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The end of laissez-faire in classical-Marxian models of growth and distribution

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The end of *laissez-faire* in classical-Marxian models of growth and distribution

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Abstract

In this paper, we study a two-class ('capitalists' and 'workers') model of growth, distribution, and employment that brings together some recent literature in the classical-Marxian tradition (Petach and Tavani, 2019; Franke, 2020; Tavani and Petach, 2021; Petach and Tavani, 2022). The central innovation of the model is the treatment of aggregate demand as a positive externality for individual firms. Despite assuming competitive firms, optimizing behavior, and perfect foresight on behalf of both firms and households, we show that *laissez-faire* involves under-utilization of the economy's productive capacity. Moreover, both the long-run labor share of income and workers' share of wealth are higher at full capacity. Thus, fiscal policies aimed at achieving full utilization are unambiguously worker-friendly. For this reason, however, capitalists may oppose fiscal policy aimed at full employment, because such policies reduce the *relative* standing of the capitalist class in terms of both wealth and income. As such, our model provides a formalization of the argument by Kalecki (1943) regarding the political aspects of full employment. We conclude by responding to some recent criticisms of the aggregate demand externality framework advanced by Gahn (2023).

JEL Codes: B12, O41, E11, E12

Keywords: Growth and Distribution, Classical Political Economy, John Maynard Keynes, The End of Laissez-Faire

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1 Introduction

On the 100th anniversary of the publication of *The End of Laissez-Faire*, the economic consequences of the Covid-19 pandemic and its aftermath have once again reaffirmed Keynes' crucial insight that "[t]he world is not so governed from above that private and social interest always coincide. It is not so managed here below that in practice they coincide" (Keynes, 1926, p. 39). To the extent that the recovery of the United States' economy following the Covid-19 recession was a success, it is due in no small part to the application of activist fiscal policy on a scale rarely seen in macroeconomic history. Figure 1 compares the performance of the United States economy during the last four major recessions (those that resulted in at least two quarters of real GDP growth less than or equal to -1%).

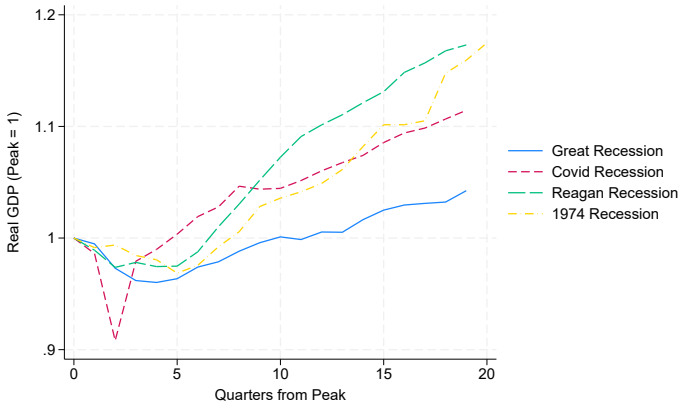
During the Covid-19 recession, real government current expenditure as a percentage of GDP doubled relative to its value at the economy's peak. As a result—despite the sharpest decline in real GDP of any recession in modern history—real disposable personal income never declined below its pre-recession level. Real GDP was restored to its pre-recession peak in only five quarters. The performance of the United States economy following the Covid-19 pandemic contrasts starkly with the anemic response to the Great Recession. During the Great Recession, real GDP remained below its pre-recession peak for two and half years, with real disposable personal income following suit nearly as long. Figure 1 suggests the culprit is to be found in the *laissez-faire* approach to demand management adopted in response to the recession. From the peak of real GDP in the second quarter of 2008, real government current expenditure (as a share of GDP) *declined*, suggesting that the initial fiscal policy response to the Great Recession was not merely weak: it was contractionary. In light of the fiscal policy failure following the Great Recession, near unanimous support for fiscal stimulus during the pandemic recession—the 2020 CARES Act passed the U.S. Senate on a 96-0 vote—recalls Frankel (2007)'s assertion that—just as there are no atheists in a foxhole—"[p]erhaps, then, there are also no libertarians in crises" (p.165)[1].

The policy response to the Covid-19 pandemic carried implications not just for economic stabilization, but also for distribution. Autor et al. (2022) provide evidence of an "unexpected compression" in the wage distribution in the post-pandemic period, wherein relative wage growth

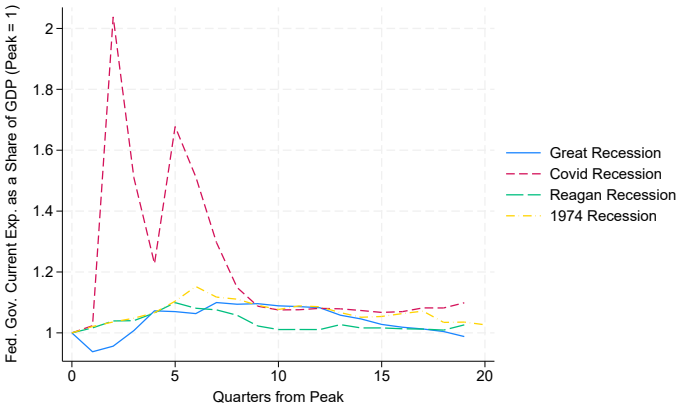
[1] Comparison of the Covid-19 recession and the Great Recession also lends support to Mathy (2024)'s recent suggestion that "jobless recoveries" are better understood as recoveries without adequate fiscal stimulus.

