Cyclical patterns of employment, wage inequality and the functional distribution of income

Peter Skott and Adam Aboobaker

May 2025

POST-KEYNESIAN ECONOMICS SOCIETY

Cyclical patterns of employment, wage inequality and the functional distribution of income

Peter Skott*and Adam Aboobaker†

April 21, 2025

Abstract

Like the functional distribution of income, wage inequality is subject to fairly regular cyclical fluctuations. In this paper, we (i) analyze sources of these fluctuations, (ii) present models of endogenous cycles that include heterogeneous labor and wage inequality, (iii) show that these models generate patterns of both wage inequality and the functional income distribution that are in line with the evidence, and (iv) caution against any extrapolation of cyclical patterns to long-term trends and beliefs in expansionary aggregate demand policy as the key instrument to promote greater economic equality.

Key words: Wage inequality, Goodwin cycles, functional distribution, aggregate demand policy

JEL codes: E32, D31, D33

---

*Aalborg University Business School, Aalborg University; (emeritus) Economics Department, University of Massachusetts Amherst. Email: pskott@econs.umass.edu

†Global Development Institute, University of Manchester; Southern Centre for Inequality Studies, University of the Witwatersrand; World Inequality Lab, Paris School of Economics. Email: adam.aboobaker@manchester.ac.uk.

1 Introduction

The distribution of income in the US has undergone significant medium- and long-term change. The 'great compression' in the 1940s was followed by a period of continued, more gradual reductions in inequality. This period came to an end in the 1970s, when neoliberal policies marked the onset of the 'great divergence' with decreasing wage shares and exploding income inequality (see figures 1-2).

In addition to the longer term trends, income distribution also shows short-term cyclical patterns. The US evidence points to fluctuations in the functional distribution of income that follow a 'Goodwin pattern', with the profit share leading both the employment rate and the utilization rate of capital over the cycle. A theoretical literature has offered an explanation of these regularities: the dynamics of the wage share are seen as being determined either by the employment rate, as an indicator of the degree of labour market tightness and workers' power, or by the utilization rate of capital and the degree of goods market tightness; the wage share, in turn, influences the growth rate of output and the changes in employment and utilization rates (e.g. Goodwin 1967, Skott 1989, Chiarella and Flaschel 2000, Barbosa-Filho and Taylor 2006, Fazzari et al. 2013, von Arnim and Barrales 2015).

Figure 3 illustrates the clockwise Goodwin patterns of unemployment and the wage share in the US, 1948-2023: high wage shares are associated with increasing unemployment, while high unemployment rates correlate with a declining wage share. Not surprisingly, the patterns are less regular in other countries. Most economies are much more open than the US, and small open economies can be greatly influenced by external shocks (Aboobaker 2022). Thus, one would expect less regularity in the patterns visible from bivariate figures showing domestic variables in very open economies.[1]

Income inequality and the functional distribution do not tell the full story of economic inequality. Other indicators of inequality also exhibit regular fluctuations. Figure 4 shows a negative association between the employment rate and wage inequality by education, as measured by the relative median wage of college-educated to non-college-educated workers (those with a BA or more versus those with less than a BA). Figure 5 shows the 90/10 percentile relative wage; this indicator also shows a negative correlation with employment but with more episodes when the labor market weakened alongside a reduction in wage inequality.

The incidence of unemployment differs across groups. The unemployment rate for workers with a college degree tends to be lower than that of those without such a qualification, and black workers experience more unemployment than white workers. These differences affect the average income of group members. High unemployment rates for particular groups reduce the average income of workers in these groups, even if the average relative wage of employed group

---

[1] Large public sectors or the presence of other significant non-capitalist sectors can also introduce noise into the patterns predicted by models of a pure capotalist economy. The evidence on Goodwin patterns is discussed in greater detail in Zipperer and Skott (2011) and Barrales-Ruiz et al. (2021).
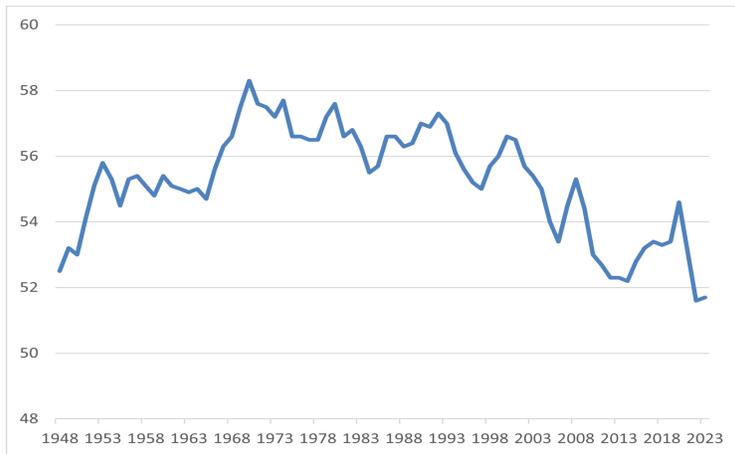
Figure 1: Wage share in the US. Source: BEA, Wage and salary accruals (A4102E) + Supplements to wages and salaries (A038RE).
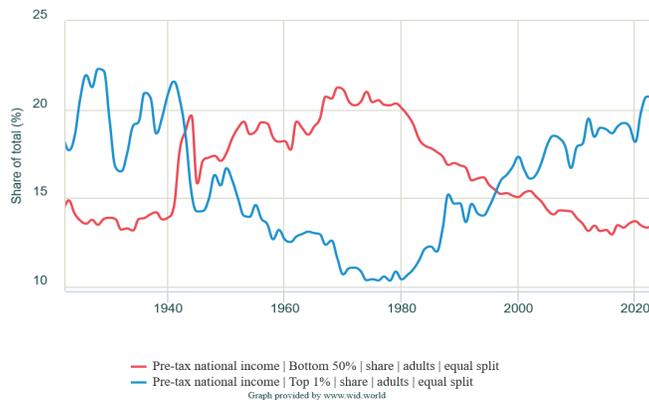

Figure 2: Income inequality, USA, 1923-2023. Source: www.wid.world.
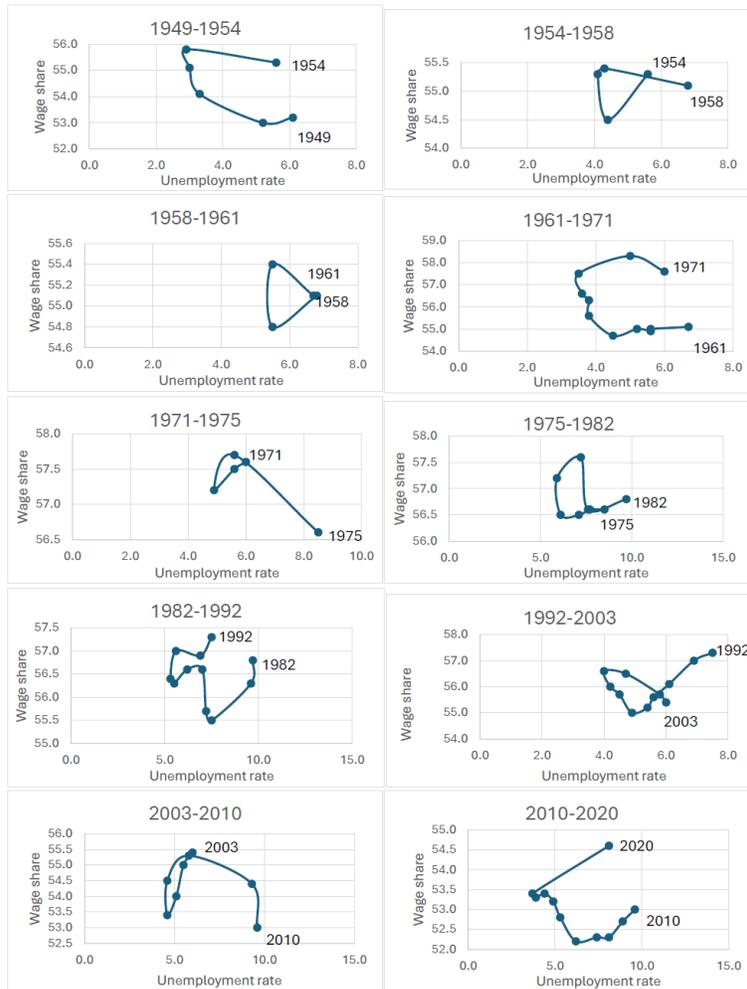
Figure 3: Goodwin patterns: clockwise movements in unemployment - wage share; US, 1949-2020.
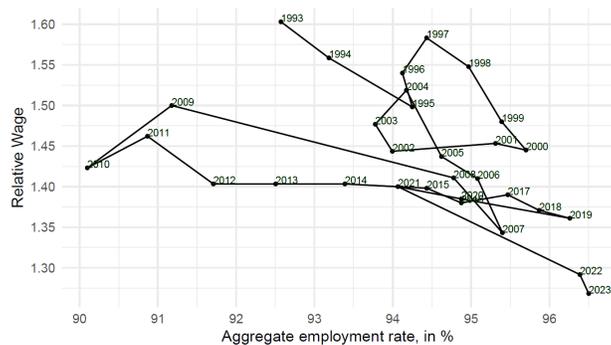
Figure 4: Patterns of aggregate employment and relative wages. Note: Aggregate employment rate is calculated from the CPS. Relative wage is the ratio of the median weekly wage of workers with a BA or more to those with less than a BA.
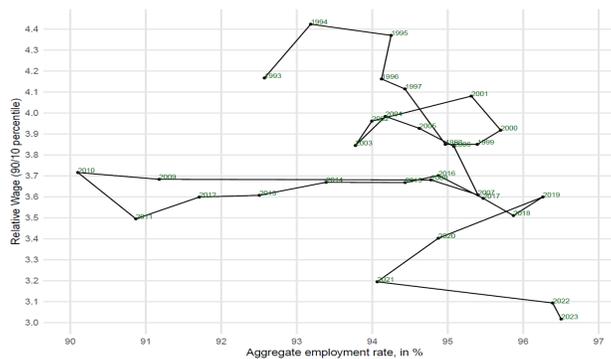

Figure 5: Patterns of aggregate employment and the 90-10 wage ratio. Note: Aggregate employment rate is constructed from the CPS. Relative wage is the ratio of the 90th to 10th percentile weekly wage of full-time workers of working age. Samples are restricted to those working full time and of working age. Self-employed individuals are excluded.
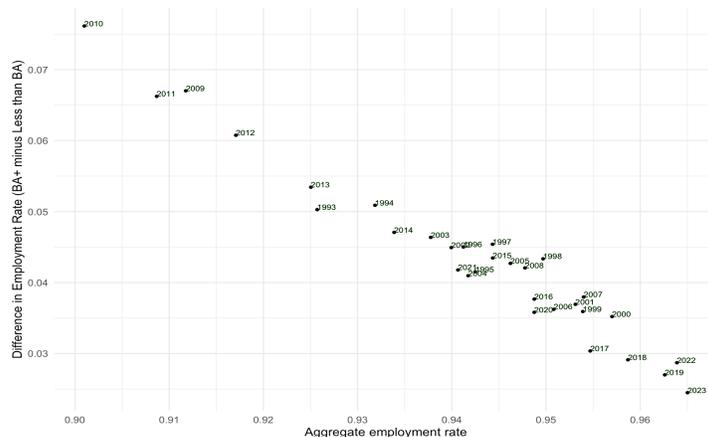
Figure 6: Pattern of aggregate and relative employment. Note: Difference in employment rates is the BA+ minus less than BA employment rates. All measures calculated with annual CPS data.

members remains unchanged. These relative income effects are reinforced by adverse direct welfare effects of being unemployed (Oswald 1997). Aside from persistent differences, relative employment rates exhibit cyclical fluctuations. As illustrated in figure 6, there is a pronounced negative correlation between the aggregate employment rate and the difference between the rates for workers with a college degree and those without.

