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A Macro Perspective

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Abstract

In this paper we investigate, against the background of Goodwin's (1967) model, the macroeconomic consequences of the introduction of an unemployment benefit system and a minimum wage barrier for both skilled and unskilled workers. In the analyzed framework, characterized by free "hiring" and "firing" in the first labor markets, we can show a) that large fluctuations in employment are made (at least partially) socially acceptable through the workfare nature of the unemployment benefit system and b) that a minimum real wages provides additional stability to the system dynamics by decreasing the amplitude of the fluctuations in employment and income distribution (and the related degradation of the workforce skills and family structures) they are otherwise subject to.

Keywords: Distributive cycles, minimum wages, stability, combined wages, base income, workfare.

JEL classifications: E32, E64.

1 Introduction

In recent times a controversial debate about the establishment of minimum wages in certain sectors or even throughout the economy has taken place at several levels (in parliament, in the media and between economists) of the German society. This controversy has been triggered by the significant rise of jobs with low salaries at or even below the subsistence level since the 1990s – documented in Rhein and Stamm (2006) and Bosch and Kalina (2007) – on the one hand, as well as by the fact that the income of top managers has been rising drastically faster than the average income of employees over the last decades. For example, according to Klesse and Voss (2007), the annual income of top managers of the largest 100 companies in Germany with total revenues exceeding 5 billion Euro has increased by the factor 8 over the last 30 years – while the general level of earned income in the same period (GDP) has risen by the factor 4.5.

In the minimum wage debate, its opponents have argued, along the neoclassical tradition, with the employment costs of such a regulation, see e.g. Sinn (2007). The main argument is well known: According with the underlying notion that employers always hire labor up to the point where real wages equal their marginal product, a lower bound on the real wage rate reduces employment and, thus, raises unemployment with all its negative effects for the economy (assuming that the marginal product at the current point of employment is below the minimum real wage rate).

There are, however, important arguments which speak for a much weaker causal relationship between real wage increases and higher unemployment than it is predicted by the neoclassical framework: On the one hand, there is nowadays a broad consensus on the fact that institutions play a more important role than the for a long time only considered real wage effect in the determination of employment (the change of perspectives between the OECD-Job Study (1994) and the OECD-Employment Outlook (2006) in these respects is overwhelming). On the other hand, the rise in aggregate demand generated by the higher disposable income of low wage workers resulting from the establishment of a minimum wage is also likely to counteract the eventual decrease in employment, so that the final effect on output is not unambiguous a priori, as many neoclassical economists still state. But last but not least, the question of whether and to what extent societies succeed in achieving the fulfillment of human rights for all their citizens (since social progress implies an evolution of societies that comprises more than just economic goals in a narrow sense) is an important issue which should also be addressed in the minimum wage

debate and on general terms which should be a major concern for policy makers (an aspect often neglected by economists who look only at the economic sub-system of societies when enunciating policy recommendations).

In this paper we will therefore show in a supply side framework that minimum (real) wages can be beneficial to the working of a modern capitalist economy (characterized by a high state of labor productivity and income per worker), at least in the longer run. As we will discuss, when the minimum wage barrier is chosen properly, its introduction can lead to economic and social outcomes that clearly dominate the situation of no minimum wages (delaying at most the rise in employment to a certain degree). Since solutions to the mass unemployment problems should involve an active participation of both capital and labor, upper bounds in real wage evolution also may be of help in such a context. In addition, we emphasize however (from the perspective of the model of this paper), that proper minimum real wages and unemployment benefits should be accompanied by working regulations that allow flexible hiring and firing on the part of employers in the economy (as assumed by the model). Hence, employers should be able to react flexibly and quickly to changes in the economic situation.

Extending the work by Flaschel and Greiner (2008), we introduce in this paper low-skilled labor, with a money wage formation of a different type than in the high-skilled labor market. As we will show, since an additional minimum wage for this type of labor does not alter the macro-behavior of the economy to a significant extent, the introduction of such a minimum wage barrier in the low-skilled segment is likely to improve the overall performance of the economy, namely through the less severe fluctuations in economic activity as discussed in Flaschel and Greiner (2008). In addition, this measure is likely to increase the low skilled workers' social acceptance of their situation, which in this case is not completely decoupled from the normal path of the economy, since in this new framework the employers cannot exploit the weak bargaining power situation of the former without limits anymore. Temporarily, employment in this segment may suffer from such minimum real wages. Yet, in the longer run the economy is likely to function in a better way and, thus, also to bring about improvements in the situation of low-skilled workers.

The remainder of this paper is organized as follows. In section 2 we extend the classical Goodwin model of such an employment cycle – to be used in this paper as point of reference – with a labor market characterized by queuing features between two groups of workers, skilled and unskilled, and show how they react to low reservation wages and mass unemployment in particular. Section 3 considers

then a segmented dual labor market with the same two groups of workers and how general regulations concerning basic income needs, minimum wages, but also maximum wages modify (and improve) the employment dynamics of the Goodwin model. Section 4 concludes.