Figure 1: Performance of the United States Economy During Major Recessions

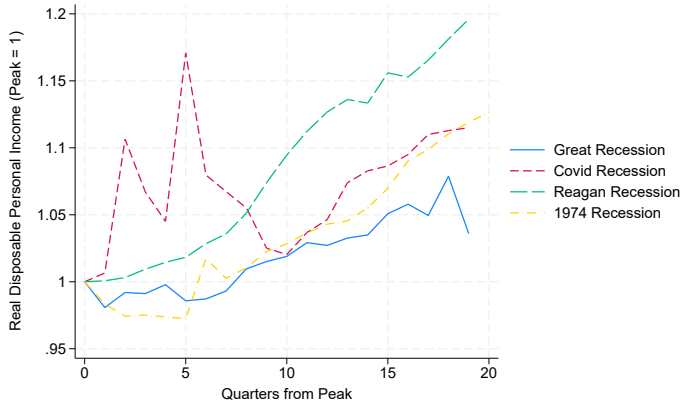
(a) Real GDP



(b) Real Government Current Expenditure (% of GDP)



(c) Real Disposable Personal Income



Notes: Data obtained from the Federal Reserve Bank of St. Louis. Figure presents trends in Real GDP (Chained 2017 $), Real Government Current Expenditure (as a share of Real GDP), and Real Disposable Personal Income (Chained 2017 $) following the Covid Recession, the Great Recession, the Reagan Recession (1981), and the 1974 Recession. Each variable is defined relative to its level during the quarter of peak Real GDP.

at the bottom of the distribution reduced the college wage premium and offset approximately one-third of the increase in wage inequality over the prior four decades. Petach (2024) shows that increased strike activity in the post-pandemic period can be linked to the increase in labor market tightness. Data on household wealth suggests a similar compression of wealth inequality in the post-pandemic period. For households between the 25th and 50th wealth percentile, median net worth increased by 40% between 2019 and 2022 and mean net worth increased by 47%. For households in the top decile of the net worth distribution, median and mean net worth grew by only 26% and 18%, respectively (Aditya et al., 2023).

The success of activist fiscal policy in steering the United States economy during the pandemic[2] poses questions for economists of classical-Marxian persuasion. Despite falling squarely within heterodox traditions, classical-Marxian models of growth and distribution share with neoclassical models the assumption of Say's law. In these models, the economy's productive capacity is assumed to be fully utilized at all times, and there is no room for fiscal policy aimed at demand management. Moreover, except in models with induced or endogenous technical change where firms react to increases in the labor share of income with productivity-enhancing innovations, the neoclassical "efficiency-equity" trade-off applies to classical-Marxian models too. Because growth depends on capital accumulation—which in turn is profit-driven—any labor-friendly redistributive measure will occur at the expense of long-run growth. Put simply: a fiscal stimulus that both increases the level of economic activity and redistributes income toward workers is not possible in the textbook Classical-Marxian model.

An influential point of view in the classical-Marxian tradition was put forward by Dumenil and Levy (1999) and reiterated by Michl (2009): it amounts to recognizing that under-utilization can occur in the short run, so that demand-management policies can be effective at restoring full employment; but the long run is supply-driven along classical-Marxian lines. Accordingly, this

[2]Critics of the pandemic fiscal stimulus may point to the increase in inflation between 2021 and 2022 as evidence of a policy failure. To this, we have two responses. First, to the extent that fiscal policy was responsible for inflation, one must weigh the cost of inflation against the benefit of avoiding a recession. To the extent that a temporary increase in inflation was the cost of avoiding a prolonged downturn of a magnitude on par with the Great Recession or Great Depression, a period of transitory inflation is a small price to pay. Second, it is likely that pandemic fiscal stimulus was not the primary driver of inflation. Between 2021 and 2022 inflation increased across the world, including in those countries where the fiscal response to the pandemic was much smaller than in the United States. The truly global nature of the recent inflation suggests that supply shocks—including pandemic-related supply-chain issues, higher energy prices stemming from the Russian invasion of Ukraine, and mark-up driven "sellers inflation" (e.g., Weber and Wasner, 2023)—were the primary driver of the 2021-2022 inflation episode.

viewpoint argues that heterodox economists should be "Keynesian in the short-run, while classical in the long-run." Recent research (Petach and Tavani, 2019; Franke, 2020; Tavani and Petach, 2021; Petach and Tavani, 2022) has provided a different viewpoint according to which aggregate demand should be considered as a positive externality for individual firms in supply-driven classical-Marxian models. An increase in aggregate demand creates incentives for firms to utilize more of their installed capacity, because it increases the profits to be made by supplying additional amounts of their goods or services to the economy. This simple observation has profound implications for the classical-Marxian framework. At long-run equilibrium—consistent with the main tenets of Keynesian economics—a state of under-utilization of productive capacity will prevail. Accordingly, *laissez-faire* results in equilibrium underproduction, and demand-management policies can be used to bring the economy to full employment. In other words, *even though the economy is supply-driven, it is not supply-constrained*.

This conclusion also has implications for the efficiency-equity trade-off mentioned above, and provides a contemporary way to revive Michal Kalecki's argument regarding the "political aspects of full employment." We will show that fiscal allocation policy aimed at full utilization will be unambiguously labor-friendly provided that, as is assumed in classical-Marxian models, the productive sector operates under competitive conditions. In fact, at full utilization, both the labor share of income and the workers' wealth share will be higher than in a *laissez-faire* equilibrium. This will inevitably generate resistance from the capitalist class to policies aimed at achieving full utilization, because it will result in a deterioration of the capitalist distributional position (Kalecki, 1943). Our simple growth and distribution model in the classical-Marxian tradition features aggregate demand as an externality and shows the implications of fiscal allocation policy for long-run growth, unemployment, and the distribution of income and wealth. The model rationalizes the success of the pandemic fiscal stimulus with respect to both stabilization *and* distribution. From a methodological standpoint, we focus on optimizing behavior both on behalf of firms and households. Whether or not this is an accurate description of real behavior is besides the point in our view: the goal is to show that under-utilization of resources arises in equilibrium despite optimizing agents—so that government intervention is needed to ensure full utilization and a more equitable distribution of both income and wealth—which is a version of Keynes' "attacking [neoclassical economists] in their citadel" (Marglin, 2021). The paper concludes by addressing and

refuting some recent criticisms of the aggregate demand externality framework advanced by Gahn (2023). All in all, our analysis points toward a "classical/post-Keynesian synthesis" where an active government role is critical in steering the economy toward full employment and maintaining an equitable distribution of income and wealth.

