

# Secular Stagnation and Income Distribution Dynamics

Review of Radical Political Economics  
2020, Vol. 00(0) 1–19  
© 2019 Union for Radical  
Political Economics  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/0486613419895143  
journals.sagepub.com/home/rrp



David Kiefer<sup>1</sup>, Ivan Mendieta-Muñoz<sup>1</sup> , Codrina Rada<sup>1</sup> , and  
Rudiger von Arnim<sup>1</sup>

## Abstract

This paper contributes to the literature on secular stagnation by estimating a measure of potential output growth for the post-war US economy derived from a novel model specification that allows for the cyclical interactions between income distribution, represented by the trajectory of the labor share of income, and economic activity, as measured by capacity utilization. The results obtained show that potential output growth exhibits a gradual decline that predates the Great Recession and follows the downward trajectory of the labor share of income, thus suggesting the existence of an important long-run relationship between income distribution and output growth in the United States.

**JEL Classification:** B50, E12, E25, O40

## Keywords

potential output growth, capacity utilization, income distribution, labor share, US economy

## 1. Introduction

The slow recovery and overall anemic macroeconomic performance of the US economy following the Great Recession have renewed the debate on the possibility of secular stagnation, that is, an era characterized by a slowdown in the rate of growth of potential GDP.<sup>1</sup> Skepticism about the

---

<sup>1</sup>Larry Summers has been credited to revive the topic, see Summers (2014). In this speech, and in subsequent debates, the focus lies on the low “natural rate of interest,” at which, in Wicksellian fashion, investment and savings equilibrate to generate full employment. We do not see historically low long-term interest rates, or the long decline in nominal and real interest rates as a relevant causal factor. At best, it is a symptom of stagnation, and hence our discussion does not focus on it. Teulings and Baldwin (2014) provide a comprehensive discussion of the relevant issues; see as well the next section for further discussion. It should be noted that secular stagnation does not need to be defined in terms of *potential* growth: a protracted slowdown in growth of (observable) real GDP is an alternative approach. Our focus here, however, lies on *potential* growth.

---

<sup>1</sup>Department of Economics, University of Utah, Salt Lake City, UT, USA

Date received: April 23, 2019

Date accepted: November 24, 2019

## Corresponding Author:

Codrina Rada, Department of Economics, University of Utah, Salt Lake City, UT, USA.

Email: rada@economics.utah.edu

long-run strength of the US economy remains despite currently low rates of unemployment and fast growth, which topped 4 percent in the second quarter of 2018.<sup>2</sup> In fact, both the literature and Congressional Budget Office (CBO) estimates suggest that the decline in potential output growth has been gradual and began before the Great Recession. Further, by definition, potential output growth is an unobservable variable, and its estimation is surrounded by considerable uncertainty: any measure of potential output growth needs to be derived from a model specification that reflects the ongoing controversies about the nature of economic fluctuations. Inherent to such an exercise are difficulties related to how potential output is conceptualized, including the assumptions of the model and the quality of the data.<sup>3</sup>

This paper explicitly explores the idea that income distribution and economic growth share important long-run properties. Our approach is closely related to the macroeconomic literature that considers growth and distribution to be endogenously linked both in the short and long run. Following this literature, our main contribution is to provide a novel measure of potential output growth derived from a specification that builds on the interactions between income distribution, measured by the labor share, and capacity utilization, defined as the difference between actual and potential output.

The measure of potential output growth constructed in this way is broadly in line with the main findings of the current literature that has studied the trajectory of other conceptualizations of potential output. The central features are that potential output growth exhibits a gradual decline that predates the Great Recession, rather than a sharp and sudden change in trend triggered by the 2008 financial crisis, which coincides with the downward trajectory of the labor share of income. These results suggest the existence of a long-run relationship between the downward trend in the labor share of income and the loss of potential output growth during the post-war period in the United States. Importantly, the empirical model put forth here raises the question of whether the rise in inequality as measured by the labor share could be a causal factor for stagnation in the long run, conditional on the short-run interaction between growth and distribution. It should be emphasized that we do not present evidence on causal linkages in this paper but discuss potential mechanisms and future research in a concluding section.

The remainder of this paper is organized as follows. The next section reviews relevant literature that is related to the present contribution. Section 3 presents the empirical modeling approach adopted. Subsequently, section 4 presents and discusses the main results. Section 5 concludes.

## **2. Literature Review and Discussion**

The question of how income distribution affects overall economic growth has been studied widely and in different strands of literature. We begin by briefly surveying selected empirical results and the recent surge in neoclassical and new-Keynesian research. Subsequently, we address the CBO's efforts to estimate potential output growth. The section concludes with a consideration of the issues from post-Keynesian and classical perspectives. Our intent is not to be exhaustive, but to frame the issues: first, empirical results on the long-run impact of rising inequality on growth are unclear; second, theoretical motivations for the interactions between growth and distribution vary considerably; and third, our main contribution is to provide an

<sup>2</sup>Real interest rates at historically low levels, large fiscal deficits, and an unusual buoyant stock market coupled with rising private debt have been fueling recent growth, but also the skepticism about its sustainability as these conditions are unlikely to be maintained indefinitely Summers (2018).

<sup>3</sup>While we do not want to pursue an ontological discussion about the nature of unobservable variables, it is clear that concepts such as potential output or TFP are theory dependent (Felipe and McCombie 2007). Therefore, interpretations should be made with caution and only in the context of the theory applied.

alternative estimate of potential growth based on a framework inspired by post-Keynesian macroeconomics.

Selected empirical contributions are Persson and Tabellini (1994), who find a significant and negative relationship between inequality (measured by the income share of the top 20 percent) and the annual growth rate of GDP, and Mo (2000), who also finds negative effects of income inequality on the GDP growth rate. In contrast, Barro (2000) concludes that the effect of income inequality on economic growth depends on the state of economic development: income inequality in poor countries affects negatively economic growth, but income inequality in rich countries affects it positively. Similarly, Forbes (2000) finds a positive effect of a country's level of income inequality on growth but considers only the short and medium run for a panel of countries, while Partridge (2005) and Frank (2009) find a positive long-run association between inequality and growth for the United States.

More recently, however, rising inequality in the personal income distribution and a downward trend in the labor share of income have been extensively documented (e.g., Autor et al., 2017; Elsby, Hobijn, and Şahin 2013; IMF, 2017; Karabarbounis and Neiman 2013; Piketty and Saez 2003; Taylor and Ömer 2019; Mendieta-Munoz, Rada, and Von Arnim 2019) and prompted the new-Keynesian macroeconomic literature to consider inequality as a possible explanatory factor for the decline in potential output growth. For example, the overlapping generations model developed by Eggertsson and Mehrotra (2014) suggests that a rise in inequality either across or within generations as well as labor market polarization can cause stagnation. However, in this paper (and related research), stagnation tends to be characterized by a negative real interest rate: a rise in inequality increases savings, and full employment savings-investment equilibrium would require negative real interest rates.

According to that view, stagnation arises because monetary policy might be ineffective to bring about sufficiently negative real rates. Conventional Keynesian wisdom suggests that authorities are “pushing on a string,” and instead should pursue fiscal expansion. The new-Keynesian literature has begun to rediscover these insights—at the zero-lower bound, fiscal multipliers are large (Blanchard and Leigh 2013; Woodford, 2011) and debt has negligible costs (Blanchard, 2019). However, despite the concerns stated in Summers (2014) about the implications of inequality for demand, aggregate demand remains an afterthought in the new-Keynesian framework.

Our paper is also related to different ways in which potential output has been computed. One route builds on growth accounting *à la* Solow. The CBO expends considerable effort to do this, see, for example, CBO (2001). The procedure seeks to estimate potential output based on a Cobb–Douglas production function, with the potential labor force, capital services, and total factor productivity (TFP) as input variables. The potential labor force is obtained by removing cyclical variation (piecewise linear regression from peak-to-peak) via Okun's Law, with a standard NAIRU as a benchmark. As one would expect, the CBO estimates closely track our findings. However, the hypothesized mechanisms embedded in the estimations are very different. In contrast to Friedman's dictum—that a theory should be judged on its ability to predict, rather than the realism of its assumptions—we maintain that the postulated mechanism matters greatly. Predictive powers may be sufficient in some contexts, but they are inadequate as a test for a theory, and cannot inform policy. Crucially, the CBO's approach implicitly assumes a clearing labor market and on average full employment of factors. Our approach is not built on similarly unrealistic assumptions.