In the paper we assume real wage setting behavior (in a fixed proportions technology environment).[1]

2   The Classical employment cycle with a low wage income sector

In this section we provide an extended version of the Goodwin (1967) employment cycle model of the interaction of income distribution and (un-)employment, as measured by the wage share and the employment rate. This model will serve as a baseline framework for our subsequent discussion of the role of base income payments (unemployment benefits) for all unemployed members of the workforce and minimum wages for the employed part of the workforce.
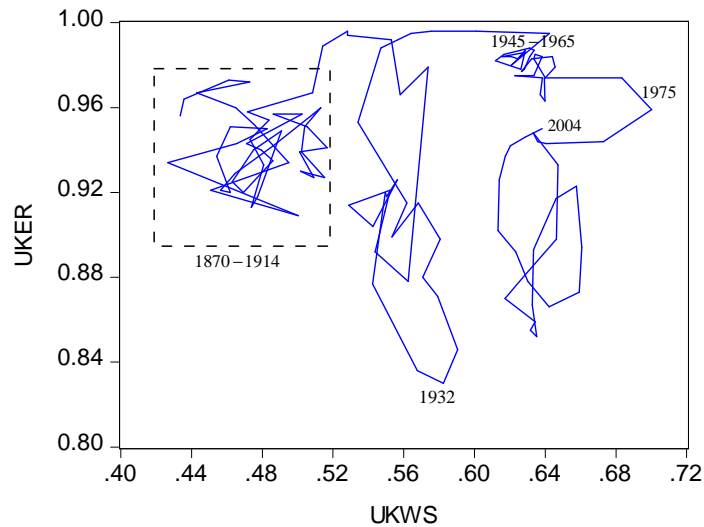

Figure 1: UK Distributive Cycles 1870–2004: WS=wage share, ER=employment rate

Considerations along these lines are still of great relevance: As figure 1 clearly shows, while Goodwin cycle in the UK seems to have been significantly shorter before

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[1]in place of a neoclassical production function, where employment would be determined by the slightly more general formula $w/p = F_L(K, L^d)$ with no change in the general conclusions of the paper.

1914, there has been a major change in it after 1945.[2] As illustrated in figure 1 by the data taken from Groth and Madsen (2007), it is clear that employment fluctuations have experienced an increase in their amplitude during the last 70 years in the UK economy. In fact, we see in figure 1 two periods of excessive over-employment (in the language of the theory of the NAIRU) which were followed by periods of dramatic long underemployment, both started by periods of the more or less pronounced occurrence of stagflation.

Generating order and economic viability in market economies by large swings in the unemployment rate (mass unemployment with human degradation of part of the families that form the society) is one way to make capitalism work, but it must surely be critically reflected with respect to its social and political consequences. From these alternative perspectives, such a reproduction mechanism does not appear to be compatible in the long-run with an advanced and democratic society.

The functioning of a capitalist market economy must therefore be contrasted with alternative social structures of accumulation and labor market institutions which allow to combine the situation of a highly competitive market economy (free hiring and firing) with a human rights bill that includes the right (and the obligation) to do (social) work (including the preservation of workforce skills), and to obtain an income from this work that at the least supports basic needs and basic happiness.[3] By contrast, a laissez-faire capitalistic society that ruins family structures to a considerable degree (through alienated work, degrading unemployment and education- and value-decomposing visual media) cannot be made compatible with a democratic society in the long-run, since it produces conflicts ranging from social segmentation to class- and racial clashes and more.

In this paper we want to discuss the working of the economy under the assumption of a normal Goodwinian labor market (workers of type 1) that is supplemented by (and interacts with) a low wage income labor market (workers of type 2) where we assume labor supply as being so abundant that there is no bottleneck created for the economy through this low income labor market. We can show in this framework that minimum real wages provide extra stability to such dynamics by decreasing the amount of overshooting in employment and distribution they are otherwise subject to. The labor market in this section is characterized by queuing features; when

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[2]This may be explained by significant changes in the adjustment processes of market economies for these two periods: primarily price adjustment before 1914 and primarily quantity adjustments after 1945.

[3]"basic" in the sense of "socially acceptable, socially desirable" rather than just "physical".

the skilled workers (type 1) do not find a job in the first labor market, they always find one in the second labor market and thus evict unskilled workers (type 2), which are then unemployed. In this simple model, if there is at first no redistribution scheme from the employed to the unemployed, then the unemployed have no income at all; we can assume that the unemployed have such a low utility value (concave utility function in terms of income) that any redistribution to them will increase the overall aggregate utility. Both working populations are stationary in time (and given by $\bar{L}_1, \bar{L}_2$) and we consider a fixed proportions technology with a given output capital ratio $\bar{x} = Y/K$ and two given employment functions of the type: $L_1^d = Y/\bar{y}_1, L_2^d = Y/\bar{y}_2$ for the two types of work corresponding to two labor markets that are performed in the industrial sector of the economy. The functioning of the labor market is illustrated in graphical form in figure 2 and all abbreviations are summarized in the table 1 on p. 25.
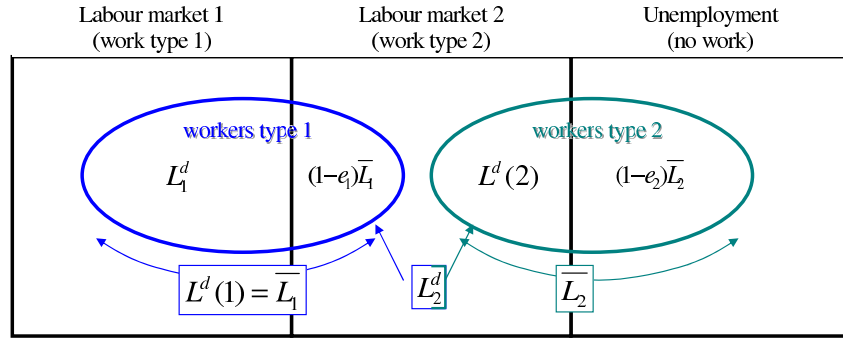

Figure 2: Labour market system in graphical form

Let us start with the detailed formulation of the model. The growth rate of the money wage of workers of type 1 is given by:

$$\hat{w}_1 = \beta_{we}(e_1 - \bar{e}_1) + \beta_{wv}(\omega_2 - \bar{\omega}_2) + \pi^e, \quad \hat{w}_1 = \dot{w}_1/w_1 \qquad (1)$$

For workers of type 2 we assume that their real wage is in principle fixed to the one of workers of type 1 by a factor a but that there will be additions to or substraction from it, depending on the state of the business cycle in the first labor market:

$$\omega_2 = a\omega_1 + b(e_1 - \bar{e}_1) \qquad (2)$$

Workers of type 2 are therefore not actively involved in wage negotiations, on the one hand, and have to suffer from income losses in the case of a depressed first labor market (and vice versa), on the other hand. Workers of type 1 are negotiating

nominal wages as in Goodwin (1967), but do this with more success when their reservation wage (the one of the second labor market) is increasing.