The rest of the paper is organized as follows. Section 2 introduces and discusses the model. Section 3 responds to recent criticisms of the approach that treats aggregate demand as an externality. Section 4 concludes.

2 The model

2.1 Production, income shares and profits

Consider a one-sector closed economy populated by a large number of identical competitive firms. Time is continuous, and we assume away the government for now. The goal is to show that, in *laissez-faire*, the productive capacity of the economy will be under-utilized. Output Y, homogeneous with aggregate capital K, is produced through a Leontief technology: $Y = \min\{UK, AL\}$ where U is the endogenous output/capital ratio, A is labor productivity and L is labor demand. Given that firms are competitive, the price of output and capital is normalized to one throughout. In a nod to Franke (2020), we assume that the output/capital ratio, which is also the amount of total revenues per unit of capital stock in the economy, depends on the firm's own utilization rate u but also the average utilization rate in the economy, denoted by $\tilde{u}$. This captures the basic notion of aggregate demand as a positive externality to the individual firm. As such, the firm will look at the average utilization but will not internalize the effect that its own choices will have on it.[3] In particular, assume that

$$U(u;\tilde{u}) = \frac{\theta}{\beta} u^{\beta} \tilde{u}^{\gamma} \tag{1}$$

where $\theta > 0$ is a shock parameter, and $0 < \gamma < 1-\beta$, which ensures a weak strategic complementarity between firms in the economy (Petach and Tavani, 2022). We also assume that $\gamma < \beta$, which ensures that the effect of aggregate utilization on the firm's own revenues is smaller than the effect of own

[3] In previous work (Petach and Tavani, 2019; Tavani and Petach, 2021; Petach and Tavani, 2022) we modeled the externality as a reduction in the user cost arising from a higher economy-wide utilization rate, while Franke (2020) has argued the externality affecting firms' revenues to be more intuitive. The two assumptions produce results that are isomorphic to one another, and have basically identical policy implications.

utilization. Our framework owes much to Nikiforos (2016), who argues that the choice of how much to utilize their installed capital stock is a crucial decision made by firms in the economy. Given that revenues are monotonically increasing in utilization u, a firm has the incentive to utilize its productive capacity to its upper limit. However, we assume—following Greenwood *et al.* (1988)—that higher utilization also increases the *user cost* of capital, that is depreciation, denoted by $\delta(u)$. We assume a linear depreciation function: $\delta(u) = u$. The firm first chooses capital and labor inputs so that $UK = AL = Y$; this implies that total labor costs are $wL = UK(w/A)$, and that the labor share $\omega \equiv wL/Y$ is equal to the unit labor cost w/A. Then, the firm chooses own utilization to maximize its profits net of the user cost of capital:

$$\text{Given} \quad \tilde{u}, \quad \max_{u} \quad \Pi \quad = \quad \frac{\theta}{\beta} u^{\beta} \tilde{u}^{\gamma} K(1-\omega) - uK \tag{2}$$

The resulting utilization choice, increasing in aggregate utilization, is:

$$u(\tilde{u}, \omega) = [\theta(1-\omega)]^{\frac{1}{1-\beta}} \, \tilde{u}^{\frac{\gamma}{1-\beta}} \tag{3}$$

It is also useful in what follows to consider the resulting firm-level output capital ratio:

$$U = \frac{1}{\beta} \theta^{\frac{1}{1-\beta}} (1-\omega)^{\frac{\beta}{1-\beta}} \tilde{u}^{\frac{\gamma}{1-\beta}} \tag{4}$$

The firm-level *profit function*, that is the value of maximized profits, is:

$$\begin{aligned} \Pi(\tilde{u}, \omega, K) &= \left\{ \left(\tfrac{1-\beta}{\beta} \right) [\theta(1-\omega)]^{\frac{1}{1-\beta}} \, \tilde{u}^{\frac{\gamma}{1-\beta}} \right\} K \\ &= [(1-\beta) U (1-\omega)] K \end{aligned} \tag{5}$$

The profit rate $r = \Pi/K$ (net of the user cost of capital) will be the uniform rate of return on wealth distributed by firms to households in the economy.

2.2 Capitalists and workers, income and wealth distribution

The economy is populated by capitalists and workers. Capitalists earn only income from profits, consume, and save; workers also save, and therefore earn income from both the wages they earn

in production and profits on the capital stock they own (Pasinetti, 1962). Thus, the aggregate capital stock K will be equal to the sum of the capital owned by the capitalists, K^c and the capital owned by the workers, K^w. In modeling the consumption and saving decisions of the two classes, we assume that both optimize intertemporally like in Petach and Tavani (2022), to show that the under-utilization of equilibrium does not arise because of myopic or rule-of-thumb behavior. Both types of households have log utility defined over consumption streams, but they differ in their rate of time preference. Capitalist households save at higher rates than worker households, and this results in a lower rate of time preference for the former: $0 < \rho^c < \rho^w$ (Mian, Straub and Sufi, 2021).

