
Perron, P. 1989. "The Great Crash, the Oil Price Shock, and the Unit Root Hypothesis." *Econometrica* 57 (6): 1361–1401. doi:10.2307/1913712.
Petach, L. 2019. "Distribution and Capacity Utilization in the United States: Evidence from State-Level Data". *Review of Keynesian Economics* forthcoming.
Rowthorn, R. 1981. "Demand, Real Wages and Growth." *Thames Papers in Political Economy* Autumn: 1–39.
Skott, P. 2015. "Growth Cycles with or without Price Flexibility." *Review of Keynesian Economics* 3 (3): 374–386. doi:10.4337/roke.
Stockhammer, E. 2017a. "Determinants of the Wage Share: A Panel Analysis of Advanced and Developing Economies." *British Journal of Industrial Relations* 55 (1): 3–33. doi:10.1111/bjir.2017.55.issue-1.
Stockhammer, E. 2017b. "Wage-Led versus Profit-Led Demand: What Have We Learned? A Kaleckian-Minskyan View." *Review of Keynesian Economics* 5 (1): 25–42. doi:10.4337/roke.
Tavani, D., and R. Vasudevan. 2014. "Capitalists, Workers, and Managers: Wage Inequality and Effective Demand." *Structural Change and Economic Dynamics* 30: 120–131. doi:10.1016/j.strueco.2014.05.001.
Taylor, L. 1985. "A Stagnationist Model of Economic Growth." *Cambridge Journal of Economics* 9 (4): 383–403. doi:10.1093/oxfordjournals.cje.a035588.
von Arnim, R., and J. Barrales. 2015. "Demand-Driven Goodwin Cycles with Kaldorian and Kaleckian Features." *Review of Keynesian Economics* 3 (3): 351–373. doi:10.4337/roke.
Weisskopf, T. E. 1979. "Marxian Crisis Theory and the Rate of Profit in the Postwar US Economy." *Cambridge Journal of Economics* 3 (4): 341–378. doi:10.1093/oxfordjournals.cje.a035429.

Appendix.
Statistic tests

Table A1. Unit root tests.

	Augmented Dickey-Fuller Test				Phillips-Perron Test				KPSS Test				Breakpoint test			
Model	Constant, Trend		Constant		Constant, Trend		Constant		Constant, Trend		Constant		Constant, Trend		Constant	
	At least 1 UR		At least 1 UR		At least 1 UR		At least 1 UR		0 UR		0 UR		At least 1 UR		At least 1 UR	
Null hypothesis	*t*-stat	*p*-value	*t*-stat	*p*-value	*t*-stat	*p*-value	*t*-stat	*p*-value	LM stat.	*p*-value	LM stat.	*p*-value	*t*-stat	*p*-value	*t*-stat	*p*-value
ln(ws)	−2.61	0.28	−0.31	0.91	−2.81	0.20	−0.05	0.95	0.08	>0.10	0.74	0.01				
d(ln(ws))	−5.76	0.00			−5.79	0.00			0.08	>0.10	0.18	>0.10				
ln(u)	−4.61	0.00			−3.05	0.13	−2.59	0.10	0.17	<0.05	0.52	<0.05	−6.11	<0.01	−5.28	<0.01
ln(nwc)	−0.97	0.94	−1.83	0.36	−0.90	0.95	−1.89	0.33	0.17	<0.05	0.76	<0.01				
d(ln(nwc))	−5.95	0.00			−6.48	0.00			0.18	<0.05	0.34	0.10				
ln(wc)	−1.43	0.84	−0.63	0.85	−1.64	0.76	−0.64	0.85	0.16	<0.05	0.81	<0.01				
d(ln(wc))	−5.16	0.00			−5.02	0.00			0.11	0.10	0.13	>0.1				

Notes: ADF test: lag order chosen so that there is no residual autocorrelation. In the KPSS test, the critical values at the 10% significance level are equal to 0.119 and 0.347 for the model with constant and trend and with constant, respectively. Breakpoint unit root test: additive outlier in the intercept and break dates selected through the Dickey-Fuller min-t criterium. In the first specification, the breakpoint is in 1985 and in the second it is in 1999. Both breaks are significant at the 10% significance level.

Table A2. Diagnostic tests.

VAR Residual Serial Correlation LM Tests				
	Specification 1		Specification 2	
Lags	LM-Stat	Prob	LM-Stat	Prob
1	2.15	0.71	11.58	0.24
2	1.74	0.78	10.82	0.29
3	3.39	0.50	4.36	0.89
4	2.12	0.71	2.36	0.98
5	7.00	0.14	7.71	0.56
6	1.70	0.79	8.42	0.49
VAR Residual Heteroskedasticity Test				
	Chi-sq	Prob.	Chi-sq	Prob.
	50.97	0.48	38.03	0.65
VAR Residual Normality Joint Test				
	Jarque-Bera	Prob.	Jarque-Bera	Prob.
	21.21	0.00	33.91	0.00
VAR Stability				
	Root	Modulus	Root	Modulus
	0.42–0.69i	0.81	0.24–0.30i	0.39
	0.42 + 0.69i	0.81	0.24 + 0.30i	0.39
	−0.60–0.40i	0.72	0.14	0.14
	−0.60 + 0.40i	0.72		
	0.02–0.72i	0.72		
	0.02 + 0.72i	0.72		
	0.56–0.12i	0.57		
	0.56 + 0.12i	0.57		