Assuming myopic perfect foresight with respect to price inflation ($\hat{p} = \pi^e$), the labor market dynamics can be reduced to the following two equations:[4]

$$\hat{v}_1 = \beta_{we}(e_1 - \bar{e}_1) + \beta_{wv}\bar{y}_2(v_2 - v_2^*), \quad v_1 = \frac{w_1 L_1^d}{pY} = \frac{\omega_1}{\bar{y}_1} \tag{3}$$

$$v_2 = av_1\frac{\bar{y}_1}{\bar{y}_2} + (b/\bar{y}_2)(e_1 - \bar{e}_1), \quad v_2 = \frac{w_2 L_2^d}{pY} = \frac{\omega_2}{\bar{y}_2} \tag{4}$$

where we now use the steady state value of v_2 (i.e. v_2^*) as point of reference for the reservation wage effect in the wage Phillips curve of workers of type 1.

Goodwin's accumulation equation for the rate of return on capital $\hat{K}$ reads in the considered framework on the basis of a linear technology with no technical change, (i.e., on the basis of the given input–output proportions $\bar{x} = Y/K = $ const., $\bar{y}_i = Y/L_i^d = $ const.), and of its extremely classical savings and investment assumptions ($s_c = 1; s_w = 0$) as follows:

$$\hat{K} = \dot{K}/K = \frac{Y - \delta K - \omega_1 L_1^d - \omega_2 L_2^d}{K} = \bar{x}(1 - v_1 - v_2) - \delta \tag{5}$$

with δ the depreciation rate of the capital stock.

Given the fixed input-output proportions $\bar{x}$ and $\bar{y}_1$, we get from the definitional equation $e_1 = L_1^d/\bar{L}_1$ the law of motion of this employment rate of workers of type 1:

$$\hat{e}_1 = \hat{K} = \bar{x}(1 - v_1 - v_2) - \delta = \bar{x}\left(1 - v_1 - av_1\frac{\bar{y}_1}{\bar{y}_2} - (b/\bar{y}_2)(e_1 - \bar{e}_1)\right) - \delta. \tag{6}$$

From the above expression we obtain an autonomous 2D system of differential equations in the state variables v_1, e_1:

$$\dot{v}_1 = [\beta_{we}(e_1 - \bar{e}_1) + \beta_{wv}\bar{y}_2(av_1\bar{y}_1/\bar{y}_2 + (b/\bar{y}_2)(e_1 - \bar{e}_1) - v_2^*)]v_1 \tag{7}$$

$$\dot{e}_1 = [\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)v_1 - (b/\bar{y}_2)(e_1 - \bar{e}_1)) - \delta]e_1. \tag{8}$$

as basis for our discussion of Classical unemployment cycles and their later modification through unemployment benefits and minimum wage payments.

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[4]Note here that v_1, v_2 represent the wage shares of the workers employed in sectors 1,2 and not the wage share of workers of type 1,2.

The uniquely determined interior steady state solution of this system is

$$v_1^* = \frac{(\bar{x} - \delta)\bar{y}_2}{(\bar{y}_2 + a\bar{y}_1)\bar{x}}, \quad e_1^* = \bar{e}_1 \tag{9}$$

With respect to this steady state position there holds:

Proposition:

1. The determinant of the Jacobian matrix of the dynamics at the steady state is positive for all positive parameter values of the dynamics (5), (6).

2. At the parameter values

$$\beta_{wv}^H = \frac{b}{a} \frac{e_1^* \bar{x}/\bar{y}_2}{\bar{y}_1 v_1^*}, \quad b^H = \frac{\beta_{wv}\bar{y}_1 a v_1^*}{e_1^* \bar{x}/\bar{y}_2}$$

there occurs a (degenerate) Hopf-bifurcation where explosive fluctuations are turned into damped ones for smaller β_{wv} and larger b. The interior steady state of the 2D dynamical system is then in particular locally asymptotically stable.

Proof: The Jacobian matrix of the considered dynamics reads at the steady state:

$$J = \begin{pmatrix} \beta_{wv}\bar{y}_1 a v_1^* & [\beta_{we} + \beta_{wv}b]v_1^* \\ -\bar{x}(1 + a\bar{y}_1/\bar{y}_2)e_1^* & -\bar{x}(b/\bar{y}_2)e_1^* \end{pmatrix} \tag{10}$$

For the determinant of this Jacobian we therefore get:

$$\begin{aligned} \det J &= [-\beta_{wv}ab\bar{y}_1/\bar{y}_2 + \beta_{we}(1 + a\bar{y}_1/\bar{y}_2) + \beta_{wv}(1 + a\bar{y}_1/\bar{y}_2)b]\bar{x}v_1^* e_1^* \\ &= (\beta_{we} + \beta_{wv}b + a\beta_{we}\bar{y}_1/\bar{y}_2)\bar{x}v_1^* e_1^* > 0. \end{aligned} \tag{11}$$

This proves the first part of the proposition. Due to this fact the system can only loose stability when the trace of J passes through zero and becomes positive. The above two bifurcation values exactly characterize such a situation.