The accumulation rate of capitalist households, denoted by g^c will be (see Appendix A1 in Petach and Tavani, 2022):

$$\begin{aligned} g^c &= r - \rho^c \\ &= (1-\beta)U(1-\omega) - \rho^c \end{aligned} \tag{6}$$

where U is as per equation (4). The workers' consumption and accumulation problem is slightly more involved. First, workers earn income $y^w \equiv wL + rK^w$. Denoting the capitalist share of wealth by $\phi \equiv K^c/(K^c + K^w)$, we can express workers' total income as follows:

$$y^w = \left[\frac{\omega}{1-\phi}U + r\right]K^w$$

which, using (6), can be rewritten as

$$y^w = \frac{U}{1-\phi}\left[\omega + (1-\beta)(1-\phi)(1-\omega)\right]K^w \tag{7}$$

so that under our behavioral assumptions the workers' accumulation rate will be (see Appendix A2 in Petach and Tavani, 2022):

$$g^w = \frac{y^w}{K^w} - \rho^w \tag{8}$$

We are now ready to trace the dynamics of the distribution of wealth in this economy. Define the average accumulation rate g as the weighted average of the accumulation rates of the two classes of households, the weights being given by each class' share in total wealth: $g = \phi g^c + (1-\phi)g^w$. Then, the capitalists' share of wealth evolves through the replicator equation (Samuelson and Modigliani,

1966; Zamparelli, 2016; Ederer and Rehm, 2020):

$$\begin{aligned} \dot{\phi} &= \phi[g^c - g] \\ &= \phi\left[(1-\phi)(\rho^w - \rho^c) - \omega U\right] \end{aligned} \tag{9}$$

2.3 Equilibrium, model closure and dynamical system

An equilibrium growth path is defined by: (a) paths of consumption and capital stock such that utility is maximized given the resource constraints for both classes; (b) demands for capital and labor such that profits are maximized; (c) a rate of utilization such that profits are maximized and (d) firms' beliefs are realized, so that $u(t) = \tilde{u}(t)\ \forall t$. The latter requirement ensures that firms' beliefs are mutually consistent—firms are "best-responding" to one another, in other words—and is equivalent to the notion of Nash equilibrium. Crucially, an equilibrium does not involve full employment, despite the optimizing behavior of all agents. Nor does the equilibrium growth path involve full capacity utilization, as we will show below.

In what follows, we consider a balanced growth path where, for each class of households, consumption and capital stock grow at the same rate. The equilibrium utilization rate and income-capital ratio are, respectively:

$$u^{Eq} = [\theta(1-\omega)]^{\frac{1}{1-(\beta+\gamma)}} \tag{10}$$

$$U^{Eq} = \frac{\theta^{\frac{1}{1-(\beta+\gamma)}}(1-\omega)^{\frac{\beta+\gamma}{1-(\beta+\gamma)}}}{\beta} \tag{11}$$

Equation (11) can be then plugged into the wealth distribution dynamics (9) to obtain:

$$\dot{\phi} = \left\{(1-\phi)(\rho^w - \rho^c) - \frac{\omega}{\beta}\theta^{\frac{1}{1-(\beta+\gamma)}}(1-\omega)^{\frac{\beta+\gamma}{1-(\beta+\gamma)}}\right\}\phi \tag{12}$$

To close the model, we embed the choice of utilization and the resulting accumulation rates and evolution of the distribution of wealth into an off-the-shelf Goodwin (1967) growth-cycle model, the paradigmatic classical-Marxian framework for understanding the dynamics of a labor-constrained mature economy (Tavani, 2025). Starting with the labor share of income, its dynamics will be equal to the difference between the growth rate of real wages, $\dot{w}/w$, and the growth rate of labor

productivity, $\dot{A}/A$. With regards to the former, we adopt the typical linear wage-Phillips curve, so that $\dot{w}/w = -\xi + \lambda e$ (Goodwin, 1967), $\lambda > 0$ and e denotes the endogenous and time-varying employment rate. As for labor productivity, let us assume that it grows exogenously: $\dot{A}/A = \alpha > 0$. Thus,

$$\dot{\omega} = [-\xi + \lambda e - \alpha]\,\omega \tag{13}$$

To trace the evolution of the employment rate, we start with its definition: $e = UK/AN$, where N denotes the labor force. Differentiating, we find that:

$$\begin{aligned} \dot{e} &= \left[\frac{\dot{U}}{U} + \frac{\dot{K}}{K} - \left(\frac{\dot{A}}{A} + \frac{\dot{N}}{N}\right)\right] e \\ &= \left[-\left(\frac{\beta+\gamma}{1-(\beta+\gamma)}\right)\left(\frac{\omega}{1-\omega}\right)\frac{\dot{\omega}}{\omega} + g - (\alpha + n)\right] e \end{aligned} \tag{14}$$

where the first term is obtained differentiating equation (10), g is the average accumulation rate defined above and n is the exogenous growth rate of the labor force.

Equations (12), (13), and (14) form a three-dimensional dynamical system in the capitalist share of wealth, the labor income share, and the employment rate. In what follows, we focus on the steady state and the policy implications of this model. For a complete dynamic characterization through numerical simulations and the formal stability analysis of a closely-related model, see Petach and Tavani (2022).

2.4 Steady state

A steady state is a triple $\{\phi_{ss} \in (0,1), \omega_{ss} \in (0,1), e_{ss} \in (0,1)\}$ such that $\dot{e} = \dot{\omega} = \dot{\phi} = 0$.[4] Starting with equation (14), we have the typical Harrodian result requiring that the accumulation rate g be equal to the natural growth rate $\alpha + n$, which ensures the long-run constancy of the employment rate: this equation will pin down the long-run labor share of income, ω_{ss}. Next, using (9), we see the Pasinetti theorem at work: the distribution of wealth will adjust to achieve a long-run value ϕ_{ss} so that the economy-wide accumulation rate is equal to the capitalists's accumulation rate: $g^c = g$. Finally, equation (13) pins down the long-run employment rate e_{ss}. Putting everything together,