An important element in the CBO approach is that, despite the long-run decline in the natural rate of unemployment, potential output growth has declined as well. This must be due to a decline in the potential labor force, or TFP, or both (assuming that capital services come forth as required). An aging workforce plays some role in the former, but the robust finding that the slowdown in

potential growth precedes the crisis, as well as the onset of the retirement of baby boomers, suggests that there is more to it than that. Indeed, the CBO has recognized the possibility of hysteresis effects on potential growth (see, e.g., CBO, 2014: 6), but these remain situated on the supply side, and unrelated to insufficient demand and/or rising inequality. Of course, the crux of the matter lies with lackluster TFP (or labor productivity growth) which is an unexplained residual in the CBO's standard growth-accounting framework.

Storm (2017) discusses a more promising mechanism, built around the idea that potential TFP growth is, in fact, a function of actual labor productivity growth. In turn, labor productivity growth responds to economic activity through the so-called Kaldor-Verdoorn channel that highlights the role of economies of scale and to income distribution through the induced technical change channel that emphasizes the profit-maximizing behavior of firms (Storm and Naastepad 2012). A decline in both economic activity and the labor share would explain a permanent decline in labor productivity growth and therefore the decline in potential output growth.<sup>4</sup>

We do not introduce such a link from distributive variables to potential growth *explicitly*. However, the present paper should be seen as a step in that direction, since our main frame of reference is the post-Keynesian and classical literature on the linkages between growth and distribution. For the purposes of this review and the motivation of our empirical model, two distinct strands of the literature should be emphasized.

First, classical writings and the *Cambridge equation* suggest that in a long-period equilibrium, the rate of accumulation is constrained by the rate of profit. If the rate of capacity utilization and the ratio of full capacity output to capital are constant, the rate of expansion of the system moves in the same direction as the profit share. In other words, in the long run, growth is facilitated by the available *surplus*. Goodwin (1967) presents an important formalization of this approach. This growth cycle features a perpetual “predator-prey” oscillation between the labor share and the employment rate around a steady state at which the accumulation rate is equal to the profit rate and the natural growth rate. This result holds as long as all profits are saved and all wages consumed. A distributive shock would affect the steady-state employment rate adversely, while steady-state labor share and natural growth rate are determined by the exogenous forces of labor supply growth and labor productivity growth. However, the cyclical expansion is driven by the profit share, and in this sense (and much-abused parlance), economic activity would be “profit-led.” A central weakness of the classical growth cycle is that it does not give a role to the principle of effective demand.

Second, a large literature building on Keynesian and Kaleckian ideas has sought to formalize a growth model that features the paradox of costs: while wages are costs to individual capitalists, they collectively represent a source of demand. Hence, and in sharp contrast to the classical approach, growth in the long run can be fostered through redistribution toward wage earners. This approach has been criticized for considering the labor share as exogenous even in empirical approaches. Further, neo-Kaleckians have not proposed a convincing mechanism to explain how the economy attains a long-period equilibrium with a constant income/capital ratio *and* retains a long-run effect of aggregate demand on growth (Lavoie, 1996; Skott, 2012).

<sup>4</sup> A fairly rich literature criticizing the standard growth accounting approach points out that TFP growth is, by definition, a weighted average of real wage and profit rate growth rates where the weights are the factor income shares (Felipe and McCombie 2003; Rada and Taylor 2006). At the steady state where the profit rate is assumed to be constant, this relation simplifies to an identity between TFP growth and the product of the steady-state labor share and the growth rate of the real wage. If the real wage declines but the labor share remains constant, lower labor productivity growth translates into a decline in TFP growth, and subsequently a decline in potential output. Based on such arguments, Storm (2017) observes that TFP growth provides no additional analytical insight. However, this relationship is based on an accounting identity and does not identify direction of causality.

Barbosa-Filho and Taylor (2006) advanced synthesis of sorts, suggesting to replace the employment rate with a demand-determined income/capital ratio as the state variable to pair with the labor share. Their empirical findings, confirmed subsequently in a variety of studies, suggest that *at business cycle frequency*, economic activity is profit-led and the reserve army of labor exerts profit-squeeze pressure.<sup>5</sup> While these results are important, the present paper is agnostic about short-run dynamics: we introduce neither a strong theoretical prior nor focus the discussion on short-run results. Instead, our target is the estimation of the underlying potential growth rate *conditional on the labor share*. Following Blecker (2016), we recognize that the labor share and economic activity might be positively linked in the long run. Kotz and Basu (2019) present a related argument, based on the theory of *Social Structures of Accumulation* (SSA). The authors outline that periods of growth are fostered by “mutually reinforcing, expansion-promoting institutions,” which need to generate *both* the required profits for continued accumulation as well as a sufficient wage fund to support aggregate demand. Their empirical findings provide suggestive evidence on the linkages between inequality and the current, protracted growth slowdown, and we return to it further below.

Our approach places emphasis on the *growth rate*. The emphasis in some of the above-mentioned literature on the rate of capacity utilization (or income/capital ratio, as proxy) is, regarding the present purposes, unwarranted. For example, after a crisis, the rate of utilization of a representative firm (or the aggregate output gap) might return quite rapidly to “normal,” all the while the potential or natural rate of growth features strong downward hysteresis. Thus, our contribution is also related to that of Li and Mendieta-Muñoz (2019), who focus on the evolution of the natural growth rate. Applying a modified first difference version of Okun’s law to the G-7 countries, they find that the latter exhibits a gradual decline that predates the Great Recession and that is mainly associated with a fall in the productivity growth component.<sup>6</sup>

In summary, the empirical approach outlined in the next section targets a question currently of central importance: conditional on business cycle dynamics between the labor share and the rate of capacity utilization, is there a long-run relationship between the labor share and the rate of potential output growth?

### 3. Empirical Strategy

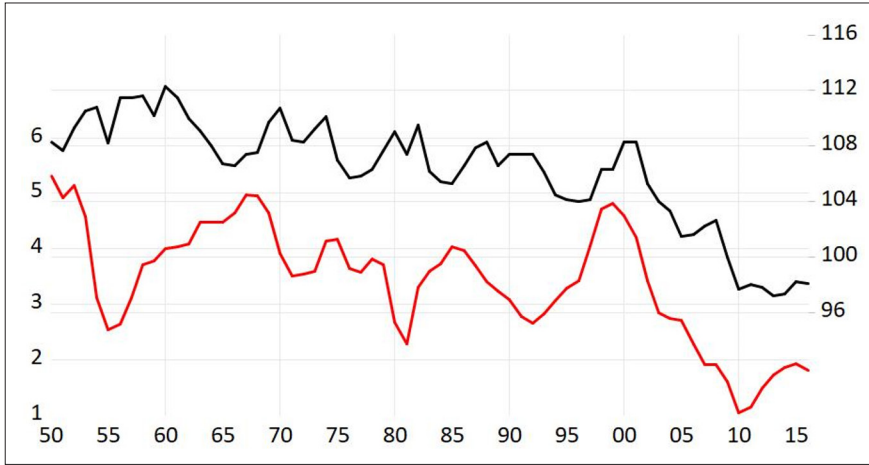
As a first step, consider Figure 1. This figure shows the CBO’s measure of potential output growth and the trajectory of the labor share for the US nonfarm business sector.

It is possible to observe that both series show a downward trend during the post-war period. The correlation coefficient between these two series is approximately 0.68 and is statistically significant at the 1 percent level. This represents preliminary evidence of a statistical relationship between potential output growth and the labor income share.

Our empirical approach consists of considering a specification of the Goodwin model that explicitly incorporates the interactions between income distribution, measured by the labor share

<sup>5</sup>See Mohun and Veneziani (2008), Zipperer and Skott (2011), and Kiefer and Rada (2015), among others, on these short-run dynamics. Flaschel (2009), Flaschel (2015), and Tavani, Flaschel, and Taylor (2011) provide related discussions. Barrales and von Arnim (2017) extend that investigation on the basis of wavelet decompositions and find evidence for a bidirectional Granger causality relationship between the labor share and measures of economic activity at high and low frequencies. Kiefer and Rada (2015) provide suggestive evidence of stagnation with falling labor shares and rising output gaps.