The proposition states that increasing sensitivity of workers of type 1 to their reservation wage in the second labor market (i.e. increasing β_{wv}) can lead the economy towards instability, while an increase in the strength by which the state in the

first labor market changes the remuneration conditions in the second labor market (i.e. increasing b) outside the steady state stabilizes the economy.[5]

We have assumed with respect to workers of type 1 that they are always fully employed (though not necessarily in the first labor market). This implies for the employment $L^d(2)$ of low income workers in the second labor market the situation ($\bar{L}_1, \bar{L}_2$ given magnitudes):

$$L^d(2) = L_2^d - (1 - e_1)\bar{L}_1 \tag{12}$$

$$\Rightarrow e_2 = L^d(2)/\bar{L}_2 = (L_2^d/K)(K/\bar{L}_2) - (1 - e_1)\bar{L}_1/\bar{L}_2 \tag{13}$$

This gives (with $l_1 = \bar{L}_1/K = \frac{\bar{x}/\bar{y}_1}{e_1}, l_2 = \frac{\bar{L}_2}{\bar{L}_1}l_1, l = l_1 + l_2$):

$$\bar{e}_2 = \bar{x}/\bar{y}_2(K/\bar{L}_2) - (1 - \bar{e}_1)(\bar{L}_1/\bar{L}_2) = \bar{x}/\bar{y}_2/l_2 - (1 - \bar{e}_1)(l_1/l_2) \tag{14}$$

if everything is expressed in per unit of capital and evaluated at the steady state. This expression show the many parameters that are involved in the determination of the steady state rate of employment of the low income workers.

In order to draw a phase diagram of the dynamics considered in proposition 1 we now calculate the isoclines of their two laws of motion. These isoclines are given by straight lines defined by:

$$\dot{v} = 0 = [\beta_{we}(e_1 - \bar{e}_1) + \beta_{wv}\bar{y}_2(av_1\bar{y}_1/\bar{y}_2 + b/\bar{y}_2(e_1 - \bar{e}_1) - v_2^*)]v_1 \tag{15}$$

$$\dot{e} = 0 = [\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)v_1 - (b/\bar{y}_2)(e_1 - \bar{e}_1)) - \delta]e_1. \tag{16}$$

This implies as explicit representation for the two partial equilibrium curves:

$$e_1|_{\dot{v}=0} = \bar{e}_1 - \frac{\beta_{wv}(av_1\bar{y}_1 - v_2^*\bar{y}_2)}{\beta_{we} + \beta_{wv}b} = \bar{e}_1 - \frac{av_1\bar{y}_1 - v_2^*\bar{y}_2}{\beta_{we}/\beta_{wv} + b} \tag{17}$$

$$e_1|_{\dot{e}=0} = \bar{e}_1 + \frac{\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)v_1) - \delta}{\bar{x}b/\bar{y}_2} \tag{18}$$

We see that both lines are negatively sloped and that the second isocline is steeper than the first one. This implies as phase plot of the dynamics the situation shown in figure 3. Note that the steady state is in the north-west corner of the square shown in figure 3. Its placement in the middle of it is only due to graphical reasons. Note that there are two more steady states of the dynamics on the axes of the phase space which however will play no role in the following.

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[5]Note that assuming that output per unit of capital, x, depends to a certain degree on the relative living standard of the low income workers as variant of an efficiency wage hypothesis:

$$x = x(v_2 - v_2^*) = x(b(e_1 - \bar{e}_1)), \quad x' > 0$$

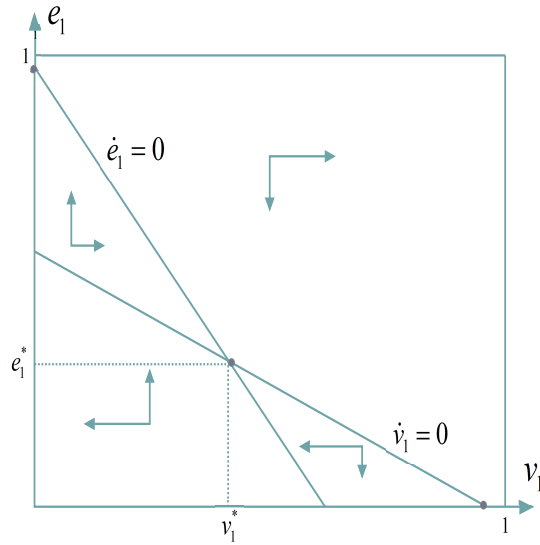would make the economy even more vulnerable in its stabilizing potential.

Figure 3: The phase diagram of the Goodwin wage spread cycle

The figure 3 shows the usual clockwise rotation of the Goodwin distributive cycle mechanism which may be damped or explosive depending on the conditions stated in proposition 1. In the explosive case we need however at least one additional mechanism that keeps the dynamics bounded within an economically meaningful part of the phase space. Since the axes of the phase space are invariant subsets, convergence to the axes can only take place if there is a steady state position as limit of this process. This can be excluded for the vertical axes since the interior dynamics is moving away from this steady state.