[4] Even though the Samuelson-Modigliani "dual" steady state with no pure capitalists ($\phi_{ss} = 0$) is a possibility, it won't arise under our assumption that $\rho^c < \rho^w$. For this reason, we restrict our analysis to the Pasinetti, two-class steady state.

we find:

$$\omega_{ss} = 1 - \frac{1}{\theta}\left[\frac{\beta(\rho^c + \alpha + n)}{1-\beta}\right]^{1-(\beta+\gamma)} \tag{15}$$

$$1 - \phi_{ss} = \frac{\omega_{ss}\theta^{\frac{1}{1-(\beta+\gamma)}}(1-\omega_{ss})^{\frac{\beta+\gamma}{1-(\beta+\gamma)}}}{\beta(\rho^w - \rho^c)} \tag{16}$$

$$e_{ss} = \frac{\alpha + \xi}{\lambda} \tag{17}$$

Note that, while the labor share and the employment rate can be immediately solved in terms of parameters only, the steady state distribution of wealth is written in terms of the *worker's share of wealth* $1 - \phi_{ss}$ so as to highlight its long-run relationship with the labor income share. Such relationship is non-linear and hill-shaped, as shown by Petach and Tavani (2022). Inserting equation (15) into (16), we find, after repeated rearrangements and substitutions, the long-run distribution of wealth in terms of parameters only:

$$1 - \phi_{ss} = \frac{[\beta(\rho^c + \alpha + n)]^{\beta+\gamma}}{\beta(1-\beta)(\rho^w - \rho^c)}\left\{\theta(1-\beta)^{1-(\beta+\gamma)} - [\beta(\rho^c + \alpha + n)]^{1-(\beta+\gamma)}\right\} \tag{18}$$

The Pasinetti theorem implies that the long-run labor income share (15) is independent of workers' saving behavior. Conversely, and intuitively, a lower rate of time preference ρ^w in equation (18) increases workers' savings and therefore will lead to a higher workers' share in total wealth.

2.5 "Full" utilization

In this model, "full" utilization would be achieved if firms internalized the effect of their own choice of utilization on the average utilization rate in the economy. The corresponding *socially-coordinated* solution (Foley, 2016) would amount to impose $u = \tilde{u}$ from the outset in the firm problem and solve:

$$\max_u \quad \Pi = \left[\frac{\theta}{\beta}(1-\omega)u^{\beta+\gamma} - u\right]K \tag{19}$$

yielding

$$u^* = \left(\frac{\beta+\gamma}{\beta}\right)^{\frac{1}{1-(\beta+\gamma)}}[\theta(1-\omega)]^{\frac{1}{1-(\beta+\gamma)}} \tag{20}$$

which is strictly greater than equilibrium utilization so long as there is an externality, that is so long as $\gamma > 0$. The corresponding full-utilization income-capital ratio is:

$$U^* = \left(\frac{\beta+\gamma}{\beta}\right)^{\frac{\beta+\gamma}{1-(\beta+\gamma)}} \left[\frac{\theta^{\frac{1}{1-(\beta+\gamma)}}\left[(1-\omega)\right]^{\frac{\beta+\gamma}{1-(\beta+\gamma)}}}{\beta}\right] \tag{21}$$

and is greater than U^{Eq} for any value of the labor share. Using U^* from (21), we can solve for the long-run labor income share at full utilization in terms of parameters only:

$$\omega^*_{ss} = 1 - \frac{1}{\theta}\left(\frac{\beta}{\beta+\gamma}\right)^{\beta+\gamma}\left[\frac{\beta(\rho^c+\alpha+n)}{1-\beta}\right]^{1-(\beta+\gamma)} \tag{22}$$

which is always higher than the long-run (steady state) labor share at equilibrium utilization.[5] In order to solve for the distribution of wealth at full utilization, consider that its dynamics is given by equation (9), but with "starred" values for the labor share and income-capital ratio. Thus, in steady state, we can use U^* from (21) and ω^* from (22) to obtain, after quite a bit of algebra, an expression that is immediately comparable with (18):

$$1-\phi^*_{ss} = \left(\frac{\beta+\gamma}{\beta}\right)^{\beta+\gamma}\frac{\left[\beta(\rho^c+\alpha+n)\right]^{\beta+\gamma}}{\beta(1-\beta)(\rho^w-\rho^c)}\left\{\theta(1-\beta)^{1-(\beta+\gamma)} - \left[\beta(\rho^c+\alpha+n)\right]^{1-(\beta+\gamma)}\right\} \tag{23}$$

so that

$$\frac{1-\phi^*_{ss}}{1-\phi_{ss}} = \left(\frac{\beta+\gamma}{\beta}\right)^{\beta+\gamma} > 1$$

or, in other words, the steady state workers' wealth share is higher at full utilization than in equilibrium. We thus have established that, when aggregate utilization acts as a positive externality on individual firms' utilization choices, the corresponding *laissez-faire* equilibrium will feature under-utilization of an economy's productive capacity. This will result in both the income and wealth distribution tilted in favor of profit-earning households. Conversely, full utilization would also be more egalitarian in the sense that both the labor share of income and the workers' share of wealth would be higher than in *laissez-faire*. To put it differently: a) the economy is not supply-

[5] To see why, rewrite (15) and (22) in terms of profit shares, that is $1-\omega_{ss}$ and $1-\omega^*_{ss}$, and divide side by side. We have that $\frac{1-\omega^*}{1-\omega} = \left(\frac{\beta}{\beta+\gamma}\right)^{\beta+\gamma} < 1$, with the interpretation that the profit (labor) share at full utilization is lower (higher) than in equilibrium.

constrained; b) in fact, a version of "Say's law in reverse"—demand creates its own supply—holds (Cornwall, 1972; Summers, 2017), in the sense that aggregate production can adjust in order to accommodate a policy-induced higher rate of utilization, as shown below; and c) contrary to the standard classical-Marxian model, there is no tradeoff between efficiency—higher utilization—and equity.[6]