<sup>6</sup>Their results corroborate the recent literature on the fall in potential output growth, based on different econometric techniques and conceptualizations of potential output. See, for example, the dynamic factor model used by Antolin-Diaz, Drechsel, and Petrella (2017), the alternative Solow-style growth accounting decomposition employed by Fernald et al. (2017), and the decomposition analyses based on the Kalman filter smoothing developed by Gordon (2016). For a useful discussion of estimates of potential from a critical perspective, see Chapter 5 of Blecker and Setterfield (2019).



**Figure 1.** United States, nonfarm business sector, 1950–2016. CBO's potential output growth rate (in percentage, red line, left axis) and labor share (index 2009 = 100, black line, right axis).

( $\psi_t$ ), and economic activity, measured by capacity utilization ( $v_t$ ) as the difference between the natural log of actual output ( $y_t$ ) and the natural log of potential output ( $y_t^*$ ):  $v_t = y_t - y_t^*$ . The specification of this model does not rest on a strong theoretical prior (i.e., does not constrain the model to generate wage-led or profit-led regimes) but merely conditions the estimation of potential growth on business cycle interaction of labor share and the rate of capacity utilization. Specifically, we follow the Vector Autoregressive model of order 2 proposed by Rada and Kiefer 2016 that captures the dynamic interactions between  $\psi_t$  and  $v_t$ :

$$\begin{aligned}\psi_t &= \alpha_0 + \alpha_1 \psi_{t-1} + \alpha_2 v_{t-1} + \alpha_3 \psi_{t-2} + \alpha_4 v_{t-2} + \varepsilon_{\psi,t} \\ v_t &= \beta_0 + \beta_1 \psi_{t-1} + \beta_2 v_{t-1} + \beta_3 \psi_{t-2} + \beta_4 v_{t-2} + \varepsilon_{v,t}\end{aligned} \quad \dots\dots\dots (1)$$

where  $\alpha_i$  and  $\beta_i$ ,  $i = 0, 1, 2, 3, 4$  are coefficients to be estimated and  $\varepsilon_{\psi,t} \sim \text{iid}.N(0, \sigma_\psi^2)$  and  $\varepsilon_{v,t} \sim \text{iid}.N(0, \sigma_v^2)$  represent the stochastic disturbances that satisfy the standard statistical properties.<sup>7</sup>

We then embed a dynamic characterization of potential output into the VAR(2) of distribution and utilization depicted in equation (1). We assume that the rate of growth of potential output ( $g_t^*$ ) follows a random walk:

$$g_t^* = g_{t-1}^* + \varepsilon_{g,t} \quad \dots\dots\dots (2)$$

where  $\varepsilon_{g,t} \sim \text{iid}.N(0, \sigma_g^2)$  represents the stochastic disturbance and that  $\text{cov}(\varepsilon_{g,t}, \varepsilon_{\psi,t}) = \text{cov}(\varepsilon_{g,t}, \varepsilon_{v,t}) = 0$ , so that the shocks to the potential rate of growth are independent of the shocks in equation (1).

<sup>7</sup>Empirically, we found that a VAR(2) captures the basic dynamics better than a VAR(1) and that little is added if we consider a VAR(3).



The choice of the dynamics of the growth rate of potential output  $g_t^*$  in equation (2) is based on the standard specification of unobserved state variables in state-space models. For a more comprehensive discussion of the technical details, see appendix A. It can intuitively be motivated as follows: by assuming that  $g_t^*$  follows a random walk, we leave *unconstrained* the growth rate of potential output (with the exception of the standard normality assumptions). This “lets the data speak” on the trajectory of potential growth, *conditional on the dynamic interaction of the observables*  $\psi_t$  and  $y_t$ . Further, since we are interested in capturing the evolution of long-run output growth rates by considering frequencies lower than the business cycle, the random walk assumption allows us to capture those changes in output growth that have been of permanent nature—that is, non-mean-reverting changes.

Therefore, the level of potential output can be defined recursively:

$$y_t^* = y_{t-1}^* + g_t^* \quad \dots \dots \dots (3)$$

And, substituting equation (3) into the definition of  $v_t$  we have that:

$$v_t = y_t - y_t^* = y_t - (y_{t-1}^* + g_t^*) \quad \dots \dots \dots (4)$$

Finally, substituting equations (3) and (4) into the original VAR(2) shown in equation (1) yields:

$$\begin{aligned} \psi_t &= \alpha_0 + \alpha_1 \psi_{t-1} + \alpha_2 (y_{t-1} - y_{t-1}^*) + \alpha_3 \psi_{t-2} + \alpha_4 (y_{t-2} - y_{t-2}^*) + \varepsilon_{\psi,t} \\ y_t &= y_{t-1}^* + g_t^* + \beta_0 + \beta_1 \psi_{t-1} + \beta_2 (y_{t-1} - y_{t-1}^*) + \beta_3 \psi_{t-2} + \beta_4 (y_{t-2} - y_{t-2}^*) + \varepsilon_{v,t} \end{aligned} \quad \dots (5)$$

The VAR(2) model shown in equation (5) contains two unobserved state variables,  $g_t^*$  and  $y_t^*$ , and two observed variables,  $\psi_t$  and  $y_t$ , and as such defines a linear state-space model that, via the Kalman filter, can provide an estimate of  $g_t^*$ .

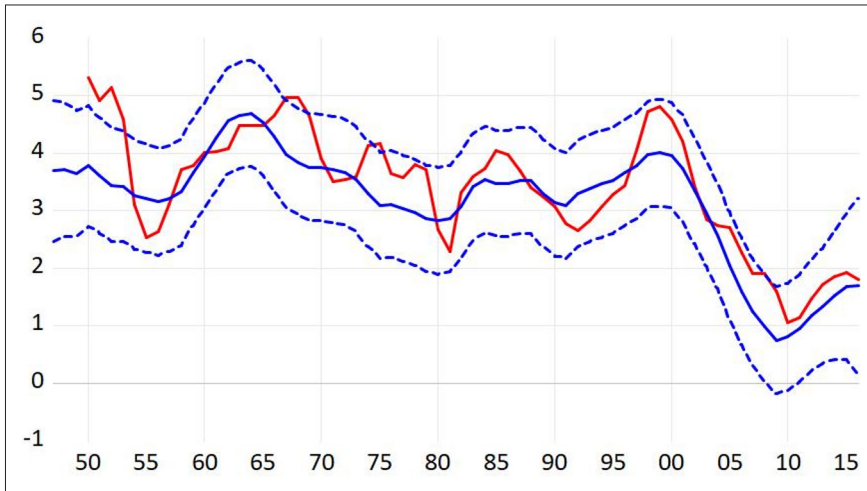
State-space models typically deal with dynamic time-series models that involve unobservable variables. Such models consist of a measurement equation, which describes the relationship between observed variables and unobserved state variables, and a transition state equation, which describes the dynamics of the state variables. In our empirical model, equations (2) and (3) represent the state transition equations, and the two equations in (5) depict the measurement equations. In the next section, we show the estimates of the unobserved state variables, the model's unknown parameters obtained from the Kalman filter, and the sample log-likelihood function based on the prediction error decomposition.<sup>8</sup>

## 4. Results

The model represented by equations (2), (3), and (5) was estimated using annual data for the US nonfarm business sector for the period 1947–2016 and for the US nonfinancial corporate business sector for the period 1948–2015. For the latter, we considered two different measures of  $\psi_t$ : an unadjusted  $\psi_t$ , calculated as the ratio of compensation of employees relative to corporate net value added and an adjusted  $\psi_t$ , which excludes the top 1 percent of the wage and salary distribution.<sup>9</sup>

<sup>8</sup> A technical description of state-space models, the Kalman filter and the log-likelihood function is presented in appendix A.

<sup>9</sup> Data on the labor share and output of the *Nonfarm Business sector* come from Bureau of Labor Statistics, “BLS\_dataset\_annualseries 2017,” and reflect the press release of September 7, 2017. Data for labor share and output of the *Nonfinancial Corporate Business sector* comes from the Bureau of Economic Analysis, National Income and Product Accounts, table 1.14, released on February 28, 2018. The labor share is calculated as the ratio of nominal compensation of employees (line 20; i.e., including wages and salaries and supplements) and net value added (line 129). Output is



**Figure 2.** United States, 1947–2016. Estimations of the potential output growth rate for the nonfarm business sector obtained from equations (2), (3), and (5). Smoothed estimates of the potential output growth rate are the blue straight lines. Blue dotted lines represent the 95 percent confidence interval around the latter. The CBO measure of potential output growth is the red straight line (first observation: 1950).