Our focus in this paper is on the sources of cyclical fluctuations in wage and employment inequality between workers with and without a college degree and, second, on the integration of these fluctuations into models of endogenous business cycles. We present models of endogenous cycles that include heterogeneous labor and wage inequality and show that they generate patterns of both wage inequality and the functional income distribution that are in line with the evidence: the employment rate and the wage share follow the Goodwin pattern, and wage inequality increases in recessions and falls in periods of expansion and tight labor markets.

In section 2 we outline and discuss possible mechanisms behind the patterns of wage inequality. One mechanism has been emphasized by a recent literature: low- and high-wage workers may be affected differentially by cyclical variations in the degree of labor market monopsony (section 2.1). Other sources derive from differential rates of labor hoarding (section 2.2), cyclical movements in the mismatch between workers' skills and job requirements (section 2.3), and the effects of asymmetric information and contested exchange (section 2.4). The implications for wage inequality in a simple static model are analyzed in section 2.5. Section 3 turns to the analysis of endogenous cycles. We briefly outline a baseline model with homogenous labor, followed by two versions that incor-

5

porate heterogenous labor. The first of these adds labor heterogeneity to the baseline model. The second extends the baseline model with heterogeneous labor to include empirically calibrated, systematic economic policy and other complications. A concluding section summarizes the main results and offers some tentative remarks on their implications and limitations.

2 Wage and employment inequality

2.1 Monopsony effects

Wage dispersion is consistent with a search and matching model that includes on-the-job search, even if firms are identical and produce the same homogeneous output, and all workers are identical (Burdett and Mortensen 1998). Intuitively, unemployed workers will be willing to accept low-wage job offers when doing so does not impede their ability to keep searching for better options. For firms, meanwhile, having few workers and high profit margins (low wages) may generate the same amount of profits as having many workers and low margins (high wages). The positive link between a firm's wage and employment emerges from frictions in the labor market. All workers, both employed and unemployed, engage in job search, with employed workers quitting their current jobs if they get a better offer. The share of job offers representing an improvement will be higher for low wage workers, while few employed workers will accept new low-wage job offers. Low-wage firms therefore experience higher separation rates and lower hiring rates, and the equilibrium outcome will be characterized by a positive correlation between firms' wage offers and employment.[2]

The search and matching framework predicts a reduced-form relation between wage inequality and the tightness of the labor market as measured by the ratio of vacancies to unemployment. But both inequality and tightness are endogenous: the parameters of any particular version of the model determine a natural rate of unemployment and an associated long-run equilibrium value of the ratio of vacancies to unemployment. The framework has been adapted, however, to address the effects of fluctuations in tightness, with the 'cyclical job ladder' describing movements in wage inequality as the tightness of labor markets fluctuates over the cycle (Moscarini and Postel-Vinay 2018).

Treating shocks to the levels of vacancies and unemployment as exogenous (the results of shocks to aggregate demand or the size of the labor force), an increase in the tightness of the labor market (a rise in vacancies or a decline in the labor force) increases the flow of job offers to currently employed workers, thereby raising the elasticity of separations with respect to wages and the

---

[2] Burdett and Mortensen consider an extension of the model that retains the assumption of identical workers but introduces two types of firms, one type having a higher labor productivity than the other. This extended model still generates a non-degenerate wage distribution. There will be wage dispersion among both low and high productivity firms, with all high productivity firms offering wages above the range offered by low productivity firms. Like the extended model, in a recent paper examining trends in wage inequality in the US, Autor et al. (2024) assume the co-existence of low- and high-productivity firms.

elasticity of the equilibrium labor supply at the firm level. For reasons that are analogous to those behind the link between employment and wages in the Burdett-Mortensen model, this effect is stronger for firms paying low wages: a larger proportion of the job offers represent an improvement for workers that currently have low-wage jobs. Thus, a tightening of the labor market leads to a compression of the distribution of wages; wages at the low end rise more than wages at the high end.[3]

The cyclical-job-ladder builds on an accounting framework that describes how the dynamics of employment in a single firm operating within a well-defined labor market can be broken into four terms: poaching of workers employed in other firms, hiring of unemployed workers, separations of workers into unemployment, and separations involving workers moving directly to another firm. To this accounting scheme the theories add assumptions about the productivities of the different jobs (often the sum of a time-invariant firm-specific component and a stochastic aggregate component), the costs of posting vacancies, the flow utility of an unemployed worker, the search and matching technology, the stipulation that all workers share the same ranking of the different job types, and the assumption that outcomes for the distribution of wages and employment are determined by intertemporal optimization by both workers and firms. Given these assumptions, the focus of the analysis is on the implications of cyclical fluctuations for job-to-job transitions and reallocations of workers along the job ladder.

It is not obvious that assumptions of perfect optimization provide a good starting point for the analysis of fluctuations, and the universally agreed ranking of all jobs by all workers (the property that defines the steps in the job ladder) is questionable for the aggregate labor market: a worker's ranking of jobs will typically depend on the worker's skills and qualifications as well as on a range of parameters (geographical location of the job, for instance, or the worker's age, sex, race, health and family conditions). The ranking issue can be circumvented by delimiting the labor market in various ways, including by industry and skill requirements. But this solution raises questions with respect to the transition from the analysis of a single market to the economy as a whole.

Workers can and do move between jobs with different characteristics, which undermines the separability assumption. Wage compression within subgroups of workers, occupations or sectors, furthermore, does not automatically ensure overall wage compression.[4] More importantly, an analysis based on the as-

---

[3] Autor et al. (2024) employ this theoretical framework in their interpretation of the recent of US wage inequality. Tightening labor markets in an economy with labor market frictions, they argue, led to an increase in the elasticity of labor supply, inducing firms to raise wages, especially in low wage firms. Hirsch et al. (2018) also interpret their findings of the cyclicality of wage patterns in German administrative data using a monopsony model.

[4] As a simple example, suppose there 10 types of jobs (numbered 1 to 10) and that the pre-compression wages of group i are distributed uniformly over the interval $(i - 1, i)$. Following the within-group compression, all workers in group i receive a wage of $(i - 0.5)$. The aggregate 90/10 ratio increases from 9 to 19 as a result of the within-group compression. Other inequality measures will decrease in this example. But modify the assumptions and consider a positive shock to the demand for goods produced by workers in the top decile. Firms' monopsony

sumption of separate labour markets has little to say about the determination of the relative tightness of the different markets or about the sources of shifts in the distribution of the average sectorial wages. These composition effects are critical: overall wage inequality will tend to fall if tightness increases in low-wage labour markets but increase if tightness predominantly affects high-wage labour markets; the modified example in footnote 4 provides a simple example of increasing inequality.

In short, theoretical frameworks that emphasize how changes in tightness influence wage inequality among identical workers who are employed in firms producing the same output cannot explain changes in inequality among heterogenous workers employed in different sectors. Thus, the cyclical job ladder may fail to capture the most important forces behind both the fluctuations and trends in economy-wide wage inequality, which clearly involve workers from multiple sectors and separate labour markets.

2.2 Differential labor hoarding

The cyclical volatility of employment is lower for highly educated (and typically highly paid) workers than for (typically low-paid) workers with low levels of formal education (figure 6).[5] Straightforward explanations of this pattern can point to higher shares of well-paid workers in overhead jobs as well as to the greater importance of firm-specific skills and the greater hiring costs associated with adjustments in the employment of highly educated workers. Putting it differently, the frictions in the labor market are larger for jobs that require firm-specific skills and particular educational backgrounds than for those that do not.

As a simple static formalization of differential labor hoarding, suppose there are two types of labor, college and high-school educated, and two types of jobs, tech and manual. Let T and M denote the number of tech and manual jobs, and assume that the production function is Leontief with unit coefficients on both M and T:[6]

$$Y = \min\{M, T, \sigma K\}$$

power declines in this segment but the compression is confined to this segment. For simplicity, suppose that after the shock all workers in the top decile receive a wage of 10. Any reasonable measure will show a widening of inequality despite a reduction in monopsony power.

[5]The variations in the ratio of employed workers do not in general mirror those in the ratios of unemployed workers: the ratio of employed workers with a college degree to employed workers with high school degrees is negatively correlated with the aggregate employment rate, but the ratio of those *unemployed* with a college degree to those *unemployed* with high school degrees was also negatively correlated with the aggregate employment rate in recent decades (Mueller, 2017). Mathematically, if x and y both lie in the unit interval, the growth rates of x/y and $(1-x)/(1-y)$ are given by $\hat{x} - \hat{y}$ and $-(x/(1-x))\hat{x} + (y/(1-y))\hat{y}$, respectively. Thus, both growth rates can be negative if $x > y$ and $\hat{x} < \hat{y}$.

[6]The Leontief coefficients can be interpreted as describing the choice of technique along the steady growth path. Whatever substitutability may exist in the long run, the labor inputs are complementary in the short run, and cyclical fluctuations around a steady growth path leave the choice of technique largely unaffected.

For simplicity, differential labor hoarding is represented by assuming that there is no hoarding in manual jobs. In tech jobs, by contrast, firms face significant adjustment costs and adjust gradually to changes in demand and output. To enable rapid adjustments of output in response to demand shocks, they aim for some margin of excess capacity of tech employment and capital; it is assumed that neither tech employment nor capital becomes a binding constraint on aggregate output, even when demand is high. Formally,

$$M = Y \tag{1}$$

$$T = N_0 + \beta Y \geq Y; \quad 0 < \beta < 1 \tag{2}$$

The positive parameter β captures the gradual adjustment associated with labor hoarding; adjustment becomes instantaneous in the limiting case with $\beta = 1$. The excess capacity of college educated workers is given by $T - Y = N_0 - (1-\beta)Y \geq 0$. The difference between the employment volatilities of high-school and college educated workers now follows if high-school and college workers have M and T jobs, respectively. The short-run relation between output and employment is more generally described in the literature on Okun's Law; our formulation extends the relation by including occupational heterogeneity.

2.3   Induced mismatch

The wage and employment effects of differential labor hoarding are likely to be amplified by induced changes in mismatch. Many workers hold jobs that do not require their education and skills, a mismatch that has been labelled variously as 'overeducation' or 'underemployment'.[7] The measurement of mismatch is notoriously difficult, but studies suggest that 'overeducation' is widespread in all OECD countries, with estimates typically falling between 10 and 40% (Groot and Maassen van den Brink, 2000).