With respect to the steady state on the horizontal axes, we assume that the dynamics is bounded to the right as shown by the dotted line in figure 4. The motivation for this bound is that we may have mathematical adjustment process there that can lead the wage share v_1 by accelerating wage (price) dynamics to 1. Even before this point is reached, the economy is no longer capable of reproducing itself so that in one way or another the behavior of economic agents will change (or be changed) before such a situation can arise. For reasons of simplicity we have here assumed a wage-price freeze (as for example imposed on the U.S. economy by President Nixon in 1971). The dotted line shown in figure 4 shows a perfect wage – price freeze once its corresponding wage share level has been reached. As it is illustrated, the economy moves along it in a downward direction until the $\dot{v}_1 = 0$ isocline is reached from where it starts moving inside again. Since the axes of the positive quadrant cannot be approached in this area the economy must have

automatically a lower turning point (in the rate of employment) and a turning point
to the left (in the wage share). As the figure shows, it must also automatically have
an upper turning point (in the rate of employment): If not, it would (similarly to
the wage share) hit a ceiling (of absolute full employment) and move along it until
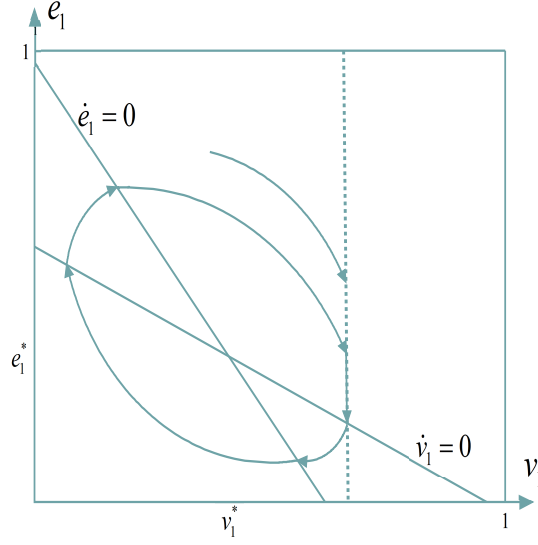it would again turn inside when the $\dot{e}_1$ isocline has been crossed.

Figure 4: A "Nixon" type wage-price freeze and the generation of persistent fluctu-
ations in employment and income distribution

Taken together, the model therefore implies in the explosive case the existence
of a limit cycle as shown in figure 4, which is rapidly approached from the outside
in the case of an overheated economy. The model is therefore capable of explaining
damped oscillations or persistent oscillation in the wage share and the employment
rate of workers of type 1 (the ones that are employed in the first labor market)
(as well as the possibility of crisis scenarios which would call for drastic political
reactions, as the system might be uncapable to find its way back to stability).

For the employment rate of the workers of type 2 we get on this basis as satellite
system:[6]

$$e_2 = \frac{\bar{x}/\bar{y}_2 - e_1 l_1}{l_2}, \quad v(2) = \frac{\omega_2}{\bar{y}_2} - \omega_2(1 - e_1)l_1\frac{1}{\bar{x}}. \tag{19}$$

Of course we need further modifications of the model, should one of these ex-
pression passes through zero. Note here that the model exhibits increasing wage

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[6]due to our assumption that workers of type 1 are always fully employed if both labor markets
are considered.

differentials in times of depressed activity ($e_1 < \bar{e}_1$) and that the wage share of workers of type 2 is in addition reduced by the workers of type 1 that are employed in the second labor market (i.e. the $(1 - e_1)$-term).

Let us now assume that there is a government wanting to mitigate the recurrent situations of mass unemployment (which means extreme poverty for workers of type 2 as they have then no income) and low wages in the second labor market by means of unemployment benefits as well as combined wages, for workers of type 2 respectively for workers in the labor market 2. We assume specifically that workers of type 1 working in the first labor market (who are never unemployed during the normal course of the established cyclical fluctuations in employment and income) have to pay a "solidarity" contribution of size $\tau \omega_1 L_1^d$ out of their wage income $\omega_1 L_1^d$ into a fund R out of which unemployment benefits and combined wages for the other workers are paid. The redistribution scheme is therefore intra-redistributive among workers type 1 as well as inter-redistributive between the two worker types. This gives as law of accumulation for these funds R :

$$\dot{R} = \underbrace{\tau \omega_1 L_1^d}_{\text{contributions}} - \underbrace{\psi_1(r)\omega_u(L_2 - L^d(2))}_{\text{unemployment benefits}} - \underbrace{\psi_2(\omega_{min} - \omega_2)L_2^d}_{\text{wage subventions}}, \quad 1 - \tau > a \quad (20)$$

The parameter ψ_2, regulating minimum wage payments to workers in the second segment if the labor market, is equal to zero for $\omega_{min} < \omega_2$ and it is equal to one for $\omega_{min} \geq \omega_2$. Moreover, there may be times when the funds R get exhausted (become zero). In order to prevent this over the normal course of the cycle, we assume that unemployment benefits ($\psi_1(r)\omega_u$) are a linearly increasing function of $r = R/K$ (in the range $[0, r^*]$), with $\psi_1(0) = 0, \psi_1(r^*) = 1$ and r^* the steady state value of r (to be determined still). This assumes that unemployment benefits are reduced linearly to zero if the fund for supporting workers of type 2 gets exhausted. Of course, other schemes are equally easy to introduce, for examples schemes that take the duration of unemployment into account. It here only serves the purpose that funds R can stay positive in principle if appropriate parameters are used to simulate the model. The justification for such a statement is that they have to be chosen such that combined wage payments can always be covered out of the new payments $\tau \omega_1 L_1^d$ during the period where they are actually paid.

For the evolution of funds $r = R/K$ per unit of capital this gives[7]

$$\dot{r} = \tau v_1 \bar{x} - \frac{r}{r^*}\omega_u(l - \bar{x}/\bar{y}_1 - \bar{x}/\bar{y}_2) - \psi_2(v_{min} - v_2)\bar{x} - (\bar{x}(1 - v_1 - v_2) - \delta)r \quad (21)$$

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[7]due to $\dot{r} = \dot{R}/K - \hat{K}r$.

with $v_{min} = \omega_{min}/\bar{y}_2 < v_2^*$ and ω_u given magnitudes. If the state variables v_1, e_1 are in their steady state position we get as special case

$$\dot{r} = \tau v_1^*/\bar{x} - \frac{r}{r^*}\omega_u(l^* - \bar{x}/\bar{y}_1 - \bar{x}/\bar{y}_2) \qquad (22)$$

We here assume finally that the value of r^* is given from the outside and that the value of ω_u is chosen such that $\dot{r} = 0$ holds at $r = r^*$.