Following Kim and Nelson (1999), in all estimations, we corroborated the appropriateness of the specified models checking for the lack of serial correlation (using the Ljung-Box  $Q$  test), homoskedasticity (using an ARCH test for heteroskedasticity), and normality (using the Jarque-Bera normality test) in the standardized one-period-ahead-forecast errors of the different estimations.<sup>10</sup> Table B.1 in appendix B presents the estimated coefficients for the respective models. It can be ascertained that the majority of the relevant parameters are of similar magnitude and also present similar levels of statistical significance.<sup>11</sup>

The two estimated models for the US nonfinancial corporate business sector satisfied the properties of no serial correlation, homoskedasticity, and normality at the 95 percent level of confidence. Similarly, the estimated model for the US nonfarm business sector did not present problems of serial correlation at the 90 percent level and satisfied the properties of

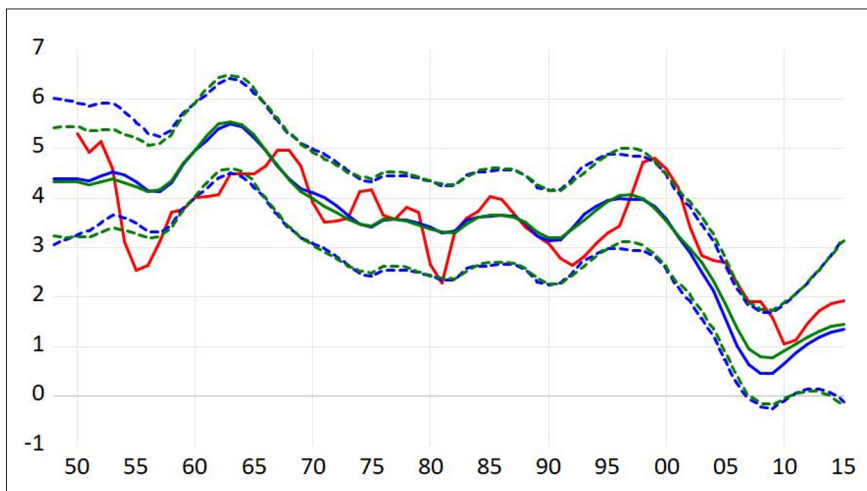
---

measured as Real Net Value Added and is calculated as the difference between the Gross Value Added and Consumption of Capital and it can be found on line 43 in table 1.14. The adjusted labor share for the *Nonfinancial Corporate Business sector* seeks to proxy the portion of wages that are truly labor income, but exclude CEO and superstar “salaries.” Hence, it excludes the top 1 percent of the wage distribution (Piketty and Saez 2003). For details on this adjustment, see Barrales and von Arnim (2017)).

<sup>10</sup>To initialize the Kalman filter, the priors for the mean and variance of the  $g_t^*$  were the following: 3.61 percent and 1.09 percent for the nonfarm business sector, respectively; 4.38 percent and 1.60 percent for the nonfinancial corporate business sector using the unadjusted labor share, respectively, and 4.34 percent and 0.56 percent for the nonfinancial corporate business sector using the adjusted labor share, respectively. These values correspond to the estimated moments of the  $g_t^*$  obtained from a first Kalman filter estimation. Finally, in all cases, we stipulated that the standard deviation of the potential output growth rate was 0.5 (that  $\sigma_g = 0.5$ ) to allow for rather larger shocks to potential output growth).

<sup>11</sup>The signs of parameters (and hence their economic interpretation) that reflect cyclical dynamics are also in line with previous findings by Barbosa-Filho and Taylor (2006), which we invite the reader to consult. Our focus here is, however, on estimating potential output conditional on the dynamic between economic activity and the labor share.





**Figure 3.** United States, 1948–2015. Estimations of the potential output growth rates for the nonfinancial corporate business sector obtained from equations (2), (3), and (5). Smoothed estimates of the potential output growth rates using the unadjusted labor share and the adjusted labor share are the blue and green straight lines, respectively. Blue and green dotted lines represent 95 percent confidence intervals around the latter. The CBO measure of potential output growth (for the nonfarm business sector) is the red straight line (first observation: 1950).

homoskedasticity and normality at the 95 percent level. Overall, the estimations of the different models suggest no evidence of model misspecification.<sup>12</sup>

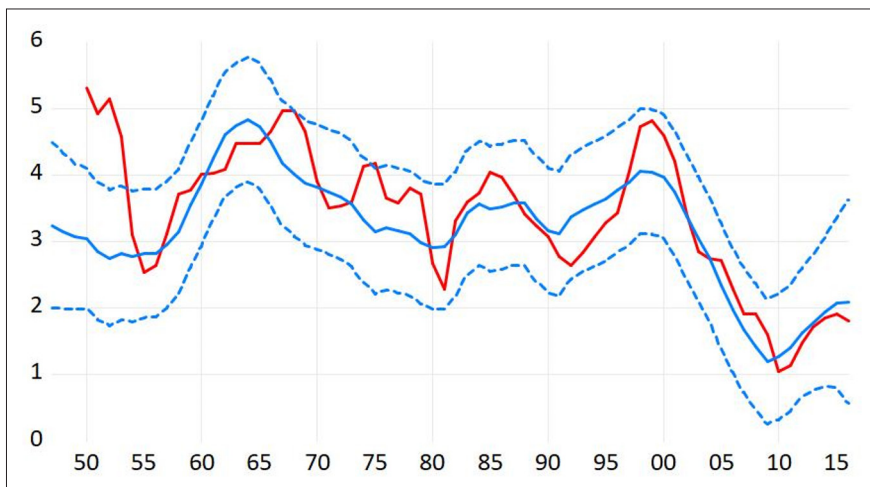
The estimated  $g_t^*$ s are presented in figures 2 and 3. All figures show the smoothed estimates of the measures of potential output growth, together with their respective 95 percent confidence intervals, and the rates of growth of potential output estimated by the CBO. The CBO's potential output growth rates lie within our estimated 95 percent confidence intervals during the periods of study.

The CBO's measure of potential output growth has fallen from approximately 5.3 percent in 1950 to 1.8 percent in 2016, which represents a fall of approximately  $-3.5$  percentage points. The estimates of  $g_t^*$  indicate that potential output growth has decreased from approximately 3.7 percent in 1947 to 1.7 percent in 2016 in the nonfarm business sector ( $-2$  percentage points), from approximately 4.4 percent in 1948 to 1.3 percent in 2015 ( $-3.1$  percentage points) in the nonfinancial corporate business sector when the unadjusted labor share was used, and from approximately 4.3 percent in 1948 to 1.5 percent in 2016 ( $-2.8$  percentage points) in the nonfinancial corporate business sector when the adjusted labor share was used.

However, a closer inspection of Table B.1 reveals one potentially problematic result related to the persistence of the shocks. The estimates of the autoregressive coefficients of the labor share equations for the nonfarm business sector and for the nonfinancial corporate business sector using the unadjusted labor share sum up to 1.07 and 1.15, respectively. This suggests the possible presence of unit roots in the labor shares, which is further corroborated by different unit root tests that show that both measures of the labor share are integrated series of order 1.

Although the maximum likelihood estimation procedure is not affected by the presence of unit roots, as a robustness check we corroborated if the smoothed  $g_t^*$ s estimates change when we

<sup>12</sup> A full report with specification tests for all models—here and further below—is available upon request. As with so many macroeconomic exercises, having more data would further support our results in terms of their robustness. However, model (mis)specification tests applied here suggest no major issues.