Importantly, the degree of mismatch between workers' skills and the skill requirements of jobs is not constant. As noted by Michael Luo (2010) in the New York Times, the recession after the financial crisis produced

> a new cadre of underemployed workers dotting American companies, occupying slots several rungs below where they are accustomed to working. These are not the more drastic examples of former professionals toiling away at "survival jobs" at Home Depot or Starbucks. They are the former chief financial officer working as comptroller, the onetime marketing director who is back to being an analyst, the former manager who is once again an "individual contributor"

In recessions, some workers search for and accept jobs that in normal times they would see themselves as overqualified for. Rather than go unemployed, highly

---

[7]The presence of significant mismatch is consistent with assignment or matching models (e.g. Sattinger 2006, Albrecht and Vroman 2002, Dolado et al. 2009) as well as with efficiency wage models that distinguish between the skill requirements of the job and the skills of the worker (Skott 2006, Slonimczyk and Skott 2012).

Figure 7: Underemployment rate of college graduates age 22-27 and aggregae employment rate. Source: Federal Reserve Bank of New York, The Labor Market for Recent College Graduates; https://nyfed.org/collegelabor .

educated workers who are unable to find jobs that match their skills may move into positions that do not require these skills.

The anecdotal evidence is supported by more systematic evidence. A database on the job market for recent graduates shows how the fluctuations in underemployment (in the proportion of college educated workers with jobs that do not require a college degree) mirror movements in the employment rate: the rates of underemployment among recent college graduates increase during periods with high rates of unemployment (early 1990s, early 2000s, 2008-2014) and fall when unemployment is low (late 1990s, 2005-2007, 2015-2019); see figure 7.[8] This pattern is what one would expect. College graduates with jobs that require their skills tend to have relatively secure, cyclically stable jobs. But high unemployment and labor hoarding in jobs that require special skills leave few good job openings for the cohort of newly minted graduates and the currently underemployed graduates. Large proportions of them therefore move into or have to remain in jobs for which they are overqualified, and the underemployment rate in the sample of graduates age 22-27 tends to increase if the outgoing cohort of 27-year old workers entered the labor market during better times and has lower rates of underemployment.

Formally, suppose that tech jobs require a college degree, while college and

---

[8] Federal Reserve Bank of New York, The Labor Market for Recent College Graduates; https://nyfed.org/collegelabor.

high-school educated workers are perfect substitutes in manual jobs. Thus,

$$T = L^{CT} \tag{3}$$

$$M = L^{HM} + L^{CM} \tag{4}$$

where L^{HM}, L^{CM} and L^{CT} represent the employment of high-school and college educated workers in manual jobs and the employment of college educated workers in tech jobs, respectively. Thus, if N^C and N^H denote the numbers of college and high-school educated workers, with L^{CU} and L^{HU} as the unemployment of the two groups, we have

$$N^C = L^{CT} + L^{CM} + L^{CU}$$
$$N^H = L^{HM} + L^{HU}$$

The symmetry between the two types of labor in the production function implies that, absent any mismatch, it will be possible to achieve full employment of both types if

$$N^C = N_0 + \beta N^C = N^H \tag{5}$$

To avoid building in significant employment asymmetries, it is assumed that this condition holds. To simplify notation, let

$$N = N^H = N^C$$

The composition of workers in manual jobs depends on the state of the labor market. Using a simple specification, suppose that firms are indifferent between hiring the two types when filling manual jobs (by assumption the two types are perfect substitutes) and that all college educated workers prefer manual jobs to unemployment. Under these conditions, high-school and college educated workers without a tech job will be competing for manual jobs, and we assume that the equilibrium employment rate of high-school workers will be equal to the proportion of the college-educated workers without tech jobs who get a manual job. Formally,

$$L^{CT} = N_0 + \beta Y \tag{6}$$

$$L^{HM} = \frac{N}{2N - L^{CT}} Y \tag{7}$$

$$L^{CM} = \frac{N - L^{CT}}{2N - L^{CT}} Y$$
$$= (1 - \frac{N}{2N - L^{CT}}) Y \tag{8}$$

This static model implies that

$$0 < \frac{\partial L^{CT}}{\partial Y} = \beta < 1$$

$$\frac{\partial L^{HM}}{\partial Y} = \frac{N}{2N - N_0 - \beta Y} + \frac{N\beta Y}{(2N - N_0 - \beta Y)^2} > 0$$

$$\frac{\partial L^{CM}}{\partial Y} = \frac{N - N_0 - \beta Y}{2N - N_0 - \beta Y} - \frac{N\beta Y}{(2N - N_0 - \beta Y)^2} < 1 \tag{9}$$

Intuitively, an increase in output raises both manual and tech employment. If there is differential labor hoarding ($\beta < 1$) the number of tech jobs will increase less than proportionately because some of the increase in output will be covered by a decline in labor hoarding (in firms' excess capacity of college workers). The increase in manual jobs will be proportional to the increase in output, and the increase in tech employment raises the proportion of manual jobs that go to high-school workers; the employment of high-school workers must therefore increase. For college educated workers, on the other hand, the composition effect is negative: an increase in output reduces the share of manual jobs going to college educated workers. Thus, the partial derivative $\partial L^{CM}/\partial Y$ must be less that one and can be negative.

The composition effect on college workers in manual jobs dominates and $\partial L^{CM}/\partial Y$ turns negative if the employment of college educated workers in tech jobs exceeds some threshold value (if $N^C - N_0 - \beta Y$ falls below some threshold). The threshold value is relatively low for reasonable parameter values, suggesting a reduction in the number of mismatched workers (L^{CM}) following a rise in output.[9]

2.4 Efficiency wages

Asymmetric information and principal-agent problems can be a source of wage differences among otherwise identical workers. By increasing its wage offers, a firm can attract a stronger pool of job applicants (as in models of adverse selection) and improve the motivation, effort and productivity of its employees (as in efficiency wage models with moral hazard). In both cases, firms set wages to minimize unit labor cost, typically choosing to pay a wage premium above the reservation wage.[10]

Our short-run equilibrium takes aggregate demand as exogenous and, assuming that the principal-agent problems are more severe in tech jobs, we consider a stylized setting in which there are no principal-agent problems with respect

---

[9] Equation (9) implies that if the aggregate employment rate is at (or above) 80 percent and $\beta = 0.5$, the condition will be satisfied as long as the employment rate of college workers in tech jobs is at (or above) 65 percent.

[10] The perceived fairness of the wage determines workers' effort in some efficiency wage models (e.g. Akerlof and Yellen 1990). Social norms – including fairness norms – typically exhibit path dependency; they are reinforced when outcomes conform to the norm but become undermined and lose power if outcomes violate the norms. This path dependency can map into path dependent employment rates and wage patterns (Skott 2005, 2023a chapter 6).

to manual jobs; effort levels and productivity in manual jobs are constant and independent of the wage rate. In tech jobs, by contrast, a simple shirking specification implies that the wage will be set to avoid shirking.

In the presence of mismatch, a standard specification suggests that the no-shirking wage will depend on the manual wage and the employment of college workers in manual jobs as well as on the employment rate of college workers in tech jobs. Formally,

$$w_T = \psi(\frac{L^{CT}}{N}, w_M, \frac{L^{CM}}{N}, b); \quad \psi_1 > 0, \psi_2 > 0, \psi_3 > 0, \psi_4 > 0 \qquad (10)$$

where w_T and w_M are the real wage rates in T and M jobs, respectively, and b denotes unemployment benefits. By assumption C and H workers are perfect substitutes in M jobs and receive the same wage.[11]

2.5   Wage inequality

The monopsony story is silent on the wage inequality across different sectors and groups of workers. By contrast, the other three mechanisms have implications for the determination of the relative wage, w_T/w_M. Labor hoarding and induced mismatch generate differential employment volatilities. In recessions high-school educated workers (who are typically low-paid) will tend to see a larger fall in employment and greater downward wage pressures than (typically high-wage) college educated workers; conversely, high employment rates can be expected to raise the relative wage of high-school workers at the low end of the wage distribution. The efficiency wage argument takes the manual wage as exogenous while tech wages are set to satisfy equation (10).

Combining the three explanations of wage inequality across groups and jobs, the equilibrium relative wage in this static setting will be determined

---

[11]The general price level over the contract period will not be known when nominal wages are set, and the real wages w_T and w_M should more accurately be referred to as the expected real wage. Since we are interested in the relative wage, w_M/w_T, this distinction between real and expected real wages will be irrelevant if the same expected price level is used in the determination of the real wages.

by $L^{CT}/N, L^{HM}/N$ and L^{CM}/N:[12]

$$\log(\frac{w_T}{w_M})^* = \phi(\frac{L^{CT}}{N}, \frac{L^{HM}}{N}, \frac{L^{CM}}{N}); \quad \phi_1 > 0, \phi_2 < 0, \phi_3 \gtreqless 0 \qquad (11)$$

The effects of L^{CT}/N and L^{HM}/N are unambiguous (raising and reducing the relative wage, respectively), but an increase in L^{CM}/N tightens the manual labor market (which tends to raise manual wages) and also improves the fallback position for college educated workers (which puts upward pressure on tech wages). The balance of these opposing effects could go either way.[13]

3 Models of endogenous cycles in wage inequality and the functional distribution

3.1 A macro model with homogeneous labor

3.1.1 Assumptions

Most contemporary macroeconomic models rely on a slew of exogenous shocks to generate business cycles; absent these shocks, the models describe economies that converge smoothly towards a steady growth path. The shocks and their underlying sources have varied, but shock-driven cycles of this kind have a long history; William Jevons, Ragnar Frisch, Eugen Slutsky and Michal Kalecki are among the early proponents.

There is an alternative perspective. Going back to Karl Marx, with later contributors including Roy Harrod, Nicholas Kaldor, John Hicks, Richard Goodwin and Hyman Minsky, fluctuations and periodic crises have been explained as endogenous features of capitalist economies. A locally unstable steady growth path can be a source of endogenously created, bounded fluctuations if stabilizing forces gain strength when the economy moves away from the steady growth

---

[12] With output as exogenously given, standard assumptions treat the real wage as an increasing function of the employment rate and the level of unemployment benefits. Thus, with two distinct labor markets and induced mismatch, we would expect to have

$$w_M = w_M(\frac{L^{HM}}{N}, \frac{L^{CM}}{N}, \frac{L^{CT}}{N}, b) \qquad (*)$$
$$w_T = w_T(\frac{L^{CT}}{N}, \frac{L^{CM}}{N}, b)$$

and

$$\frac{w_T}{w_M} = \phi(\frac{L^{CT}}{N}, \frac{L^{HM}}{N}, \frac{L^{CM}}{N}, b)$$

Using equation (*) to substitute for w_M in equation (10), the efficiency wage argument generates the same reduced form for the relative wage.

Taking the level of unemployment benefits as exogenously given, this variable has been omitted from equation (11).

[13] The effect of an increase in tech employment may also appear to be ambiguous. From an economic perspective, however, it would seem highly unlikely for an increase in tech employment to have a larger effect on manual wages than on tech wages.

path. There is, we believe, both theoretical and empirical evidence to support this alternative tradition of endogenous cycles. Thus, depending on parameter values, the models in this section generate local instability and limit cycles or local stability with damped oscillations.

Our baseline model of a closed economy with homogeneous labor and no public sector follows Skott (2015, 2023a chapter 10). The production function takes the Leontief form with fixed coefficients and, for simplicity, there is no technical change (or, alternatively, technical change is labor augmenting, with the labor force measured in effective units). The labor force, N, grows at the constant rate n,

$$\hat{N} = n \tag{12}$$

with carets denoting growth rates. Both the level of employment and the capital stock are treated as state variables: they are predetermined at each moment, adjusting gradually in response to signals from goods and labor markets.