2.6 Policy and the "political aspects of full utilization"

Given that capacity will be under-utilized in *laissez-faire* there is space for government intervention through taxes and subsidies to achieve full utilization. Let us introduce a government authority that taxes the firm's capital proportionally at a rate τ while subsidizing revenues UK at a rate σ. Let us also assume that the government runs a balanced budget, so that $\sigma U = \tau K$. The firm problem becomes

$$\text{Given} \quad \tilde{u}, \quad \max_{u} \quad \Pi \quad = \quad [U(u;\tilde{u})(1-\omega)(1+\sigma) - \delta(u)K - \tau]K \tag{24}$$

The choice of utilization satisfies:

$$u(\sigma) = [\theta(1-\omega)(1+\sigma)]^{\frac{1}{1-\beta}} \, \tilde{u}^{\frac{\gamma}{1-\beta}} \tag{25}$$

Which, imposing equilibrium ($u = \tilde{u}$), reduces to:

$$u^{Eq}(\sigma) = [\theta(1-\omega)(1+\sigma)]^{\frac{1}{1-(\beta+\gamma)}} \tag{26}$$

A comparison with equation (20) will reveal that the subsidy that achieves full utilization solves $1+\sigma = (\beta+\gamma)/\beta$, yielding

$$\sigma = \frac{\gamma}{\beta} \tag{27}$$

which is nothing but the ratio between the extent of the externality γ and the elasticity of the firm's output to own utilization, β. It can also be shown (see Tavani and Petach, 2021) that the fiscal

[6] As steady-state employment is tied up to labor productivity, which is exogenous by assumption, the model delivers no employment effects of full utilization (see equation 17). However, and as mentioned below, if labor productivity growth is endogenous to utilization, then long-run employment will also be higher at full utilization than in equilibrium.

multiplier at balanced budget is equal to $(1-\beta)/(1-\beta-\gamma)$, which is larger than one under our assumptions.[7]

A final question to address is the following. We have shown that *laissez-faire* is characterized by under-utilization of the economy's productive capacity, and that achieving full utilization does not suffer of the usual efficiency-equity tradeoff, since full utilization is more egalitarian both in terms of the distribution of income and the distribution of wealth between the two classes. Why then should one expect that such "inefficient" situation would persist? Our answer, building on Kalecki (1943), is that firms (capitalists) will lose relative to labor, and this will make them resist policies aimed at achieving full utilization. At full utilization, capitalists are not worse off in absolute terms than in *laissez-faire*. To see this, consider a balanced growth path and assume an initial capital stock $K(0)$. At both equilibrium and full utilization, long-run capitalist profits will be equal to:

$$\Pi^{Eq}(t) = rK(t) = (\rho^c + \alpha + n)K(0)\exp\{(\alpha+n)t\} = \Pi^*(t) \tag{28}$$

However, we have shown that capitalist households are worse off in *relative* terms at full utilization, given that both their income and wealth shares will be lower than in equilibrium. In other words, workers will capture the entire gains from achieving full utilization in our model. This, in our view, provides a strong motive for capitalists to resist policies aimed at achieving full utilization, because "the social position of the boss would be undermined" and "'discipline in the factories' and 'political stability' are more appreciated than profits by business leaders" (Kalecki, 1943, p.3).[8]

3 Aggregate demand externalities: Response to critics

In a recent paper, Gahn (2023) advanced several criticisms of the aggregate demand externality framework outlined above. This section is dedicated to showing that none of these criticisms survives scrutiny. We begin with Gahn's critique of our use of a representative firm. He claims that the representative firm setup precludes the existence of an externality, since identical firms should

[7] In Petach and Tavani (2019) we estimated several versions of equation (3) using US data and taking into account various endogeneity issues: the multiplier corresponding to our parameter estimates for β and γ is around 2.

[8] In Petach and Tavani (2022) we showed that, if labor productivity growth is endogenous to utilization, then long-run profits will be not just the same, but actually *higher* in this case than under *laissez-faire*. Such finding provides a formal representation of Kalecki's insight that "profits would be higher under a regime of full employment than they are on average under *laissez-faire* (ibid)" and yet firms will forego such higher profits to safeguard their distributional position.

internalize their collective influence on aggregate outcomes. This misinterprets our modeling approach. The use of a representative firm is not intended to reflect actual firm heterogeneity; rather, it provides a conservative baseline that biases results in favor of laissez-faire. By showing that under-utilization arises even in this stylized setting, we strengthen the case for aggregate demand externalities. Moreover, the assumption of identical agents acting independently is standard in game theory and macroeconomics, where strategic interdependence gives rise to external effects. Models such as the Prisoner's Dilemma or the Assurance Game similarly feature identical players whose independent actions result in suboptimal outcomes (Bowles, 2003). For further applications in macroeconomics, see Romer (1986); Lucas (1988); Cooper and John (1988).

Next, Gahn (2023) questions the fact that our results depend on the *assumption* (his emphasis) that there are in fact externalities to firms arising from aggregate demand. The objection that results depend on assumptions is hardly controversial, because it applies to *any* model. Let us offer just two examples. First, the prescriptions of the neo-Kaleckian model depend crucially on the assumptions made about the shape of the investment function—for example, if investment demand depends solely on the profit *rate*, utilization will be unambiguously wage-led while, if investment is assumed to depend directly on the profit *share*, then the possibility arises of profit-led demand (Bhaduri and Marglin, 1990; Foley et al., 2019). Second, the Sraffian supermultiplier by Serrano and Freitas (2017) model assumes an exogenous distribution, a "fully adjusted position" regarding capacity utilization, and actual prices being equal to prices of production or normal prices. The assumption of an exogenous distribution implies that the economy is never labor-constrained, and is responsible for the ultimate dependence of the long-run growth rate on autonomous demand. To discredit a model's assumptions, one must show they are either internally inconsistent or empirically invalid. Gahn does neither. His suggestion that our framework is logically flawed is addressed above, and we revisit the empirical evidence below.[9]

A third criticism concerns our suggestion that introducing an independent investment function would reinforce, rather than contradict, our model's welfare results. Gahn argues that such an addition is incompatible with profit-led utilization, unless the Keynesian Stability Condition (KSC), which requires savings to be more responsive than investment to changes in utilization, is violated.