**Figure 4.** United States, 1948–2016. Estimations of the potential output growth rate for the nonfarm business sector obtained from equations (2), (3), and (6). Smoothed estimates of the potential output growth rate are the blue azure straight lines. Blue azure dotted lines represent the 95 percent confidence interval around the latter. The CBO measure of potential output growth is the red straight line (first observation: 1950).

consider stationary  $\psi_t$  series. Hence, in order to remove the stochastic trend, we considered the first differences of the labor share,  $\Delta\psi_t$ , in the measurement equations for the nonfarm business sector and the nonfinancial corporate business sector when the unadjusted labor share was used:

$$\begin{aligned} \Delta\psi_t &= \gamma_0 + \gamma_1 \Delta\psi_{t-1} + \gamma_2 (y_{t-1} - y_{t-1}^*) + \gamma_3 \Delta\psi_{t-2} + \gamma_4 (y_{t-2} - y_{t-2}^*) + \varepsilon_{\Delta\psi,t} \\ y_t &= y_{t-1}^* + g_t^* + \zeta_0 + \zeta_1 \Delta\psi_{t-1} + \zeta_2 (y_{t-1} - y_{t-1}^*) + \zeta_3 \Delta\psi_{t-2} + \zeta_4 (y_{t-2} - y_{t-2}^*) + \varepsilon_{v,t} \end{aligned} \quad \dots (6)$$

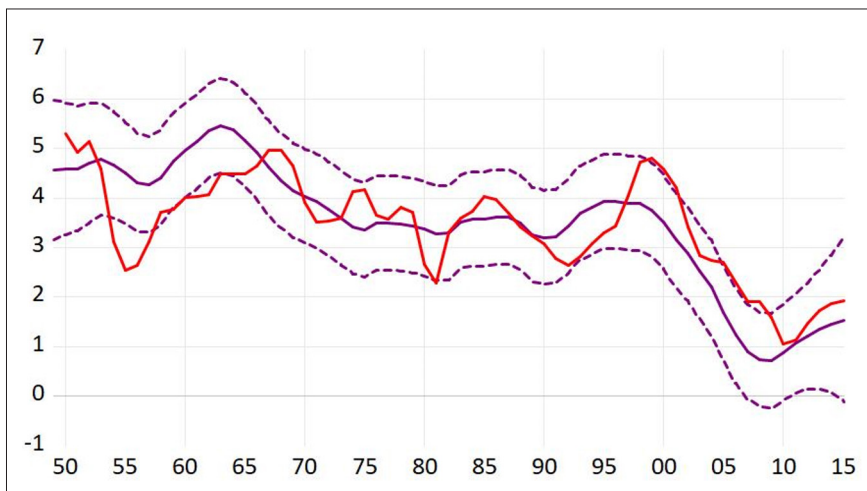
The estimated coefficients of the alternative state-space model defined by equations (2), (3) and (6) are presented in able B.2 in appendix B.

The estimation results for the US nonfinancial corporate business sector satisfy all correct specification tests at the 95 percent level, while the results for the nonfarm business sector do not show evidence of serial correlation at the 90 percent level and do not present problems of heteroskedasticity or nonnormality at the 95 percent level. Moreover, the coefficients obtained are fairly similar and also present similar levels of statistical significance.

Finally, the smoothed estimates of  $g_t^*$ s are presented in Figures 4 and 5, together with their respective 95 percent confidence intervals, and the CBO's measure of potential output growth.

The estimates of  $g_t^*$  closely track results discussed above. The new estimations show that potential output growth has decreased from approximately 3.2 percent in 1948 to 2.1 percent in 2016 in the nonfarm business sector (a fall of  $-1.1$  percentage points) and from approximately 4.6 percent in 1949 to 1.5 percent in 2015 in the nonfinancial corporate business sector when the unadjusted labor share was used (which represents a fall of  $-3.1$  percentage points). Therefore, using either  $\psi_t$  or  $\Delta\psi_t$  yields similar results: a gradual decline in potential output growth that predates the Great Recession and that follows the downward trend of the labor share of income.

To further illustrate this result, consider longer-term averages of the estimated potential output growth rates reported in Figures 2–5. An oft-considered demarcation point is the turn from the so-called *golden age* to *neoliberal era*. The former covers the immediate post-war decades until either



**Figure 5.** United States, 1949–2015. Estimations of the potential output growth rate for the nonfinancial corporate business sector obtained from equations (2), (3) and (6) using the unadjusted labor share. Smoothed estimates of the potential output growth rate are the purple straight lines. Purple dotted lines represent the 95 percent confidence interval around the latter. The CBO measure of potential output growth (for the nonfarm business sector) is the red straight line (first observation: 1950).

the late 1960s or the late 1970s and the latter, in turn, the years since 1980. The average potential growth rate during the golden age (47–79) across the four main estimated series—based on the labor share in either nonfarm or nonfinancial corporate business sector and either in levels or first differences—amounts to 4 percent. During the neoliberal era, it falls to 2.8 percent, declining by almost one-third. The narrower definition of the golden age (47–69) shows an average growth of potential of 4.2 percent, implying a decline by more than one-third to the neoliberal era. (The 1970s saw an average growth of potential output of 3.5 percent.)

A still different periodization could focus on golden age (47–69) and the “modern era,” which includes China’s entrance into the global economy as well as the Great Recession (00–16), plus the intervening decades (70–99). The average growth rates of potential across the four estimated series for the golden age, intervening decades, and modern era are 4.2 percent, 3.4 percent, and 1.6 percent, respectively. While these observations do not provide a formal assessment of the estimated series, they clearly indicate a sustained decline of potential growth *after the 1960s*. This decline appears to have accelerated since 2000.

## 5. Conclusions

This paper assumes that economic growth and income distribution share important long-run properties. In this way, secular stagnation in the United States, represented by the gradual decline in potential output growth, is related to the worsening trend in income inequality, represented by the downward trajectory of the labor share of income. We estimate potential output growth in a dynamic model that explicitly considers the interaction between the labor share of income and capacity utilization. This starting point differentiates our approach from others in the literature such as the CBO’s. Two features of our approach are particularly appealing: the endogenous treatment of both income distribution and economic activity and the simultaneous analysis of trends and business cycles. As expected, our results are roughly in line with the CBO’s estimate of the rate of potential growth.

Nevertheless, in contrast to the CBO framework, our approach brings the socioeconomic conflict over the distribution of income to the fore, through the endogenization of the labor share.

In summary, the results obtained for the nonfarm business sector and the nonfinancial corporate business sector for the post-war period show a gradual decline of the measure of potential output growth that predates the Great Recession. Hence, our results confirm previous findings in the literature on the fall of potential output growth in a new framework. Our findings clearly indicate a positive long-run relationship between economic growth and the labor share in the post-war US economy, conditional on the theoretical framework put forth. A relevant implication of our exercise is that income distribution and stagnation should be jointly explained. Future research should further investigate whether slower growth is depressing the labor share in the long run, or vice versa, and provide a more disaggregated characterization of the channels that connect both phenomena.

For now, we briefly consider several mechanisms of stagnation in a distribution-growth framework. Our starting point is that the stylized picture drawn up in Goodwin (1967) matters greatly and has been confirmed by the subsequent empirical literature: cyclical expansions at business cycle frequencies are *profit-led*. How do we square this with the positive long-run relation between the labor share and potential growth? Several possibilities arise.

First, business cycles evolve around a shifting equilibrium: shocks to exogenous variables alter the steady state of the model. This possibility is raised by Kiefer and Rada (2015). Put simply, decreases in the labor share (through globalization, financialization, and technical change) should lead to an acceleration of economic activity but haven't. As Blecker (2020, forthcoming) points out, the empirical record would make sense if *structural austerity* depressed demand. However, this channel might be implausible, given high fiscal deficits and very loose monetary policy throughout much of the recent period.<sup>13</sup>

A second mechanism could be drawn up on the basis of explicit treatment of *expectations*. The Goodwin model's lower turning point is provided by the falling labor share. That, in the original supply-constrained version with a fixed income/capital ratio, triggers the increase in investment. However, in a demand-driven version—*à la* Flaschel (2009), Flaschel (2015) or Barbosa-Filho and Taylor (2006)—the decline in real unit labor costs is only *one* argument; the other is, of course, the endogenous activity variable. Now, *if capitalists do not expect demand to rise*, the labor share could fall to zero and investment would still not come forth. In other words, suppose capitalists observe a weakening profit squeeze, technological unemployment, and the increasingly precarious lives of their customers. Would they conclude that expansion of capacity is not warranted, even at falling labor costs? This, of course, would imply that long-run growth is wage constrained.

A third hypothesis focuses on *induced technical change*. If technological progress is strongly driven by increases in real unit labor costs, labor suppression and the resulting fall in the labor share might be a causal factor in the weakening of labor productivity growth (Storm and Naastepad 2012). Long-run growth would again be wage-constrained—but along the lines of Marx-Verdoorn, rather than expectations about demand. If the growth rate of labor productivity responds positively to the labor share through induced technical change, rising inequality would lead to high employment rates *and* a decline in the potential or natural rate of growth. In this manner, our results might be consistent with a classical growth cycle *and* the institutional and empirical analyses proposed by Montier and Pilkington (2017) and Kotz and Basu (2019).