Changes in employment are subject to adjustment costs, partly because frictions like those highlighted by search and matching models may require firms to improve wage offers in order to increase hiring rates and attract workers with the desired qualifications, but also because of on-the-job learning, training costs related to firm-specific features of the jobs, costs of severance packages, and adverse effects of layoffs on workers' morale and productivity. Profit maximizing firms weigh the benefits of having a different number workers (which depend on the demand for output) against the costs associated with changes in the labor force (which depend on the state of the labor market and the speed of adjustment). Capital adjusts even more sluggishly than employment, with many investment projects being subject to significant planning and implementation lags. Unlike the sluggish inputs, demand can be volatile, especially at the firm level, and excess capacity is needed to enable rapid adjustment of output.[14] For simplicity, it is assumed that the predetermined short-run levels of employment and capital never become binding constraints at the aggregate level and that output is perfectly flexible.

Formally, the 'employment expansion' and accumulation functions are written as

$$\hat{L} = h(y, e); \quad h_1 > 0, h_2 < 0 \tag{13}$$

$$\hat{K} = g_0 + \lambda_K(l - l^d); \quad \lambda_K > 0 \tag{14}$$

where $K, L, y = Y/L, l = L/K, e = L/N$ and l^d denote the capital stock, the level of employment, the output-employment ratio, the employment-capital ratio, the employment rate and the desired employment capital ratio, respectively.

An increase in the demand for output raises the output-employment ratio (the utilization rate of employment), providing an incentive for firms to increase employment to maintain the flexibility of output. The costs of adjustment are

---

[14]Indivisibilities in plant size and the use of excess capacity as a deterrent to new entry may accentuate the desire for excess capital capacity.

likely to be convex, however, and we assume that the growth rate of employment will be increasing but nonlinear in y. An expansion, moreover, is tempered when high employment rates make it harder to attract workers and, more broadly, erode 'discipline in the labor market'. These employment effects are also nonlinear, strengthening as the economy approaches full employment.

The accumulation function follows a simple capital adjustment principle. The desired capital stock is taken to be proportional to employment, with the growth rate of the capital stock reacting to discrepancies between the desired and current values of the employment-capital ratio. Skott (1989, 2023a) analyzes the employment expansion and accumulation functions in greater detail, with attention to both firm-level decisions and aggregation issues in the derivation of the macroeconomic implications.

Private consumption depends on labor income and wealth,

$$C = c(1 - \pi)Y + \nu\Omega = [c(1 - \pi)yl + \nu\frac{\Omega}{K}]K; \quad c > 0, \nu > 0 \qquad (15)$$

where π and Ω are the profit share and household wealth. This specification is consistent with traditional Keynesian versions of the consumption function but can also be given a two-class interpretation: workers spend their wage income on consumption (corresponding to $c = 1$), while capitalists' consumption is determined by their wealth.[15] Leaving aside complications associated with the financial valuation of firms, aggregate household wealth is taken as equal to the capital stock

$$\Omega = K \qquad (16)$$

By definition, the profit share is increasing in the productivity of labor (the output-employment ratio, y) and decreasing in the real wage, ω:

$$\pi = 1 - \frac{\omega}{y} \qquad (17)$$

For simplicity, the real wage is taken to be constant in this baseline model.[16]

3.1.2 Analysis

The short-run equilibrium condition for the goods market determines the level of output. Absent both foreign and public sectors, this condition requires the

---

[15] In a contemporary version of the two-class approach, Foley et al. (2019) assume that capitalists optimize intertemporally with an infinite horizon, while workers engage in life cycle saving, leaving no bequests. Their specification implies that aggregate consumption is determined by aggregate wage income, aggregate wealth and the share of wealth owned by capitalists.

[16] Nominal wages are sticky, and sticky prices may be a reasonable approximation in some activities (mainly within the service sector). Other activities, however, exhibit great price flexibility and sticky output, and the general presumption among both post- and new-Keynesians of all prices as being highly sticky is empirically questionable (Skott 2023a, chapter 10). The extended model in section 3.3 includes wage and price Phillips curves and cyclical variations of real wages.

A constant real wage would be consistent with constant markups on normal unit labor cost (as argued by Lavoie 2014 and others).

equalization of saving and investment:

$$\frac{I}{K} = g_0 + \lambda_K(l - l^d) + \delta = yl - c(1 - \pi)yl - \nu = \frac{S}{K} \qquad (18)$$

where δ is the depreciation rate. Equation (18) defines the short-run equilibrium value of labor utilization as a function of the labor-capital ratio:

$$y = \lambda_K + c\omega + \frac{g_0 - \lambda_K l^d + \delta + \nu}{l} = y(l) \qquad (19)$$

Equations (13)-(19) can be used to derive dynamic equations for the employment-capital ratio and the employment rate:

$$\hat{l} = \hat{L} - \hat{K} = h(y(l), l, e) - g_0 - \lambda_K(l - l^d) \qquad (20)$$
$$\hat{e} = h(y(l), l, e) - n \qquad (21)$$

This 2D system of differential equations has a unique (non-trivial) stationary solution with $l^* = l^d + (n - g_0)/\lambda_K$ and e satisfying the condition $h(y(l^*), l^*, e^*) = 0$.[17] Assuming that the parameter g_0 equals the average long-run rate of growth, we have $g_0 = n$ and $l^* = l^d$.[18] The stationary point is locally unstable for high values of λ_K and h_1 and stable for low values of λ_K and h_1.[19]

The simulation in figure 8 illustrates a case with local instability. The simulation uses the following functional form for the h-function

$$\hat{L} = \frac{0.3}{1 + \exp(-20(y - 1 + 0.02(0.2^{-1} - (1.1 - e)^{-1})))} - 0.12 \qquad (22)$$

This specification captures nonlinearities associated with highly convex adjustment costs (the logistic functional form with upper and lower bounds on employment growth) and the strengthening of the negative labor market effects as the employment rate increases (the hyperbolic employment term in the denominator). The parameter values are consistent with the empirical findings in Skott and Zipperer (2012).[20]

---

[17] The system also has a trivial solution with $l = e = 0$. For the non-trivial solution to be economically meaningful, we must have $0 < e^* < 1$.

[18] The desired utilization rate is likely to depend on structural features that may vary over time. For present purposes, we ignore these complications and take l^d as constant.

[19] The Jacobian matrix is given by

$$J(l, e) = \begin{pmatrix} l(h_1 \lambda_K \frac{l^d}{l^2} + h_2 - \lambda_K) & lh_3 \\ e(h_1 \lambda_K \frac{l^d}{l} + h_2) & eh_3 \end{pmatrix}$$

The determinant $(-\lambda_K leh_3)$ is unambiguously positive and, evaluated at the stationary solution, the trace is equal to $l\lambda_K(h_1 - 1) + lh_2 + eh_3$.

[20] Skott and Zipperer estimate the effects of profitability and employment on output growth. The results have implications for the specification of employment growth because of the relation between labor productivity and the profit share (equation (17)) and between employment and output growth.

The linear investment function is modified slightly in the simulation since, by definition, gross investment cannot be negative. Thus,

$$\frac{I}{K} = \max\{0, \delta + g_0 + \lambda_K(l - 0.5)\} \tag{23}$$

The investment parameters are $g_0 = 0.03, \delta = 0.07$ and $\lambda_K = 1.054$. The consumption function uses $c = 1, \nu = 0.05$, yielding a saving to capital ratio of

$$\frac{S}{K} = \pi y l - 0.05 \tag{24}$$

The natural growth rate, the depreciation rate and the real wage are set at $n = 0.03, \delta = 0.07$ and $\omega = 0.7$.

With these parameters, the steady growth path at $(l, e) = (l^d, 0.9)$ is locally unstable; trajectories starting away from the stationary solution converge to a limit cycle with clockwise movements in the $(e, Y/K), (e, \pi), (e, \hat{Y}), (\pi, \hat{Y}), (e, Y/L)$ and $(Y/K, \hat{Y})$ spaces. These movements are consistent with observed patterns in the US economy (Zipperer and Skott 2011).

3.2   A model with heterogeneous labor

Now introduce labor and job heterogeneity along the lines of the simple model in section 2. With the equilibrium allocation of M jobs determined by equations (7)-(8), the equilibrium 'mismatch ratio' is given by

$$\left(\frac{L^{CM}}{L^{HM}}\right)^* = \frac{N^C - T}{N^H}$$

In a dynamic model of cycles, the adjustment to the equilibrium ratio happens gradually as a result of gross movements (separations into and hiring from the pool of unemployed). Formally, with dots indicating time derivatives, let

$$\dot{L}^{HM} = -\rho L^{HM} + (\rho M + \dot{M})\frac{N^H - L^{HM}}{N^C - L^{CT} - L^{CM} + N^H - L^{HM}} \tag{25}$$

$$\dot{L}^{CM} = -\rho L^{CM} + (\rho M + \dot{M})\frac{N^C - L^{CT} - L^{CM}}{N^C - L^{CT} - L^{CM} + N^H - L^{HM}} \tag{26}$$

where ρ is the rate of separations into unemployment. The term $(\rho M + \dot{M})$ is the gross hiring rate into M jobs; the hiring is split between C and H workers in proportion to their respective shares of the unemployed.

Combining the dynamic equations (25)-(26) for L^{HM} and L^{CM}, we get

$$\frac{d\left(\frac{L^{CM}}{L^{HM}}\right)}{dt} = \frac{L^{CM}}{L^{HM}}(\hat{L}^{CM} - \hat{L}^{HM})$$

$$= \frac{L^{CM}}{L^{HM}}\left(\frac{\rho M + \dot{M}}{N^C - L^{CT} - L^{CM} + N^H - L^{HM}}\right)\left(\frac{N^C - L^{CT} - L^{CM}}{L^{CM}} - \frac{N^H - L^{HM}}{L^{HM}}\right)$$