[9] Gahn also questions the intuition behind introducing the utilization externality in the user cost function as done in Petach and Tavani (2019). We showed in this paper that if the externality affects the firm's revenues, the results are basically identical.

However, this critique fails on two grounds. First, the investment function Gahn himself introduces also contradicts profit-led demand unless the KSC is violated, which undermines his own position: we show this formally in Appendix A. Second, even if his argument held, it misses our central point: including an investment function would likely amplify the gap between laissez-faire and full (i.e. socially efficient) utilization. If demand is profit-led and policy can still increase both utilization and the labor share, then this result would hold even more strongly under wage-led demand. Thus, Gahn's criticism misrepresents both the logic and the implications of our argument.

Finally, Gahn (2023) criticizes our empirical findings in Petach and Tavani (2019), which provide evidence of the existence of aggregate demand externalities using state-by-industry data for the United States from the Bureau of Economic Analysis (BEA). A central piece of the econometric identification strategy we adopted is the separation of tradable vs. non-tradable industries. Gahn (2023) expresses skepticism of our results on the basis of the assertion that "it is very difficult to separate tradable industries from non-tradable ones. (p. 284)" A large empirical literature in urban and regional economics (Moretti, 2010; Mian and Sufi, 2014; Lynch and Manduca, 2024) suggests that Gahn is simply mistaken. While one may contend that the two-digit NAICS industry categories we used are overly broad (something we acknowledged in our contribution), it is not an impossible task to delineate between tradable and non-tradable industries. Note also the irony that follows: as part of his argument Gahn (2023) also states that "[I]t is likely that when a sector booms, it will boom in all regions of the country at the same time" (p.284), which—far from refuting the current framework—seems to be an assertion of the existence of aggregate demand externalities. Beyond his criticism of the data construction, Gahn (2023) also claims that our empirical results are better explained by an alternative set of theoretical conjectures. However, Gahn (2023) offers no empirical evidence in support of his claim (merely discussing how the data might fit his theory), such that his argument remains just that: a conjecture.

In sum, Gahn's objections fail to undermine the aggregate demand externality framework. The theoretical concerns rest on misinterpretations or assumptions that are common to other accepted models. The empirical critiques ignore well-established literature and offer no data-driven rebuttal. We reaffirm that under-utilization can emerge endogenously even under optimizing behavior, and that fiscal policy has the potential to improve both macroeconomic efficiency and distributional equity.

4 Conclusion

This paper challenges a key limitation of the contemporary classical-Marxian tradition—its reliance on Say's Law and the assumption of full capacity utilization. These features of the framework are responsible for its policy conclusions, which, similarly to neoclassical economics, involve efficiency-equity trade-offs (Tavani, 2025). Blending together some recent literature (Petach and Tavani, 2019; Franke, 2020; Tavani and Petach, 2021; Petach and Tavani, 2022) we presented a model of a labor-constrained mature economy where aggregate demand features as a positive externality for individual firms, and we showed that this way of modeling growth and distribution has some important implications for classical-Marxian economics. First, despite forward-looking optimization and perfect foresight, a *laissez-faire* equilibrium growth path is characterized by under-utilization of the economy's productive capacity. Second, even though the economy is modeled from the supply side, it is not supply-constrained, and a version of "Say's law in reverse" (Cornwall, 1972; Summers, 2017) holds: expansionary demand policy can be accommodated by a corresponding expansion in supply. Third, there is no efficiency-equity tradeoff: fiscal policy aimed at achieving full capacity will be unambiguously labor-friendly, in that both the long-run labor share of income and workers' share of wealth will be higher than in *laissez-faire*. Fourth, and related, our model provides a formal counterpart to a crucial insight by Kalecki (1943): despite the fact that firms (capitalists) would not lose in absolute terms (aggregate profits) from policies implementing full capacity, they will lose in *relative* terms (both their shares of income and wealth will decrease), and this will induce them to resist such expansionary policies.

We have argued that this model helps in rationalizing the success of the fiscal response to the Covid cirsis with respect both to restoring the economy's pre-pandemic growth path and to reducing inequality. Moreover, our argument about the need of fiscal intervention pertains to *allocation* policy, and not just stabilization. As such, it is about the need for active fiscal policy *in the long run*, thus countering the prescription by Dumenil and Levy (1999) according to which Keynesian demand management should remain confined to short-run fluctuations.

Finally, we responded to the criticisms of the aggregate demand externality framework offered by Gahn (2023). We find his arguments unconvincing, both theoretically and empirically. Theoretically, he argues that the inclusion of an independent investment function in our model leads

to wage-led demand, contrary to our own implications, and therefore invalidates our framework. However, we showed that Gahn's *own investment function* is incompatible with profit-led demand. Moreover, we showed that, by failing to address the distinction between equilibrium utilization and full utilization, Gahn (2023)'s criticism of our theoretical model misses the core point entirely. Gahn (2023)'s criticism of our empirical results falls equally short, insofar as he overstates the difficulties with delineating between tradable and non-tradable industries and provides no empirical counter-evidence in support of his own position.