<sup>13</sup>Still, it can be argued that “loose monetary policy” in general and “loose fiscal policy” specifically, when not targeting investment and innovation but rather upward redistribution of income are ill-suited to generate sustainable expansions. Blecker (2020, forthcoming) further suggests that financialization can depress demand, since it elevates rentier's income share.

We believe that these hypotheses deserve further investigation. Based on our analysis, the starting point is that trend output growth and income distribution are linked positively during recent decades.

## Appendix A: Econometric details

This appendix provides details on state-space models, the Kalman filter, and the sample log-likelihood function following Kim and Nelson (1999). A state-space model consists of two equations: a measurement equation and a transition (or state) equation. The former describes the relation between the observed variables (data) and unobserved state variables, while the latter describes the dynamics of the state variables and has the form of a first-order difference equation in the state vector.

A linear state-space representation of the dynamics of a  $nx1$  vector of variables observed at time  $t = 1, 2, \dots, T$ ,  $\mathbf{y}_t$ , can be represented by the following system of equations:

$$\mathbf{y}_t = \mathbf{H}_t \mathbf{B}_t + \mathbf{A} \mathbf{z}_t + \mathbf{e}_t \quad \dots\dots\dots (\text{A.1})$$

$$\mathbf{B}_t = \bar{\mu} + \mathbf{F} \mathbf{B}_{t-1} + \mathbf{v}_t \quad \dots\dots\dots (\text{A.2})$$

$$\mathbf{e}_t \sim \text{iid}.N(0, \mathbf{R}) \quad \dots\dots\dots (\text{A.3})$$

$$\mathbf{v}_t \sim \text{iid}.N(0, \mathbf{Q}) \quad \dots\dots\dots (\text{A.4})$$

$$E(\mathbf{e}_t \mathbf{v}_s') = 0, \text{ for all } s \quad \dots\dots\dots (\text{A.5})$$

where  $\mathbf{B}_t$  is a  $kx1$  vector of unobserved state variables;  $\mathbf{H}_t$  is an  $nxk$  matrix that links the observed  $\mathbf{y}_t$  vector and the unobserved  $\mathbf{B}_t$  (elements of which can be either data on exogenous variables or constant parameters);  $\mathbf{A}$  is an  $nxr$  matrix of coefficients;  $\mathbf{z}_t$  is an  $rx1$  vector of exogenous or predetermined observed variables;  $\bar{\mu}$  is a  $kx1$  vector; and  $\mathbf{F}$  is a  $kxk$  matrix of coefficients.

Equations (A.1) and (A.2) represent, respectively, the measurement and the transition equations of a state-space model in which the measurement equation errors,  $\mathbf{e}_t$ , are independent of the transition equation errors,  $\mathbf{v}_t$ .

In this representation, the positive-definiteness of  $\mathbf{R}$  and  $\mathbf{Q}$  is not always guaranteed. A usual practice is to write equations (A.2) and (A.4) alternatively as:

$$\mathbf{B}_t = \bar{\mu} + \mathbf{F} \mathbf{B}_{t-1} + \mathbf{G} \mathbf{v}_t^* \quad \dots\dots\dots (\text{A.6})$$

$$\mathbf{v}_t^* \sim \text{iid}.N(0, \mathbf{Q}^*) \quad \dots\dots\dots (\text{A.7})$$

where  $\mathbf{G}$  is  $kxg$  and  $\mathbf{v}_t^*$  is  $gx1$  ( $g \leq k$ ). This representation of the transition equation guarantees the positive-definiteness of  $\mathbf{Q}^*$ , and the relationship between  $\mathbf{Q}$  in equation (A.4) and  $\mathbf{Q}^*$  in equation (A.7) is given by  $\mathbf{Q} = \mathbf{G} \mathbf{Q}^* \mathbf{G}'$ .

The basic tool to deal with the standard state-space model is the Kalman filter. The latter is a recursive procedure for computing the optimal estimate of the unobserved state vector  $\mathbf{B}_t$ , based on the appropriate information set, assuming that  $\bar{\mu}$ ,  $\mathbf{F}$ ,  $\mathbf{R}$ , and  $\mathbf{Q}^*$  are known.<sup>14</sup> In other

<sup>14</sup>It is also possible to employ Generalized Least Squares regressions. However, this method may be extremely inefficient

words, it provides a minimum mean square error estimate of  $\mathbf{B}_t$ , given the appropriate information set.

Depending upon the information set used, it is possible to find the basic filter and the smoothing filter. The former refers to an estimate of  $\mathbf{B}_t$  based on information available up to time  $t$ , while the latter refers to an estimate of  $\mathbf{B}_t$  based on all the available information in the sample through time  $T$ .

The basic filtering consists of two steps: the prediction step and the updating step. These can be represented by the following equations, where equations (A.8) to (A.11) depict the prediction step and equations (A.12) and (A.13) depict the updating step:

$$\mathbf{B}_{t|t-1} = \bar{\mu} + \mathbf{F}\mathbf{B}_{t-1|t-1} \dots\dots\dots (\text{A.8})$$

$$\mathbf{P}_{t|t-1} = \mathbf{F}\mathbf{P}_{t-1|t-1}\mathbf{F}' + \mathbf{Q} \dots\dots\dots (\text{A.9})$$

$$\eta_{t|t-1} = \mathbf{y}_t - \mathbf{y}_{t|t-1} = \mathbf{y}_t - \mathbf{H}_t\mathbf{B}_{t|t-1} - \mathbf{A}\mathbf{z}_t \dots\dots\dots (\text{A.10})$$

$$\mathbf{f}_{t|t-1} = \mathbf{H}_t\mathbf{P}_{t|t-1}\mathbf{H}_t' + \mathbf{R} \dots\dots\dots (\text{A.11})$$

$$\mathbf{B}_{t|t} = \mathbf{B}_{t|t-1} + \mathbf{K}_t\eta_{t|t-1} \dots\dots\dots (\text{A.12})$$

$$\mathbf{P}_{t|t} = \mathbf{P}_{t|t-1} - \mathbf{K}_t\mathbf{H}_t\mathbf{P}_{t|t-1} \dots\dots\dots (\text{A.13})$$

where  $\mathbf{K}_t = \mathbf{P}_{t|t-1}\mathbf{H}_t'\mathbf{f}_{t|t-1}^{-1}$  is the Kalman gain, which determines the weight assigned to new information about  $\mathbf{B}_t$  contained in the prediction error,  $\eta_{t|t-1}$ ;  $\mathbf{B}_{t|t-1}$  and  $\mathbf{B}_{t|t}$  are the expectations (estimates) of  $\mathbf{B}_t$  conditional on information up to  $t-1$  and  $t$ , respectively;  $\mathbf{P}_{t|t-1}$  and  $\mathbf{P}_{t|t}$  are the covariance matrices of  $\mathbf{B}_t$  conditional on information up to  $t-1$  and  $t$ , respectively;  $\mathbf{y}_{t|t-1}$  is the forecast of  $\mathbf{y}_t$  given information up to  $t-1$ ; and  $\mathbf{f}_{t|t-1}$  is the conditional variance of the prediction error.

On the other hand, the smoothing filter provides a more accurate inference on  $\mathbf{B}_t$  since it uses more information than the basic filter. For  $t = T-1, T-2, \dots, 1$ , the smoothing filter can be described by the following equations:

$$\mathbf{B}_{t|T} = \mathbf{B}_{t|t} + \mathbf{P}_{t|t}\mathbf{F}'\mathbf{P}_{t+1|t}^{-1}(\mathbf{B}_{t+1|T} - \mathbf{F}\mathbf{B}_{t|t} - \bar{\mu}) \dots\dots\dots (\text{A.14})$$

$$\mathbf{P}_{t|T} = \mathbf{P}_{t|t} + \mathbf{P}_{t|t}\mathbf{F}'\mathbf{P}_{t+1|t}^{-1}(\mathbf{P}_{t+1|T} - \mathbf{P}_{t+1|t})\mathbf{P}_{t+1|t}^{-1}\mathbf{F}\mathbf{P}_{t|t}' \dots\dots\dots (\text{A.15})$$

where the initial values for the smoothing,  $\mathbf{B}_{T|T}$  and  $\mathbf{P}_{T|T}$ , are obtained from the last iteration of the basic filter.