This set of assumptions for the evolution of the variable r simply tailors the situation such that unemployment benefit payments and combined wages can actually be realized according to the rules just described. They serve the purpose to show how the Goodwinian cycle dynamics with two types of workers can be augmented such that basic needs of the workers of type 2 can be met in order to avoid their human degradation during the downswings of the cycle, with respect to employment by the benefits and with respect to wages in the second segment in the labor market by extra wage payments out of the funds R.

The important issue here is that these solidarity payments between workers employed in the first labor market and those temporarily or permanently in the second labor do not at all alter the accumulation dynamics shown in figure 4, since they only represent a redistribution of wages between workers that does not alter their total consumption of produced goods. The inclusion of such transfer payments therefore mitigate the lot of the poor workers, but do not question at all the two-level distributive reserve army mechanism of Goodwin type (with its typical overshooting effects in income distribution and employment at the aggregate) we have introduced in the previous section.

3 Free hiring and firing, income security and socially acceptable reserve army fluctuations

3.1 Human rights: Basic income and minimum wages

1 Everyone has the right to work, to free choice of employment, to just and favorable conditions of work and to protection against unemployment.

2 Everyone, without any discrimination, has the right to equal pay for equal work.

3 Everyone who works has the right to just and favorable remuneration ensuring for himself and his family an existence worthy of

human dignity, and supplemented, if necessary, by other means of social protection.

4 Everyone has the right to form and to join trade unions for the protection of his interests.

United Nations (1998, article 23): Universal Declaration of Human Rights, 1948 (http://www.un.org/Overview/rights.html)

Our purpose is to show that the quoted article 23 from the United Nations' declaration of Human Rights does not only represent a normative political statement, but can also be justified from the economic point of view in the context of analysis of the process of capital accumulation of this paper. We believe that capitalism is a very robust system of resource allocation and income distribution that can adjust to many social restrictions if these restrictions are justified from a normative point of view.[8]

In this section, we therefore augment the analysis of the working of the reserve army mechanism in a capitalist economy of the preceding section by two fundamental human rights: the right for basic (of course: real) income when getting unemployed (that cannot and need not be adjusted to lower values as in the preceding section), and the right to earn fair wages i.e. that do not fall below a certain real minimum level. Of course, there are also obligations connected with the formulations of these rights which concern the obligation to work, the need of skill preservation when unemployed and the provision of adequate social services for the considered society (as in a workfare system). In this paper however our focus relies on the macroeconomic sustainability of these minimum restrictions on the working of a capitalist economy and not on the detailed analysis on how such a system can work at the microlevel. We will argue that the social costs of reproduction mechanisms as they are shown in figures 3 and 4 are much higher than those produced within the above minimum restrictions by a capitalist economy and that it is the duty of capital as well as of labor to provide the necessary behavior such that these restrictions can be realized not only theoretically, but also – at least – in actual (advanced) capitalist democracies.

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[8]For more detailed discussions of such an approach, the reader is referred to Bowles, Gordon and Weisskopf's (1983) work 'Beyond the Waste Land' and in particular to their chapter on "an economic bill of rights".

3.2 Capital's and labor's responsibility: Minimum wages and basic income needs

We saw that in the queuing model neither the dynamics of the model nor its equilibrium values are altered if a redistribution scheme is introduced although the lot of the workers of type 2 greatly increase. In this section we consider another type of labor market which involves segmentation features and therefore is perhaps more realistic for European economies. In this market type workers of type 1 if they do not find a job on the labor market 1 become now unemployed (they do not evict workers of type 2 from their job positions in the labor market 2). Both labor markets functions in the same way and are represented graphically in figure 5.
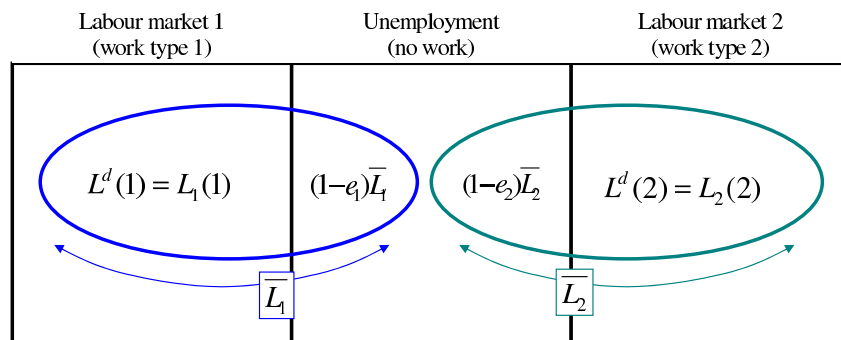

Figure 5: Labor market system in graphical form

Wages are still bargained in labor market 1 only and along a slightly modified Phillips curve:

$$\hat{w}_1 = \beta_{we}(e_1 - \bar{e}_1) + \hat{p} \tag{23}$$

This simplification is justified, since we will now assume that unemployment benefits for workers of the first type are higher than the wages paid to workers of the second type. The real wages of workers of type 2 are assumed now to be fully fixed to the one of workers of type 1 by a factor a and thus no longer overproportionally shrinking in periods of a depressed economy:

$$\omega_2 = a\omega_1, \qquad \omega_1 > \omega_1^{min} \tag{24}$$

Workers of type 2 are still not actively involved in wage negotiations, while workers of type 1 are negotiating nominal wages as in Goodwin (1967). Workers of type 1 do not enter the second labor market now,[9] i.e., the employment rates in both sectors