These disputes aside, our hope is that the baseline framework presented in this paper will be useful to economists of the classical-Marxian persuasion, and will lead them to question their reliance on full utilization and *laissez-faire*—as well as their damning implications for activist fiscal policy—as an accurate description of growth and distribution in the long run. In fact, our analysis points toward a "classical/post-Keynesian synthesis" where an active fiscal authority is necessary to steer economies toward both full capacity utilization and a more equitable distribution of income and wealth.

A Investment functions and demand regimes

Gahn (2023) uses the following linear investment function where investment responds to deviations of utilization u from a normal rate u_n:

$$\frac{I}{K} = \alpha + \gamma_u(u - u_n) \tag{29}$$

He then assumes that savings are a constant fraction of profits: with $\pi \equiv 1 - \omega$ denoting the profit share, the saving function is:

$$\frac{S}{K} = s_\pi u \pi \tag{30}$$

Imposing equality between savings and investment gives

$$u = \frac{\alpha - \gamma_u u_n}{s_\pi \pi - \gamma_u} \tag{31}$$

We can now show that the utilization rate that ensures a goods market equilibrium can only

be wage-led. As Gahn notes, the so-called *Keynesian stability condition* (KSC) requires savings to be more responsive than investment to changes in the utilization rate ($s_\pi \pi > \gamma_u$), so that the denominator is positive if the condition is satisfied. For a positive utilization rate, then, the numerator must also be positive: $\alpha > \gamma_u u_n$. But if this is the case,

$$\frac{\partial u}{\partial \pi} = -\frac{s_\pi(\alpha - \gamma_u u_n)}{(s_\pi \pi - \gamma_u)^2} < 0 \text{ always}$$

so that utilization is *always wage-led by assumption*. Thus, Gahn's conclusion that profit-led regimes are inconsistent with the KSC is a consequence of his assumption, not a property of our framework.[10]

Let us now show that the equilibrium utilization rate in Petach and Tavani (2019) can very well be profit-led with a more general independent investment function. We proceed in two steps. First, we adopt a general investment function à la Bhaduri and Marglin (1990) and show that it can generate profit-led demand when the KSC is satisfied. Then, we show—following Gahn (2023)'s logic—that the profit-led choice of utilization in Petach and Tavani (2019) survives the introduction of an independent investment function of this kind. Consider the investment function

$$\frac{I}{K} = \alpha + \gamma_u(u - u_n) + \gamma_\pi \pi, \;\; \gamma_\pi > 0 \tag{32}$$

which, given equation (30), results in the equilibrium rate of utilization:

$$u = \frac{\gamma_\pi \pi + \alpha - \gamma_u u_n}{s_\pi \pi - \gamma_u} \tag{33}$$

As before, the KSC requires the denominator to be positive. Therefore, the numerator must be positive as well. If it was positive in equation (31), it will be positive here too, given that we are adding a strictly positive term. Differentiating and simplifying, we see that

$$\frac{\partial u}{\partial \pi} = \frac{\gamma_\pi - s_\pi u}{s_\pi \pi - \gamma_u}$$

which, given the positive denominator, will be positive if $\gamma_\pi > s_\pi u$—that is, if investment is more

[10] Note also the irony in light of Gahn's criticism that our conclusions depend on our assumptions noted in Section 3.

responsive than savings to changes in the profit share. If this is the case, utilization will be profit-led while the KSC is also satisfied.

We are now ready to show that the profit-led utilization results in Petach and Tavani (2019) are compatible with the above-defined independent investment function when the KSC is satisfied. In that contribution, we assume $\theta = 1$ and the externality affecting the user cost function and not the firm's revenues. The firm's problem is

$$\max_{u} \quad \Pi \quad = \quad \left\{ u\pi - \beta u^{\frac{1}{\beta}} \tilde{u}^{-\frac{\gamma}{\beta}} \right\} K \tag{34}$$

so that the desired utilization rate is:

$$u_n = \pi^{\frac{\beta}{1-\beta}} \tilde{u}^{\frac{\gamma}{1-\beta}} \tag{35}$$

The IS equilibrium solves:

$$\alpha + \gamma_u (u - u_n) + \gamma_\pi \pi = s_\pi \pi u \tag{36}$$

Imposing the equilibrium condition $u = \tilde{u}$, we can rewrite what above as the implicit function

$$\alpha + \gamma_u u - \gamma_u \pi^{\frac{\beta}{1-\beta}} u^{\frac{\gamma}{1-\beta}} + \gamma_\pi \pi - s_\pi \pi u = 0 \tag{37}$$

so that, differentiating with respect to u and π as Gahn does, we find:

$$\left(\gamma_u - \frac{\gamma}{1-\beta} \gamma_u \pi^{\frac{\beta}{1-\beta}} u^{\frac{\gamma+\beta-1}{1-\beta}} - s_\pi \pi \right) d_u - \left(s_\pi u - \gamma_\pi + \gamma_u \frac{\beta}{1-\beta} \pi^{\frac{2\beta-1}{1-\beta}} u^{\frac{\gamma}{1-\beta}} \right) d\pi = 0$$

Then, we can write:

$$\frac{du}{d\pi} = \frac{\gamma_\pi - s_\pi u - \gamma_u \frac{\beta}{1-\beta} \pi^{\frac{2\beta-1}{1-\beta}} u^{\frac{\gamma}{1-\beta}}}{s_\pi \pi - \gamma_u + \frac{\gamma}{1-\beta} \gamma_u \pi^{\frac{\beta}{1-\beta}} u^{\frac{\gamma+\beta-1}{1-\beta}}} \tag{38}$$

A positive denominator is required for the KSC to hold. Then, utilization will be profit-led if the numerator of the fraction is also positive, that is if

$$\gamma_\pi - s_\pi u - \gamma_u \frac{\beta}{1-\beta} \pi^{\frac{2\beta-1}{1-\beta}} u^{\frac{\gamma}{1-\beta}} > 0$$

which concludes the argument.

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