$$= \frac{\rho M + \dot{M}}{(N^C + N^H)(1 - e)}\frac{N^H}{L^{HM}}\left(\frac{N^C - T}{N^H} - \frac{L^{CM}}{L^{HM}}\right) \tag{27}$$
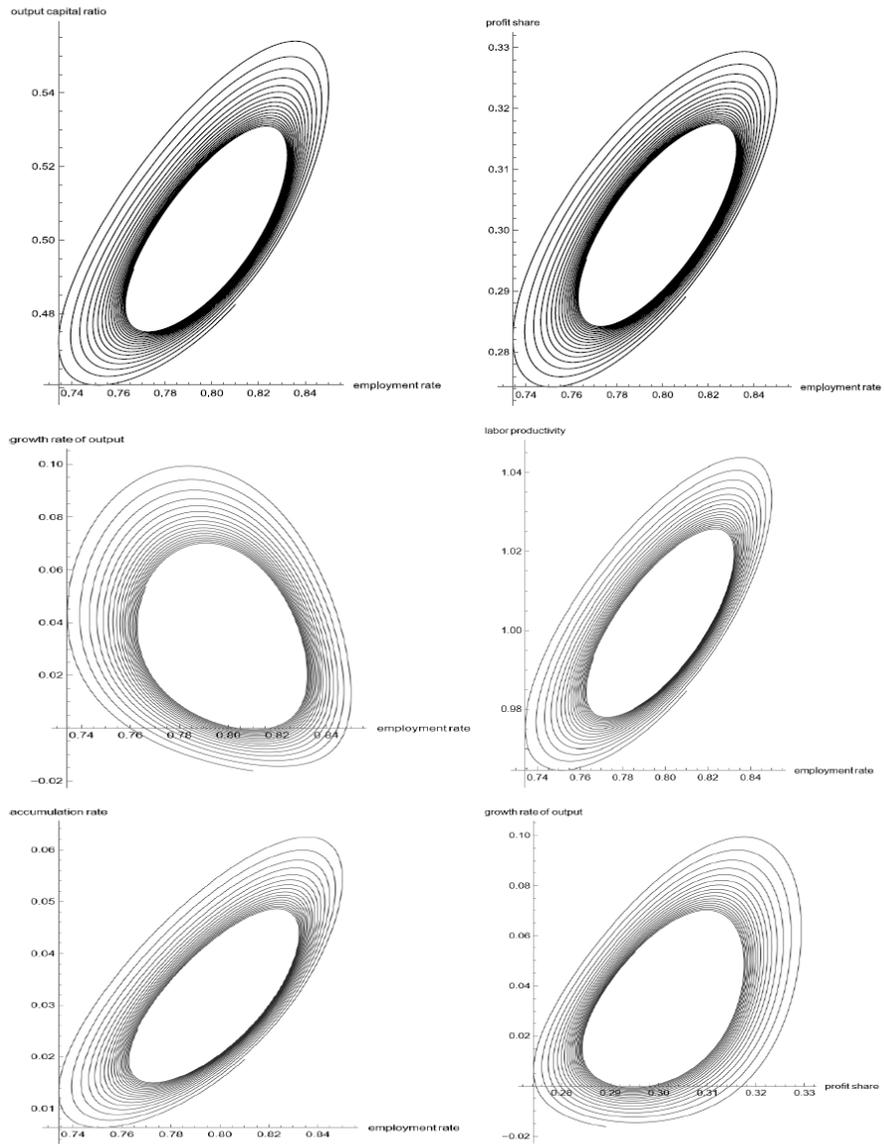
18

Figure 8: Simulation of baseline model

19

where $e = (T + M)/(N^C + N^H)$ is the aggregate rate of employment. As in sections 2.3 and 3.1, it is assumed that

$$N^H = N^C = N$$

$$\hat{N} = n$$

The cyclical changes in the relative wage are determined as gradual adjustments towards the equilibrium relative wage in equation (11):

$$\frac{d \log \frac{w_T}{w_M}}{dt} = \lambda_w \left(\frac{\left(\frac{w_T}{w_M} \right)^*}{\frac{w_T}{w_M}} - 1 \right) \tag{28}$$

The accumulation function, equation (14), is modified to accommodate two types of jobs:

$$\hat{K} = \max\{-0.07, g_0 + \lambda_K (0.5 (\frac{T}{K} + \frac{M}{K}) - 0.5)\} \tag{29}$$

The job heterogeneity also requires the replacement of the employment expansion function by separate expansion functions for T and M. The speed of adjustment for T jobs is significantly slower than for M jobs because of differences in adjustment costs, and, instead of a single employment rate, we now have separate employment rates for C and H workers as well as a rate of mismatched C workers. Reflecting these changes compared to the baseline model, the employment expansion functions for T and M jobs are given by

$$\hat{T} = h^T (y_T, \frac{L^{CT}}{N}, \frac{L^{CM}}{N}); \quad h_1^T > 0, h_2^T <, h_3^T \leq 0 \tag{30}$$

$$\hat{M} = h^M (y_M, \frac{L^{HM}}{N}, \frac{L^{CT}}{N}, \frac{L^{CM}}{N}); h_1^M > 0, h_2^M < 0, h_3^M \leq 0, h_4^M \leq 0 \tag{31}$$

where L^{CT}/N and L^{CM}/N are the employment rates for C workers in tech and manual jobs, respectively, and L^{HM}/N is the employment rate of H workers. The effect of changes in L^{CM}/N on $\hat{T}$ is likely to be quite small: college educated workers with manual jobs will be looking for better jobs in the tech sector, and their search intensity could be as high as (or even higher than) that of those who are unemployed and possibly discouraged. The effect of college workers' employment rate on $\hat{M}$, likewise, is likely to be small.

The model generates a 5D dynamic system:

$$\widehat{T/N} = h^T(y_T, \frac{L^{CT}}{N}, \frac{L^{CM}}{N}) - n \tag{32}$$

$$\widehat{M/N} = h^M(y_M, \frac{L^{HM}}{N}, \frac{L^{CT}}{N}, \frac{L^{CM}}{N}) - n \tag{33}$$

$$\widehat{K/N} = \max\{-0.07, g_0 + \lambda_K(0.5(\frac{T}{K} + \frac{M}{K}) - 0.5)\} - n \tag{34}$$

$$\frac{d\frac{L^{CM}}{L^{HM}}}{dt} = \frac{N}{2N(1-e)} \frac{\rho M + \dot{M}}{L^{HM}} (\frac{N-T}{N} - \frac{L^{CM}}{L^{HM}}) \tag{35}$$

$$\frac{d\frac{w_T}{w_M}}{dt} = \lambda_w((\frac{w_T}{w_M})^* - \frac{w_T}{w_M}) \tag{36}$$

The properties of this system depends on the functional forms of the h^T, h^M and $(w_T/w_M)^*$ functions and the precise parameter values.

The simulations in figure 9 use

$$\hat{T} = \frac{0.3}{1 + \exp(-15(y_T - 1 + 0.02((0.2)^{-1} - (0.2 + \frac{14}{17} - \frac{L^{CT}}{N})^{-1})))}$$
$$- 0.12 \tag{37}$$

$$\hat{M} = \frac{0.3}{1 + \exp(-30(y_M - 1 + 0.02((0.2)^{-1} - (0.9 - \frac{L^{HM}}{N})^{-1})))}$$
$$- 0.12 \tag{38}$$

The parameters have been calibrated to give steady growth solutions of $T/K = M/K = 0.5, L^{HM}/N = 0.7T, y_T = y_M = 1$ and to provide labor productivity and employment effects that are similar to those in the homogeneous equation (13).[21]

The equation for the equilibrium relative wage is specified as

$$\log(\frac{w_T}{w_M})^* = \gamma_0 + \gamma_1(\frac{L^{CT}}{N} - (\frac{L^{CT}}{N})^*) + \gamma_2(\frac{L^{HM}}{N} - (\frac{L^{HM}}{N})^*) + \gamma_3(\frac{L^{CM}}{N} - (\frac{L^{CM}}{N})^*) \tag{39}$$

The sign of γ_3 is ambiguous and, as a simple benchmark, let $\gamma_3 = 0$. In the simulation, the other coefficients are set to $\gamma_0 = 5/3, \gamma_1 = 0.2, \gamma_2 = -1$, reflecting a presumption of significantly higher wage sensitivity in M jobs compared to T jobs.

Production requires two types of labor input, and the sum $\omega_T + \omega_M$ is set to 0.7 (corresponding to setting $\omega = 0.7$ in the baseline model). The coefficients in the investment function (23) are $g_0 = 0.03$ and $\lambda_K = 1.2$; the disaggregation of the labor market with gradual adjustments of mismatch and relative wages

---

[21]Steady growth solutions of $T/K = M/K = 0.5, L^{HM}/N = 0.7$ in combination with equations (3)-(4) and (7)-(8) imply that in steady growth $N/K = 17/28, (L^{CT} + L^{CM})/N = 0.575(28/17) \approx 0.95$ $L^{CT}/N = 14/17$ and $e = (M+T)/(2N) = 0.5(0.7 + 0.575 * (28/17)) \approx 0.825$.

has had a stabilizing effect, and the sensitivity of accumulation to changes in the labor capital ratio has been raised from 1.054 in the baseline model to 1.2 in order to facilitate comparison of the cycles in the two models. The natural growth rate and the depreciation rate are unchanged at $n = 0.03, \delta = 0.07$.

The simulation generates cyclical movements with a clear negative correlation between aggregate employment rates and both wage inequality and the degree of mismatch in the labor market. The movements in the wage share and wage inequality are also consistent with US data: the wage share leads the college premium in cyclical fluctuations around an upward-sloping axis; the observed US patters are depicted in figure 10. The patterns of the aggregate variables are qualitatively similar to those of the baseline without heterogeneous labor.

3.3 An extended model with economic policy

The models in sections 3.1-3.2 have important weaknesses. One weakness is the sensitivity of the qualitative outcome to changes in key parameters. In the model with homogeneous labor, for instance, the simulation produced a limit cycle with a reasonable amplitude when the accumulation coefficient λ_K was set at 1.054. But strengthen the destabilizing forces slightly by raising this parameter to 1.13 and the economy collapses completely.

This fragility of the models could be overcome by increasing the stabilizing coefficients on the employment term in the employment expansion function. It would be difficult, however, to justify a sufficiently large increase on behavioral grounds.[22] The answer to the fragility problem may come, instead, from addressing other aspects of the models: they are highly simplified, leaving out many features of real-world capitalist economies.

Among the omissions and shortcomings, three issues stand out, even if the models are intended to describe a closed, advanced capitalist economy: (i) the absence of wage and price setting, inflation and monetary policy, (ii) the absence of a public sector and fiscal policy, and (iii) a treatment of investment – the key source in instability in the models – that leaves out important complications. Extended versions of the model with homogeneous labor have addressed these weaknesses. Skott (2023b) incorporates empirically calibrated wage and price Phillips curves, adds a public sector with stylized fiscal and monetary policy rules that are also calibrated based on empirical evidence for the US economy, and includes empirically motivated modifications of investment behavior (introducing lags, a role for gradually changing expectations of medium-term growth, and the influence of the profit share and the real interest rate on investment decisions). The extensions greatly enhance the robustness of the model: minor changes in parameter values no longer lead to global divergence.[23]

---

[22] The introduction of nonlinearities to prevent upward divergence is straightforward and easy to justify. As pointed out by Hicks (1950), it is the floor under the downturn that presents a problem.