Finally, it is possible to use the sample log likelihood function based on the prediction error decomposition to estimate the model's unknown parameters. If both the prediction error ( $\eta_{t|t-1}$ ) and the variance ( $\mathbf{f}_{t|t-1}$ ) of the state-space model are estimated via the Kalman filter and if the observations are normally distributed, then the sample log-likelihood function for a stationary  $\mathbf{B}_t$  in equation (A.2),  $L$ , is represented by:

$$L = -\frac{1}{2} \sum_{t=1}^T \ln(2\pi\mathbf{f}_{t|t-1}) - \frac{1}{2} \sum_{t=1}^T \eta_{t|t-1}'\mathbf{f}_{t|t-1}^{-1}\eta_{t|t-1} \dots\dots\dots (\text{A.16})$$



which can be maximized with respect to the unknown parameters of the model.

## Appendix B: Tables

**Table B.1.** United States: Estimated Parameters Obtained From Equations (2), (3), and (5)

Parameters	Nonfarm business sector, 1947–2016 <sup>a,c</sup>	Nonfinancial corporate business sector, 1948–2015 <sup>b,c</sup>	
		Using the unadjusted labor share	Using the adjusted labor share
$\alpha_0$	27.599 (28.857)	−92.700** (45.763)	−96.597** (39.022)
$\alpha_1$	1.071*** (0.168)	1.146*** (0.265)	0.897*** (0.271)
$\alpha_2$	0.403*** (0.086)	0.305*** (0.057)	0.256*** (0.059)
$\alpha_3$	−0.004 (0.167)	−0.161 (0.198)	0.034 (0.131)
$\alpha_4$	−0.275*** (0.072)	−0.139* (0.083)	−0.076 (0.103)
$\beta_0$	−105.467 (66.989)	317.937 (227.301)	257.900 (241.646)
$\beta_1$	−0.338 (0.381)	−0.733 (0.689)	−0.407 (0.605)
$\beta_2$	0.594*** (0.200)	0.495** (0.193)	0.628*** (0.201)
$\beta_3$	−0.015 (0.400)	0.260 (0.823)	0.403 (0.664)
$\beta_4$	−0.121 (0.198)	0.001 (0.283)	−0.088 (0.335)
$\sigma_\psi$	1.036*** (0.143)	0.756*** (0.110)	0.833*** (0.115)
$\sigma_v$	2.233*** (0.325)	2.958*** (0.421)	3.143*** (0.492)
$L^d$	−268.929	−259.708	−268.328

*Notes.* <sup>a</sup>The labor share included in the state-space model corresponds to an index, 2009 = 100. <sup>b</sup>The labor share included in the state-space model was measured in percentage. <sup>c</sup>Standard errors are shown in parenthesis. <sup>d</sup>Log-likelihood.

\*, \*\*, and \*\*\* denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

**Table B. 2.** United States: Estimated Parameters Obtained From Equations (2), (3), and (6)

Parameters	Nonfarm business sector, 1948–2016 <sup>a,c</sup>	Nonfinancial corporate business sector using the unadjusted labor share, 1949–2015 <sup>b,c</sup>
$\gamma_0$	34.780 (26.453)	−85.118 (53.654)
$\gamma_1$	0.026 (0.178)	0.187 (0.217)

Parameters	Nonfarm business sector, 1948–2016 <sup>a,c</sup>	Nonfinancial corporate business sector using the unadjusted labor share, 1949–2015 <sup>b,c</sup>
$\gamma_2$	0.399*** (0.074)	0.308*** (0.054)
$\gamma_3$	0.039 (0.146)	0.019 (0.112)
$\gamma_4$	-0.269*** (0.078)	-0.156* (0.080)
$\zeta_0$	-119.913* (61.958)	232.174 (193.009)
$\zeta_1$	-0.245 (0.312)	-0.445 (0.678)
$\zeta_2$	0.661*** (0.140)	0.663*** (0.159)
$\zeta_3$	-0.320 (0.250)	-0.195 (0.469)
$\zeta_4$	-0.109 (0.197)	-0.077 (0.325)
$\sigma_{\Delta\psi}$	1.017*** (0.140)	0.772*** (0.121)
$\sigma_v$	2.172*** (0.278)	3.066*** (0.382)
$L^d$	-261.299	-257.761

Notes. <sup>a</sup>The labor share included in the state-space model corresponds to the first differences of the labor share index, 2009 = 100. <sup>b</sup>The labor share included in the state-space model corresponds to the first differences of the labor share measured in percentage. <sup>c</sup>Standard errors are shown in parenthesis. <sup>d</sup>Log-likelihood.

\*, \*\*, and \*\*\* denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

## Acknowledgments

The authors would like to thank the three referees of this journal, David Kotz, Robert Jump, and Roberto Veneziani, for their very helpful feedback; and Robert Blecker, Korkut Ertürk, Antonella Palumbo, and Servaas Storm for detailed and thoughtful comments. The usual disclaimer applies.

## Declaration of Conflicting Interests


The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## ORCID iD

Ivan Mendieta-Muñoz  <https://orcid.org/0000-0003-0018-5642>

Codrina Rada  <https://orcid.org/0000-0002-8333-8407>

## References

Antolin-Diaz, Juan, Thomas Drechsel, and Ivan Petrella. 2017. Tracking the slowdown in long-run GDP growth. *The Review of Economics and Statistics* 99 (2): 343–56.

- Autor, David, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen. 2017. The fall of the labor share and the rise of superstar firms. NBER Working Paper No. 23396. Cambridge, MA: National Bureau of Economic Research. Accessed at: <https://www.nber.org/papers/w23396>.
- Barbosa-Filho, Nelson H, and Lance Taylor. 2006. Distributive and demand cycles in the US economy? A structuralist goodwin model. *Metroeconomica* 57 (3): 389–411.
- Barrales, Jose, and Rudiger von Arnim. 2017. Longer-run distributive cycles: Wavelet decompositions for the US, 1948–2011. *Review of Keynesian Economics* 5 (2): 196–217.
- Barro Robert J. 2000. Inequality and growth in a panel of countries. *Journal of Economic Growth* 5 (1): 5–32.
- Blanchard, Olivier J. 2019. Public debt and low interest rates. *American Economic Review* 109 (4): 1197–229.
- Blanchard, Olivier J, and Daniel. Leigh. 2013. Growth forecast errors and fiscal multipliers. IMF Working Paper 1301. Washington, DC: International Monetary Fund. <https://www.imf.org/external/pubs/ft/wp/2013/wp1301.pdf>.
- Blecker, Robert A. 2016. Wage-led versus profit-led demand regimes: The long and the short of it. *Review of Keynesian Economics* 4 (4): 373–90.
- . 2020, forthcoming. Long-term shifts in demand and distribution in neo-Kaleckian and neo-Goodwinian models. In *Economic Growth and Macroeconomic Stabilization Policies in Post-Keynesian Economics: Essays in Honour of Marc Lavoie and Mario Seccareccia, Book Two*, eds. Hassan Bougrine, and Louis-Philippe Rochon. Cheltenham and Northampton MA: Edward Elgar.
- Blecker, Robert A., and Mark Setterfield. 2019. *Heterodox Macroeconomics: Models of Demand, Distribution and Growth*. Edward Elgar.
- CBO. 2001. *CBO's Method for Estimating Potential Output: An Update*. Congress of the United States: Congressional Budget Office. <https://www.cbo.gov/sites/default/files/107th-congress-2001-2002/reports/potentialoutput.pdf>.
- . 2014. *Revisions to CBO's Projection of Potential Output Since 2007*. Congressional Budget Office: Congress of the United States. <https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/45150-PotentialOutput.pdf>.
- Eggertsson, Gauti B., and Neil R. Mehrotra. 2014. A model of secular stagnation. NBER Working Paper No. 20574. Cambridge, MA: National Bureau of Economic Research. <https://www.nber.org/papers/w20574.pdf>
- Elsby, Michael W. L, Bart Hobijn, and Ayşegül Şahin. 2013. The decline of the US labor share. *Brookings Papers on Economic Activity* 44 (2): 1–63.
- , and John S. L McCombie. 2007. Is a theory of total factor productivity really needed? *Metroeconomica* 58 (1): 195–229.
- Felipe, Jesus, and John S. L. McCombie. 2003. Some methodological problems with the neoclassical analysis of the East Asian miracle. *Cambridge Journal of Economics* 27 (5): 695–721.
- Fernald, John G, Robert E. Hall, James H. Stock, and Mark W. Watson. 2017. The disappointing recovery of output after 2009. *Brooking Papers on Economic Activity* 48 (1): 1–58.
- Flaschel, Peter. 2009. *The Macrodynamics of Capitalism: Elements for a Synthesis of Marx, Keynes, and Schumpeter*. Berlin: Springer.
- . 2015. Goodwin's MKS system: A baseline macro model. *Cambridge Journal of Economics* 39 (6): 1591–605.
- Forbes, Kristin J. 2000. A reassessment of the relationship between inequality and growth. *American Economic Review* 90 (4): 869–87.
- Frank, Mark W. 2009. Inequality and growth in the United States: Evidence from a new state-level panel of income inequality measures. *Economic Inquiry* 47 (1): 55–68.
- Goodwin, Richard M. 1967. A growth cycle. In *Socialism, Capitalism and Growth: Essays Presented to Maurice Dobb*, ed. Charles H. Feinstein, 54–58. Cambridge: Cambridge University Press.