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[9]This requires the validity of $\omega_{1u} > a\omega_1$ for the admissible employment cycles of the model.

are now the ones of the two types of workers as pictured in figure 5. Following the new wage equation of the worker of type 2, the wage share of workers of type 2 is now given by:

$$v_2 = \frac{w_2 L_2^d}{pY} = \frac{\omega_2}{\bar{y}_2} = a v_1 \frac{\bar{y}_1}{\bar{y}_2} \tag{25}$$

Goodwin's accumulation equation is unchanged and reads:

$$\hat{K} = \dot{K}/K = \frac{Y - \delta K - \omega_1 L_1^d - \omega_2 L_2^d}{K} = \bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)v_1) - \delta. \tag{26}$$

Using again $Y/K = $ const. and $Y/L_1^d = $ const, we get from the definitional equation $e_1 = L_1^d/\bar{L}_1$ the law of motion of this employment rate of workers of type 1 ($\bar{L}_1 = const$):

$$\hat{e}_1 = \hat{K} = \bar{x}(1 - v_1 - v_2) - \delta = \bar{x}(1 - v_1 - a\bar{y}_1/\bar{y}_2 v_1) - \delta \tag{27}$$

From the above equation we get an autonomous 2D system of differential equations in the state variables v_1, e_1:

$$
\begin{aligned}
\dot{v}_1 &= \beta_{we}(e_1 - \bar{e}_1)v_1 & (28) \\
\dot{e}_1 &= [\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)v_1) - \delta]e_1. & (29)
\end{aligned}
$$

This system is of the original Goodwin (1967) type and no longer subject to intimidating effects we considered in the preceding section with respect to workers of type 1 and 2.[10]

For the evolution of unemployment funds $r = R/K$ per unit of capital we now assume:

$$\dot{r} = \tau_1 v_1/\bar{x} - \omega_{1u}(1 - e_1)l_1 + \tau_2 v_2 \bar{x} - \omega_{2u}(1 - e_2)l_2 \tag{30}$$

where $l_i = \bar{x}/(\bar{y}_i e_i), i = 1, 2$ now. There are no further deductions her, since minimum wages

$$\omega_1 > \omega_1^{min}, \qquad \omega_2 > \omega_2^{min} = a\omega_1^{min}$$

have to be paid by firms now due to legislation. We assume that the contributions to the unemployment benefits are regulated such that they are equal to benefits

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[10]Figures 3 and 4 are further valid in the aggregate. The fluctuations in the employment rate of the workers of type 2 are however smaller.

payments for each group separately in the steady state[11] defined as:

$$v_1^* = \frac{\bar{x} - \delta}{1 + a}, \ v_2^* = a v_1 \frac{\bar{y}_1}{\bar{y}_2}, \ e_1^* = \bar{e}_1, \ e_2^* = \frac{\bar{y}_1 L_1}{\bar{y}_2 L_2} e_1^* \tag{31}$$

We thus have in sum now a standard Goodwinian dynamics augmented by unemployment benefits for the two groups of workers which depending on the size of the cycle that is in operation demand for a certain initial value of R in order to get the sustainability of benefits payments over the cycle. Here the redistribution scheme is only intra-redistributive for each type of worker separately.[12]

The question now however is how the dynamics of the original Goodwin model are modified in the large through the assumption of a minimum wage rate for the employed workers that is not organized via wages subventions, but that has to be paid by firms. Figure 6 shows what is happening in the employment cycle dynamics if a minimum wage restriction $\omega_1^{min} > \omega_{1u}, \omega_2^{min} > \omega_{2u}$ is added to the model.
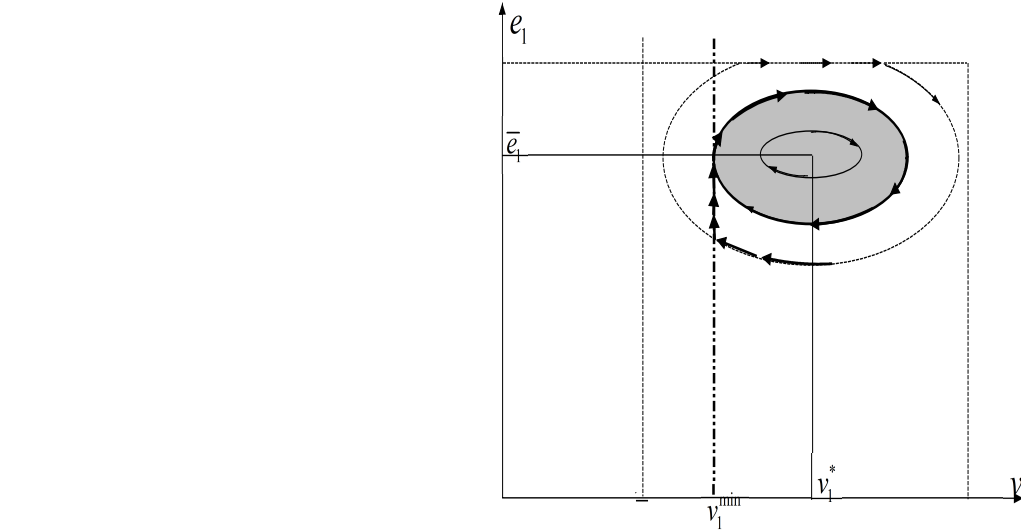

Figure 6: The distributive cycle with a minimum wage restriction

As long as the unrestricted cycle moves inside the grey area, nothing is changed because the minimum real wage is less than the lowest real wage along this cycle; The minimum wage restriction is in this case not binding. If however, as shown

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[11]This is guaranteed if $\tau_i = \frac{\omega_{iu}}{\omega_i^* e_i^*}$, $i = 1, 2$ holds true, expressions that can be shown to be smaller than 0.05 for reasonable parameter constellations.