[23] The robustness is further improved by recognizing that policy rules can and do change. Deep depressions or explosive inflation provoke the development of new instruments and poli-
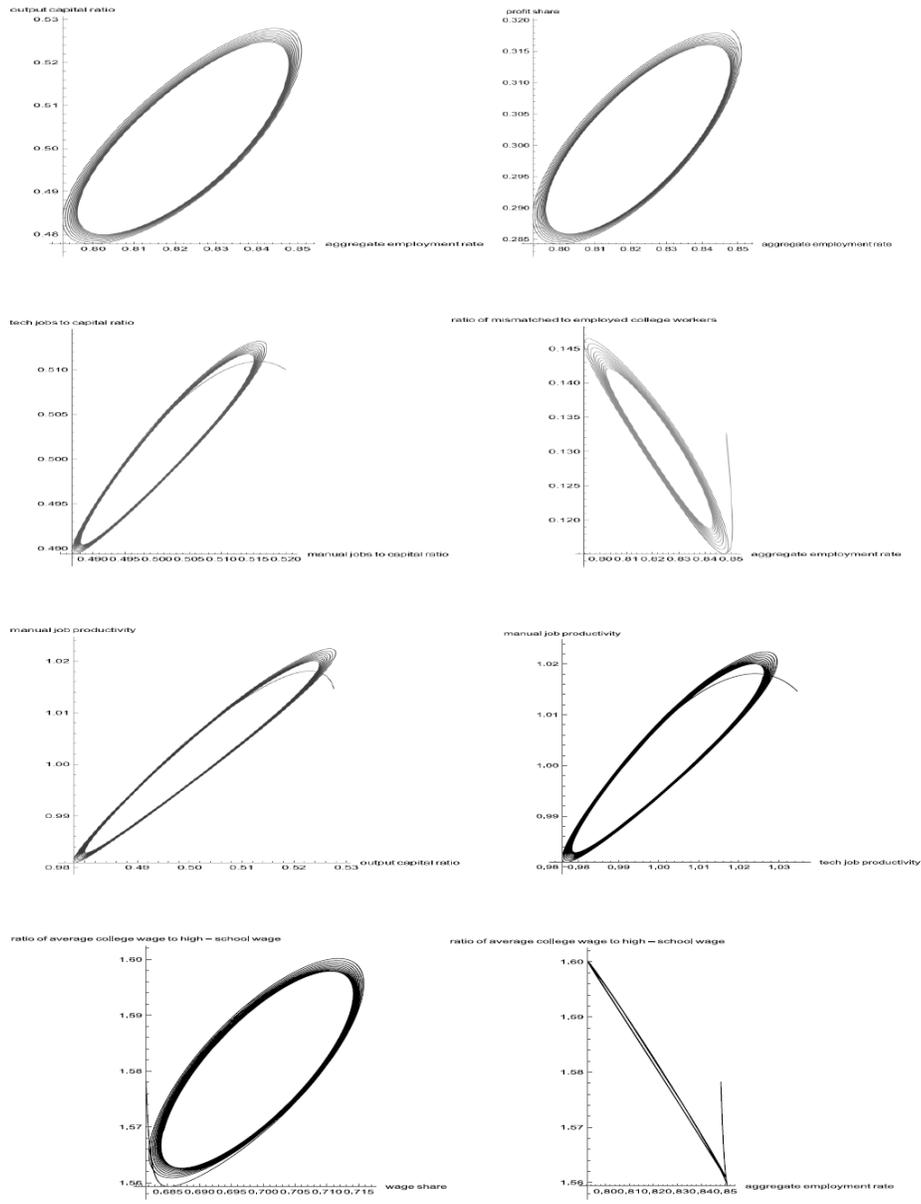
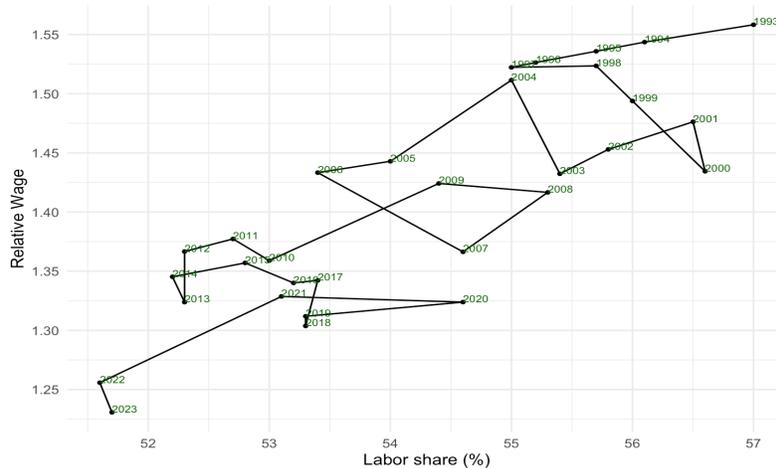Figure 9: Simulation of baseline model with heterogenenous labor; $\lambda_K = 1.2$

Figure 10: Patterns of wage share and wage inequality. Note: Labor share is compensation of employees as percentage of gross domestic income (FRED: A4002E1A156NBEA). Relative wage is the ratio of the mean weekly wage of workers with a BA or more to those with less than a BA.

The dimensionality of the extended model increases further when heterogenous labor is introduced along the lines of section 3.2. But simulations confirm the robustness of the system, and the cyclical patterns of the aggregate variables (employment, utilization, profit share etc.) are very similar to those with homogeneous labor. The cyclical patterns in relative employment, wage inequality and mismatch are also qualitatively identical to those in section 3.2.

The specification and simulation of the extended model with labor heterogeneity are outlined in Appendix 1.

4 Conclusion

Many macroeconomic and distributional variables exhibit regular cyclical fluctuations. This paper has outlined some stylized facts, discussed mechanisms that may contribute to the observed patterns of wage inequality, and presented macro models of endogenous cycles that include fluctuations in the functional distribution as well as worker heterogeneity and fluctuations in wage inequality.

Frictions exist, as emphasized by search and matching models, and these frictions can be a source of monopsony power and fluctuations in wage inequality

cies. Central banks reacted to the financial crisis and a binding zero lower bound by adding quantitative and qualitative easing to their toolbox, while discretionary fiscal expansion was rediscovered with the stimulus package in 2009 and used more aggressively during the COVID pandemic.

among identical workers doing identical jobs. But the severity of frictions varies across jobs. The frictions will be larger in jobs requiring particular educational qualifications and significant on-the-job training. Labor hoarding will be prevalent in these jobs, with implications for the cyclical patterns of both relative employment rates and relative wages: college educated workers will experience employment rates and wages that are less volatile than those for workers with lower levels of education. Wage differences across jobs also emerge naturally in settings with asymmetric information (even if workers are otherwise identical), while the pool of job applicants depends on general conditions: workers apply for and accept low-paying jobs for which they are overqualified when times are bad, and firms lower the credentials they require when labor markets are tight.

Overall wage inequality derives primarily from wage differences across types of jobs and groups of workers, and the monopsony model with identical workers says nothing about these aspects of inequality; in fact, a wage compression within segmented labor markets need not reduce overall wage inequality. The analysis has therefore focused on the effects of differential labor hoarding, induced mismatch and efficiency wages.

The sources of cyclical fluctuations are important for the design of stabilization policies. Endogenous cycles driven by Harrodian instability have implications that are quite different, for instance, from those of the shock-driven new Keynesian models that have been used to justify fiscal austerity and a reliance of monetary policy for stabilization.[24] The extensions in this paper add little to that issue. The main contribution is the demonstration of how models of endogenous cycles can accommodate heterogenous labor in a fairly parsimonious way and produce patterns of both wage inequality and the functional income distribution that are in line with the evidence.[25] The models still display the Goodwin pattern with respect to employment and the wage share, and wage inequality increases in recessions and falls in periods of expansion and tight labor markets.

We want to caution against the extrapolation of these cyclical patterns to long-term trends. In fact, the Burdett-Mortensen model of monopsony-induced wage inequality has a natural rate of unemployment, and any attempt to maintain unemployment below this rate will generate rising inflation. There are many reasons to question the Burdett-Mortensen model and, more generally, the existence of a well-defined natural rate of unemployment, and we do not suggest that aggregate demand policy and the tightness of labor markets cannot influence income distribution in the long run. High employment rates will shift the balance of power, with potential effects on the distribution of income. But tight labor markets are not unambiguously associated with improved dis-

---

[24] See Ryoo and Skott (2017) and Franke (2018) for analyses of stabilization policy in models with Harrodian instability.

[25] Wage heterogeneity is typically abstracted from in heterodox macro models. Tavani and Vasudevan (2014), Carvalho and Rezai (2016), and Palley (2017) are among the exceptions; unlike in the present paper, these contributions analyze the effects of exoegenously given wage heterogeneity on long-run growth in models without Harrodian instability and endogenous cycles.

tributional outcomes; the outcome may depend critically on the specific sources of the changes in aggregate demand and the selected measure of distribution.

Estimates by Autor et al. (2024) show that about one third of the increase in wage inequality during the 'great divergence' from 1979 to 2019 was reversed between 2019 and 2023. Attributing this dramatic compression to expansionary policy and tight labor markets, it has been suggested that tight labor markets may be key to reducing inequality (Autor et al. 2024, Dube 2024 and Gould and DeCourcy 2024). But while some compression would have been expected in an upturn, the magnitude of the post-pandemic compression is far larger than can be explained by general labor market tightness. Fiscal policy was expansionary, but it also took forms that were unprecedented. Huge increases in unemployment benefits meant that the replacement rate for most unemployed workers on minimum wages exceeded 200 percent during part of 2020 and that it stayed well above 100 percent until September 2021; meanwhile, flat-rate stimulus checks also benefitted low-income households disproportionately and strengthened the bargaining position of low-income workers. Not surprisingly, these interventions led to large wage increases at the low end of the wage distribution. In short, the post-pandemic experience demonstrates the equalizing effects interventions that are power biased in favor of low-paid workers rather than the influence of expansionary aggregate demand policy and a tight labor market (Aboobaker and Skott 2025).

The argument for tightness as the key to reducing inequality faces another problem. Aggregate demand policies that raise employment rates and generate falling wage inequality typically shift the functional distribution in favor of profits, with ambiguous total effects on income inequality. The dramatic post-pandemic compression of wage inequality in the US represents a case in point: it was accompanied by a falling wage share and increasing income inequality.

Attempts to reduce inequality by maintaining tight labor markets may be not just futile but also dangerous. Real wages are determined by the interaction between wage and price setting rather than directly by wage bargaining in the labor market. Economy-wide nominal wage increases give firms an incentive to raise prices. If markups do not fall – and it is not obvious why they would fall – the real wage will not increase, despite the gains in nominal wages. A pure wage struggle generates inflation, with real-wage improvements that are uncertain, at best.[26]

The dangers associated with tight labor markets derive from the unpopularity of inflation. The dislike of inflation, not least among workers and low-income households, can be and has been exploited by right-wing groups and parties to create a backlash against labor. The recent US example with Donald Trump's return to the presidency is by no means unique. The elections of Margaret Thatcher and Ronald Reagan at the start of the neoliberal era also came on the back of deeply unpopular inflationary periods; in developing countries, the election of Milei in the 2023 presidential election in Argentina is another recent

---

[26] In an open economy nominal wage gains may raise real wages via its effects on the real exchange rate. The resulting decline in international competitiveness and a deteriorating balance of payments are likely to make these gains unsustainable.

example.

It plays into the hands of capital if we rely on expansionary policy, tight labor markets and workers' ability to gain wage increases in order to reduce inequality. Fighting for higher wages may succeed in raising the growth rate of nominal wages when employment is high, but real wages are likely to remain largely unaffected, and the ensuing inflation undermines support for the aggregate demand policy that sustains high employment.

Fortunately, there are other ways to reduce inequality. Power-biased interventions can reduce both wage and income inequality. Firms' monopoly and monopsony power, for instance, can be reduced by breaking up firms with a dominant position, by tightening regulatory measures such as prohibiting non-compete contracts in employment contracts and no-poaching agreements among firms, and by the enforcement of measures to prevent evasions of labor market regulations by the use of gigs and franchises. Increased minimum wages, improved unemployment benefits and measures to facilitate unionization are also among the power-biased interventions that could compress inequality.

Class conflict, moreover, is not confined to wage and price setting. The power of market forces, along with inequality, can be curtailed if the allocation of substantial shares of total output becomes independent of market incomes and the ability to pay. This has happened to varying degrees, especially in some European, with the establishment of citizenship rights to healthcare, education and retirement pensions as well as public insurance against unemployment and other risks.[27]

In short, labor movements need to prioritize political and institutional change rather than focus primarily on expansionary aggregate demand as a means to reduce inequality.