- Gordon, Robert J. 2016. *The Rise and Fall of American Growth*. Princeton: Princeton University Press.
- IMF. 2017. *Understanding the downward trend in labor income shares*. In *Chapter 3 of World Economic Outlook: Gaining Momentum?* Washington, DC: International Monetary Fund.
- Karabarbounis, Loukas, and Brent Neiman. 2013. The global decline of the labor shares. *Quarterly Journal of Economics* 129 (1): 61–103.
- Kiefer, David., and Codrina Rada. 2015. Profit maximising goes global: The race to the bottom. *Cambridge Journal of Economics* 39 (5): 1333–50.
- Kim, Chang-Jim, and Charles R. Nelson. 1999. *State-Space Models with Regime Switching: Classical and Gibbs Sampling Approaches with Applications*. Cambridge: The MIT Press.
- Kotz, David M, and Deepankar Basu. 2019. Stagnation and institutional structures. *The Review of Radical Political Economics* 51 (1): 5–30.
- Lavoie, Marc. 1996. Traverse, hysteresis, and normal rates of capacity utilization in Kaleckian models of growth and distribution. *Review of Radical Political Economics* 28 (4): 113–47.
- Li, Mengheng., and Ivan Mendieta-Muñoz. 2019. Are long-run output growth rates falling? *Metroeconomica* 71 (1): 204–34.
- Mendieta-Muñoz Ivan, Codrina Rada., and Rudiger Von Arnim. 2019. The decline of the U.S. labor share across sectors. *INET Working Paper 105*. Institute for New Economic Thinking.
- Mo, Pak Hung. 2000. Income inequality and economic growth. *Kyklos: Jahrbuch des Instituts für Geschichte der Medizin an der Universität Leipzig* 53 (3): 293–315.
- Mohun, Simon, and Roberto Veneziani. 2008. Goodwin cycles and the US economy, 1948–2004. In *Mathematical Economics and the Dynamics of Capitalism: Goodwin's Legacy Continued*, eds. Peter Flaschel, and Michael Landesmann, 157–194. Oxfordshire: Routledge.
- Montier, James., and Philip Pilkington. 2017. The deep causes of secular stagnation and the rise of populism. Boston: GMO White Paper. Accessed at: <https://www.gmo.com/americas/research-library/the-deep-causes-of-secular-stagnation-and-the-rise-of-populism/>.
- Partridge, Mark D. 2005. Does income distribution affect US state economic growth? *Journal of Regional Science* 45 (2): 363–94.
- Persson, Torsten., and Guido Tabellini. 1994. Is inequality harmful for growth? *The American Economic Review* 84 (3): 600–21.
- Piketty, Thomas., and Emmanuel Saez. 2003. Income inequality in the United States, 1913–1998. *The Quarterly Journal of Economics* 118 (1): 1–41.
- Rada, Codrina., and David Kiefer. 2016. Distribution-utilization interactions: A race-to-the-bottom among OECD countries. *Metroeconomica* 67 (2): 477–98.
- Rada, Codrina., and Lance Taylor. 2006. Empty sources of growth accounting, and empirical replacements à la Kaldor and Goodwin with some beef. *Structural Change and Economic Dynamics* 17 (4): 486–500.
- Skott, Peter. 2012. Shortcomings of the neo-Kaleckian investment function. *Metroeconomica* 63 (1): 109–38.
- Storm, Servaas., and C. W. M Naastepad. 2012. *Macroeconomics Beyond the NAIRU*. Cambridge, MA; London, England: Harvard University Press.
- Storm, Servaas. 2017. The new normal: Demand, secular stagnation, and the vanishing middle class. *International Journal of Political Economy* 46 (4): 169–210.
- Summers, Lawrence H. 2014. US economic prospects: Secular stagnation, hysteresis, and the zero lower bound. *Business Economics* 49 (2): 65–73.
- . 2018. The threat of secular stagnation has not gone away. *Financial Times*. May 16. Accessed at: <https://www.ft.com/content/aa76e2a8-4ef2-11e8-9471-a083af05aea7>
- Tavani, Daniele, Peter Flaschel, and Lance Taylor. 2011. Estimated non-linearities and multiple equilibria in a model of distributive-demand cycles. *International Review of Applied Economics* 25 (5): 519–38.
- Taylor, Lance., and Özlem Ömer. 2019. Where do profits and jobs come from? Employment and distribution in the US economy. *Review of social economy*: 1–20.

- Teulings, Coen, and Richard, Baldwin, eds. 2014. *Secular Stagnation: Facts, Causes and Cures*. London: VoxEU.org eBook, Centre for Economic Policy Research (CEPR) press.
- Woodford, Michael. 2011. Simple analytics of the government expenditure multiplier. *American Economic Journal: Macroeconomics* 3 (1): 1–35.
- Zipperer, Ben, and Peter Skott. 2011. Cyclical patterns of employment, utilization, and profitability. *Journal of Post Keynesian Economics* 34 (1): 25–58.

### Author Biographies

**David Kiefer** is one of the original baby boomers, born in Cleveland, Ohio. He studied electrical engineering at Carnegie Tech and worked on a space probe to Mars for NASA. Although he switched to social science long ago, he still brings an engineering perspective to his economics. After completing his doctorate at the University of Michigan, his first academic job was in Australia. He teaches a variety of courses ranging from introductory statistics and sports economics to advanced econometrics and the graduate theory courses. His research interests include macroeconomic policy, inequality and globalization. Recently, he has been studying the interaction of inequality and macroeconomic outcomes. Another dimension of his international focus is his visiting professorships at Chulalongkorn University in Bangkok and John Cabot University in Rome.

**Ivan Mendieta-Muñoz** is assistant professor in the Department of Economics at the University of Utah since 2016. He received his Ph.D. in Economics from the University of Kent (Canterbury, United Kingdom). His research fields are Macroeconomics, Macroeconometrics, Financial Macroeconomics and Economic Development in Latin America. His work has appeared in academic outlets such as *Competition and Change*, *Economics Bulletin*, *International Review of Applied Economics*, *Journal of Post Keynesian Economics*, *Macroeconomic Dynamics* and *Metroeconomica*.

**Codrina Rada** holds a PhD in Economics from the New School for Social Research (2007) and is Associate Professor of Economics at the University of Utah. Her current research gravitates around issues of economic growth and income distribution, with a specific interest in the effects of structural change and global economic integration on macroeconomic dynamics. Over the years she has also published theoretical and empirical work that explores the economics of pensions and aging, gender aspects of household dynamics and structural transformation in emerging economies. Her work has appeared in academic outlets such as *Agricultural Economics*, *Cambridge Journal of Economics*, *Development and Change*, Columbia University Press, *Economic Systems Research*, *Journal of Policy Modeling*, and *Metroeconomica*, among others.

**Rudiger von Arnim** holds a PhD in Economics from the New School for Social Research (2008) and is Associate Professor of Economics in the Department of Economics at the University of Utah. His research focuses on macroeconomics, specifically: (i) the linkages between growth, the business cycle and the distribution of income; (ii) economic development, with emphasis on structural heterogeneity; and (iii) the ex-ante assessment of international trade agreements. On these themes, he has worked with and consulted for G24, UNDP, UNCTAD, ILO's Institute for International Studies (IILS) as well as OEFSE (Austrian Foundation for Development Research).