---

[27] These issues are discussed in greater detail by Auerbach and Skott (2021), Aboobaker and Skott (2025) and Skott (2025).

References

[1] Aboobaker, A. (2022). "Macroeconomic determinants of South Africa's post-apartheid income distribution". World Inequality Lab Working Papers halshs-03693225, HAL.

[2] Aboobaker, A. and Skott, P. (2025). "The recent compression: tightness, turbulence, and power-biased policy". Working Paper

[3] Akerlof, G.A. and Yellen, J.L. (1990). "The fair wage-effort hypothesis and unemployment". *Quarterly Journal of Economics*, 255-283.

[4] Albrecht, J. and Vroman, S. (2002). "A Matching Model with Endogenous Skill Requirements". *International Economic Review*, 43(1), pp. 283-305.

[5] Auerbach, P. and Skott, P. (2021). "Visions of the future – a socialist departure from gloom?" *PSL Quarterly Review*, 74(298), pp. 155-177.

[6] Autor, D., Dube, A., & McGrew, A. (2024). "The unexpected compression: Competition at work in the low wage labor market (Working Paper No. 31010; revised May 2024). NBER Working Papers. Cambridge, MA.

[7] Barrales-Ruiz, J., Mendieta-Mũnoz, I., Rada, C., Tavani, D., and Von Arnim, R. (2021). "The distributive cycle: evidence and recent debates". *Journal of Economic Surveys,* 36(2), pp. 468-503.

[8] Barbosa-Filho, N.H. and Taylor, L. (2006). "Distributive and demand cycles in the US economy – a structuralist Goodwin model". *Metroeconomica*, 57 (3), pp. 389-411.

[9] Blanchard, O.J. (2016). "The Phillips Curve: Back to the '60s?" *American Economic Review*, 106(5), pp. 31-34.

[10] Burdett, K., and Mortensen, D. T. 1998. "Wage differentials, employer size, and unemployment". *International Economic Review* 39(2), pp. 257-273.

[11] Carvalho, L., & Rezai, A. (2016). "Personal income inequality and aggregate demand". *Cambridge Journal of Economics*, 40(2), 491–505.

[12] Chiarella, C. and Flaschel, P. (2000). *The Dynamics of Keynesian Monetary Growth*. Cambridge: Cambridge University Press.

[13] Clarida, R., Galı, J., and Gertler, M (2000). "Monetary policy rules and macroeconomic stability: Evidence and some theory". *Quarterly Journal of Economics* 115(1), 147–180.

[14] Diallo, M.B, Flaschel, P., Krolzig, H.-M. and Proano, C. (2011). "Reconsidering the dynamic interaction between real wages and macroeconomic activity". *Research in World Economy*, 2(1), pp. 77-93.

[15] Dolado, J.J., Jansen, M. and Jimeno, J.F. (2009). "On-the-job search in a matching model with heterogeneous jobs and workers". *Economic Journal*, 119, pp. 200–228.

[16] Dube, A. (2024). "Credit Bidenomics for rising US wages". Project Syndicate, Feb 8, 2024.

[17] Fazzari, S.M., Ferri, P.E., Greenberg, E.G. and Variato, A.M. (2013). "Aggregate demand, instability, and growth". *Review of Keynesian Economics*, 1(1), pp. 1-21.

[18] Flaschel, P. and Krolzig, H.M. (2006). "Wage-Price Phillips Curves and Macroeconomic Stability: Basic Structural Form, Estimation and Analysis". In Chiarella, C., Flaschel, P., Franke, R. and Semmler. W. (eds) *Quantitative and Empirical Analysis of Nonlinear Dynamic Macromodels*. Amsterdam: Elsevier, pp. 7–47.

[19] Foley, D.K., Michl, T.R. and Tavani, D. (2019). *Growth and Distribution, 2nd ed.* Cambridge: Harvard University Press.

[20] Franke, R. (2018). "Can Monetary Policy Tame Harrodian Instability?". *Metroeconomica*, 69(3), pp. 593-618.

[21] Goodwin, R. M. (1967). "A growth cycle". In H. Feinstein (Ed.), *Socialism, capitalism and growth*. Cambridge University press.

[22] Gould, E., & deCourcy, K. (2024). "Fastest wage growth over the last four years among historically disadvantaged groups". Economic policy Institute.

[23] Groot, W., Maassen van den Brink, H. (2000). "Overeducation in the labor market: a meta-analysis". *Economics of Education Review* 19(2), pp. 149–158.\

[24] Hicks, J.R. (1950). *A contribution to the theory of the trade cycle.* Oxford: Oxford University Press.

[25] Hirsch, B., Jahn, E. J., and Schnabel, C. (2018). "Do Employers Have More Monopsony Power in Slack Labor Markets?" *ILR Review*, 71(3), pp. 676-704.

[26] Lavoie, M. (2014). *Post-Keynesian economics.* Cheltenham: Edward Elgar.

[27] Luo, M. (2010). "Overqualified? Yes, but Happy to Have a Job". New York Times, 28 March 2010

[28] Moscarini, G. and Postel-Vinay, F. (2018). "The Cyclical Job Ladder". *Annual Review of Economics*, 10, pp. 165–188, https://doi.org/10.1146/annurev-economics-080217-053425

[29] Mueller, A. I. (2017). "Separations, sorting, and cyclical unemployment". *American Economic Review*, 107(7), 2081–2107.

[30] Oswald, (1997). "Happiness and economic performance" *The Economic Journal*, 107 (November), pp. 1815-1831.

[31] Palley, T. (2017). "Inequality and growth in neo-Kaleckian and Cambridge growth theory". *Review of Keynesian Economics*, 5(2), pp. 146-169.

[32] Ryoo, S. and Skott, P. (2017). "Fiscal and Monetary Policy Rules in an Unstable Economy". *Metroeconomica*, 68(3), pp. 500–548.

[33] Sattinger, M. (2006). "Overlapping Labor Markets". *Labour Economics*, 13, pp. 237–257.

[34] Skott, P. (1989). "Effective demand, class struggle and cyclical growth". *International Economic Review*, 30(1), pp. 231–247.

[35] Skott, P. (2005). "Fairness as a source of hysteresis in employment and relative wages". *Journal of Economic Behavior and Organization,* 57, pp. 305–331.

[36] Skott, P. (2006) "Wage Inequality and Overeducation in a Model with Efficiency Wages". *Canadian Journal of Economics*, 39 (1), pp. 94-123.

[37] Skott, P. (2015). "Growth cycles and price flexibility". *Review of Keynesian Economics*, 3(3), pp. 374-386.

[38] Skott, P. (2023a). *Structuralist and behavioral macroeconomics*. Cambridge University Press.

[39] Skott, P. (2023b). "Endogenous business cycles and economic policy". *Journal of Economic Behavior and Organization*, 210, pp. 61-82.

[40] Skott, P. (2025). "Conflict Inflation: Keynesian Path Dependency or Marxian Cumulation?". *Metroeconomica,* https://doi.org/10.1111/meca.12490

[41] Skott, P. and Zipperer, B. (2012)."An empirical evaluation of three post-Keynesian models". Intervention – European Journal of Economics and Economic Policies, 9(2)., pp. 277–308.

[42] Slonimczyk, F. and Skott, P. (2012) "Employment and Distribution Effects of the Minimum Wage". *Journal of Economic Behavior and Organization,*.84(1), pp. 245– 264.

[43] Tavani, D. and Vasudevan, R. (2014). "Capitalists, workers, and managers: Wage inequality and effective demand". *Structural Change and Economic Dynamics*, 30(C), pp. 120-131.

[44] von Arnim, R. and Barrales, J. (2015). "Demand-driven Goodwin cycles with Kaldorian and Kaleckian features". *Review of Keynesian Economics*, 3(3), pp. 351-373.

[45] Zipperer, B. and Skott, P. (2011). "Cyclical patterns of employment, utilization and profitability". *Journal of Post Keynesian Economics*, 44(1), pp. 25-58.

Appendix 1

An extended model along the lines of Skott (2023b), but with labor heterogeneity following section 3.2, produces the following dynamic system:

$$\hat{T} = h^T(y_T, \frac{L^{CT}}{N^C}, \frac{L^{CM}}{N^C}) \tag{A1}$$

$$\hat{M} = h^M(y_M, \frac{L^{HM}}{N}, \frac{L^{CT}}{N^C}, \frac{L^{CM}}{N^C}) \tag{A2}$$

$$\frac{d\frac{N}{K}}{dt} = \frac{N}{K}[0.03 - g_K] \tag{A3}$$

$$\frac{d\frac{L^{CM}}{L^{HM}}}{dt} = \frac{N}{(N^C + N)(1-e)}\frac{\rho M + \dot{M}}{L^{HM}}(\frac{N^C - T}{N} - \frac{L^{CM}}{L^{HM}}) \tag{A4}$$

$$\frac{d\frac{w_T}{w_M}}{dt} = \lambda_w((\frac{w_T}{w_M})^* - \frac{w_T}{w_M}) \tag{A5}$$

$$\dot{g}_K = \lambda_{g_K}(\max\{-0.07, \rho + \lambda_K(0.5(\frac{T}{K} + \frac{M}{K}) + \rho_2(\pi - 0.375)$$
$$- \rho_3[(r - x) - 0.03] - \rho_4(e - \frac{14}{17})) - g_K)) \tag{A6}$$

$$\dot{\rho} = \lambda_\rho(0.5(\hat{T} + \hat{M}) - \rho) = \lambda_\rho[h(y, l, e) - \rho] \tag{A7}$$

$$\dot{e} = e[(\widehat{T + M}) - n) \tag{A8}$$

$$\dot{x} = \lambda_x(\hat{p} - x) \tag{A9}$$

$$\dot{\omega} = \omega[\alpha_{\omega 1}(e - e^*) - \alpha_{\omega 2}(\sigma - \sigma^*) + \alpha_{\omega 3}(\pi - \pi^*)] \tag{A10}$$

$$\dot{b} = d + (r - \hat{p} - g_K)b \tag{A11}$$

$$\dot{r}^d = \lambda_r(r^T - r^d) \tag{A12}$$

where $g_K = \hat{K}, e = (T+M)/(N+N^C), \pi, r, p, x, r^d, \rho, \omega, \sigma = Y/K, b = B/K, d = D/K$ denote the net accumulation rate, the aggregate employment rate, the profit share, the nominal interest rate, the expected inflation rate, the target nominal interest rate, the expected medium term growth rate of demand, the average real wage, the ratio of public debt to capital, the ratio of the primary public deficit to capital.

Equations (A1)-(A5) reproduce the system from section 3.2. Equations (A6)-(A7) replace the simple static accumulation function in section 3.2 (equation (29)). The dynamics of the aggregate employment rate are given by equation (A8). Equations (A9)-(A12) describe the dynamics of expected inflation, the movements in real wages, the change in the ratio of public debt to capital and the gradual adjustment of nominal interest rates towards their target.

The values of $\sigma, C/K, I/K, G/K, \varsigma/K, y_T, y_M, \pi, \hat{w}, \hat{p}, d, r$ are determined by

the following static equations:

$$\sigma = \frac{Y}{K} = \frac{C + I + G}{K}$$

$$\frac{C}{K} = c(1 - t_1)(1 - \pi)\sigma + t_2(e^* - e)y^*\frac{N}{K} + \nu(1 + b)$$

$$\frac{I}{K} = \hat{K} + \delta$$

$$\frac{G}{K} = \gamma_1\sigma^* + \gamma_2 y^* e^*\frac{N}{K} + \gamma_3(e^* - e)^3 - \gamma_4 b$$

$$\frac{\varsigma}{K} = t_1\sigma - t_2(e^* - e)y^*\frac{N}{K}$$

$$y_T = \frac{\sigma}{\frac{T}{K}}$$

$$y_M = \frac{\sigma}{\frac{M}{K}}$$

$$\pi = 1 - \frac{\omega}{y}$$

$$\hat{w} = \beta_e(e - e^*) + \beta_\sigma(\sigma - \sigma^*) + \beta_\pi(\pi - \pi^*) + x$$

$$\hat{p} = \beta_1(\sigma - \sigma^*) + \beta_2\hat{w} - \beta_3(\pi - \pi^*) + (1 - \beta_2)x$$

$$d = \frac{G}{K} - \frac{\varsigma}{K}$$

$$r^T = \bar{r} + \theta_1(\hat{p} - \hat{p}^T) + \theta_2(e - e^*) + \theta_3(\sigma - \sigma^*)$$

$$r = \max\{0, r^d\}$$

$\hat{w}$ and $\hat{p}$ denote wage and price inflation; ς is taxes net of transfers. The dynamic equation for real wages (equation (A10)) – is derived by combining the wage and price Phillips curves. Substituting the wage Phillips curve into the price Phillips curve gives a reduced-form equation for price inflation as a function of the employment rate, the utilization rate, the profit share and the expected inflation rate:

$$\hat{p} = \alpha_{p1}(e - e^*) + \alpha_{p2}(\sigma - \sigma^*) + \alpha_{p3}(\pi - \pi^*) + x$$

The functional forms and parameter values imply that the model has a stationary solution with $(T/N)^* = (M/N)^* = 0.5, e^* = 14/17, y_T^* = y_M^* = 1, g_K^* = 0.03, x^* = 0.02, \gamma^* = 0.03, r^* = 0.05, \omega^* = 0.625, b^* = 0$.

Figures 11-13 illustrate some key patterns for three different values of the investment parameter λ_K that is central to the determination of the destabilizing forces. Figure 11 uses a value of the parameter ($\lambda_K = 1.16$) that generates limit cycles with amplitudes that are roughly the same as those in the simulations of the models in sections 3.1.and 3.2. In figure 12 the parameter has been reduced to $\lambda_K = 0.8$, leading to damped oscillations. The parameter is increased to $\lambda_K = 2$ in figure 13 which generates a limit cycle with a wide amplitude. The other parameter values used in the simulations are summarized in Table

33

1. Those relating to the equations for wage and price inflation are based on estimates in Flaschel and Krolzig (2006), Diallo et al. (2011) and Blanchard (2016); the Taylor rule follows the findings in Clarida et al. (2000) and Diallo et al. (2011); and the fiscal parameters are in line with average US data over the post-second-world-war period. See Skott (2023b) for details.

Table 1: Parameter values

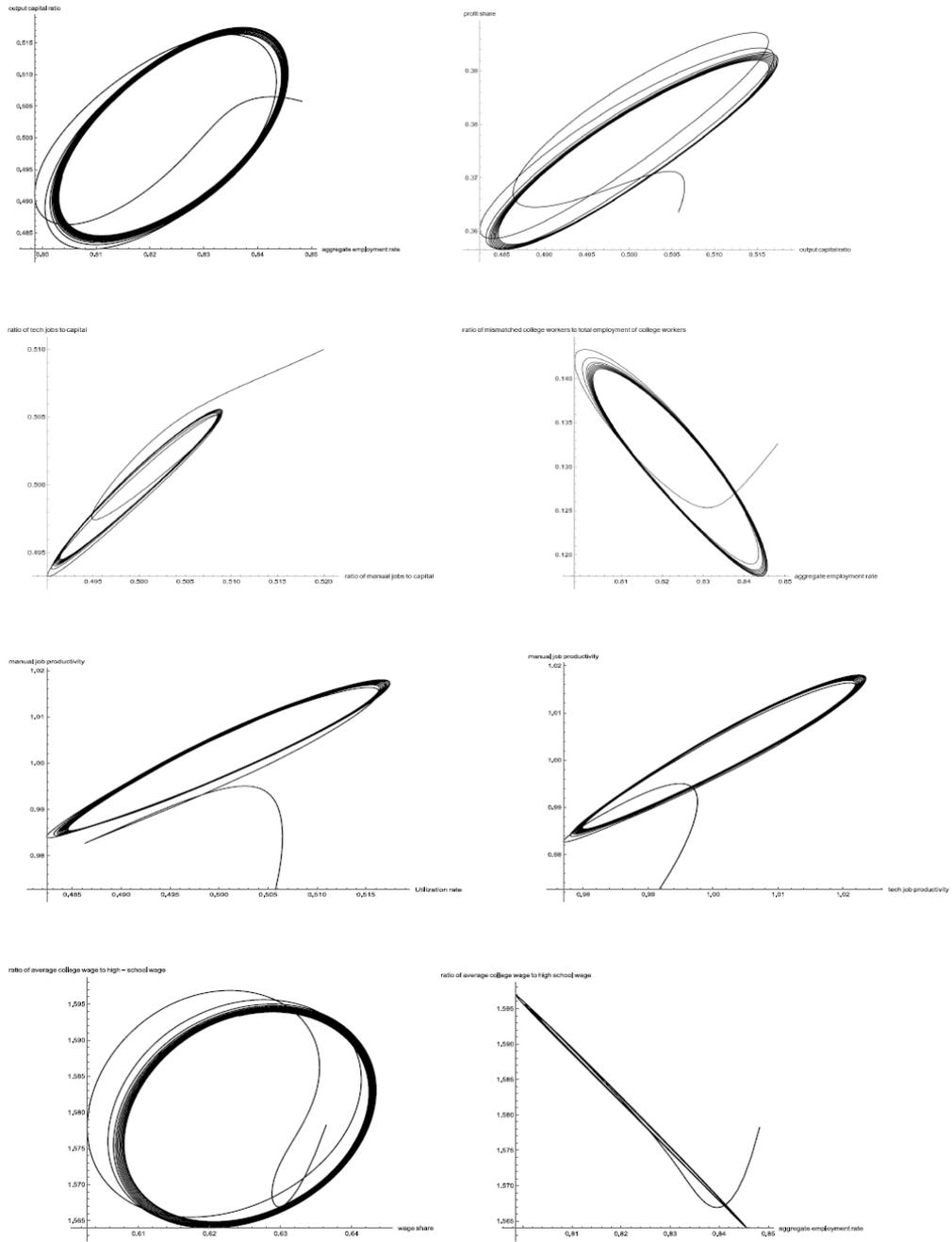|	
Phillips curve	$\alpha_{p1} = 0.3, \alpha_{p2} = 0.4, \alpha_{p3} = 0$
Inflation expectations	$\lambda_x = 0.3$
Real wage dynamics	$\alpha_{\omega1} = 0.5, \alpha_{\omega2} = 0.3, \alpha_{\omega3} = 0.5$
Target investment	$\rho_2 = 0.2, \rho_3 = 0.2, \rho_3 = 0.1, \rho_4 = 0.2, \delta = 0.07$
Investment adjustment	$\lambda_\rho = 0.4, \lambda_{g_K} = 2$
Government consumption	$\gamma_1 = 0.1, \gamma_2 = 0.1, \gamma_3 = 75, \gamma_4 = 0.05$
Taxation	$t_1 = 0.2, t_2 = 0.04$
Taylor rule	$\lambda_r = 2, \theta_1 = 2, \theta_2 = 0.5, \theta_3 = 0.5, \bar{r} = 0.05, \hat{p}^T = 0.02$
Natural growth rate	$n = 0.03$
Private consumption	$c = 1, \nu = 0.05$

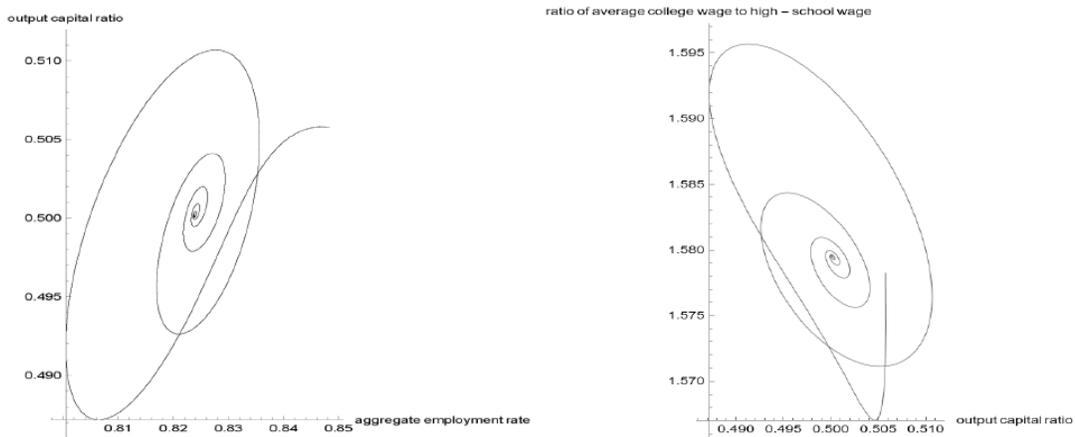Figure 11: Extended model with economic policy, inflation and heterogenenous labor; $\lambda_K = 1.16$

Figure 12: Extended model with economic policy, inflation and heterogenous labor; stable case, $\lambda_K = 0.8$
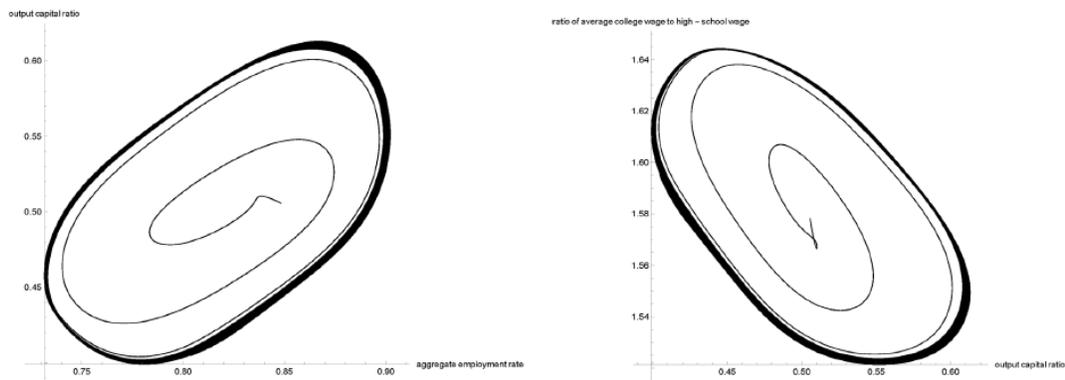

Figure 13: Extended model with economic policy, inflation and heterogeneous labor; highly unstable case ($\lambda_K = 2$)