[12]This may be seen as an unrealistic specification but a modification where the funds payments would be pooled and redistributed to all unemployed according to their respective type (which match much more the European unemployment benefits systems) would not alter the results.

by the largest cycle, the minimum wage bound is hit, the economy will move along this boundary upwards (since profitability is above the steady state profit rate) until the NAIRU rate of employment is reached. From there on real wages will be rising again along the cycle that is just tangent to the minimum wage restriction. The result therefore is that all larger cycles will be dampened towards this boundary case (around the grey area in figure 6). Minimum real wages therefore make the fluctuations the economy is subject to less severe, reduce among other stagflationary periods, and diminish the volatility in the employment rate in the longer run.

This is clearly an economically more desirable situation,[13] since excessive fluctuations of the aggregate employment rate are avoided now. This positive judgment is further strengthened due to the fact that all social consequences of unemployment can be avoided now through the transfer payments underlying this tamed operation of the Classical reserve army mechanism. Moreover, increasing minimum real wages moderately (to ensure that it will not exceed v_1^*) will improve this situation further while a return to a cold turkey strategy of no minimum wages at all may be the faster solution to end the depression, but one that reintroduces larger fluctuations in the employment rate and income distribution with all their social consequences. We thus have an improvement of the accumulation dynamics implied by the model supplemented by a system of unemployment benefit payments that – if appropriately tailored – can be maintained along the cycle.

Instead of pursuing such a radical strategy, this paper would propose a further reflection of the strategies that will make the distributive cycle even less severe and maybe also convergent to the steady state of the economy. The addition of Blanchard and Katz (1999) error correction may be a candidate here, being neoclassical smooth factor substitution another stabilizing mechanism,[14] (and, of course, any dialogue between workers' union and capitalists' unions can also be of help). The advantage of the Goodwin approach to the employment cycle is that it is not biased against capitalist interest, since it entails that workers' union bear responsibility for overshooting wage share and unemployment rates in the prosperity phase of the cycle.[15] Minimum wages come to the help of workers' unions in stagnant phases by avoiding more severe unemployment situations. Their responsibility however is to provide a similar mechanisms for the situation to the right of figure 6, see the next

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[13]Here we assume implicitly as standard in the literature that any departure from the steady-state is welfare reducing and that the welfare losses increase exponentially with the distance from steady-state.

[14]see Flaschel (2008, ch.4).

[15]See Wörgötter (1986) for the details of such an observation.

section, where prudent wage policies (and supporting fiscal and monetary policies) have to be found that avoid the occurrence of severe stagflation and its twin evils.

3.3 Capital's and Union's responsibility: Upper bounds for real wage increases

One may ask how the lower floor to real wage payments is in fact monitored in a society where wage negotiations are about money wages and not about real wages and are subject to collective bargaining (tariff autonomy). The answer to this question is however on the theoretical level not a difficult one, since it only demands that wage inflation has to be adjusted to price inflation (as in the Italian scala mobile case or in the French adjustment rule for the minimum wage) when minimum real wages are reached and as long as employment is below the NAIRU. The problem may of course be to reach agreement between capital and labor on the management of wage inflation in this phase of the distributive cycle, here primarily concerning capital, since labor is in the weaker position.
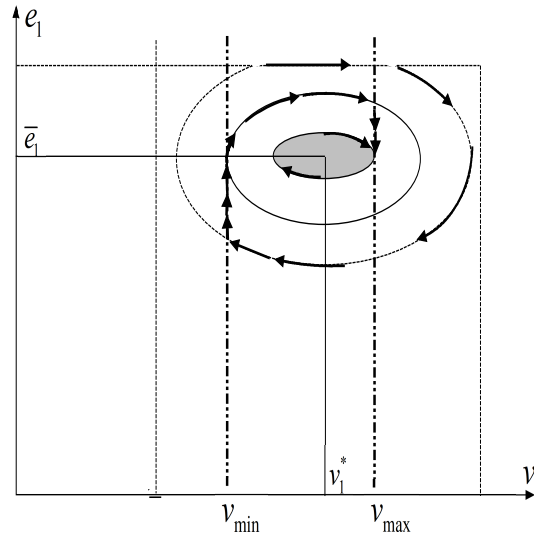

Figure 7: The distributive cycle with a maximum wage restriction

A compensation that can be offered by labor is that a similar rule is applied when labor is in a strong position, i.e., when the maximum real wage shown in figure 7 has been reached. Wage inflation is then higher than price inflation (since the real wage is increasing) and it demands now for a compromise primarily from the side of workers' unions to accept that there will be only inflationary compensation until

again the NAIRU level $\bar{e}$ has been reached (now from above). If such an agreement can be reached between capital and labor we get what is shown in figure 7 and thus a further improvement in the cyclical behavior that is generated by the wage-price Phillips curve mechanism and the pace of capital accumulation this implies.

The choice of the correct levels of minimum and maximum wages may however run into problems when set to close to the unobserved steady state level. Though this may dampen, on the one hand, the fluctuations in the rate of employment further if it really stays below (above) ω^*, it will, on the other hand, lead to disastrous consequences if set above the steady state level, since profits are then not sufficient to maintain even the current level of the employment rate which will fall without limit then if this choice of the minimum wage level is not revised. It may therefore be wise to use the minimum with a sense for proportions and look for help from the maximum real wage level in order to tailor the fluctuations in income distribution and employment in the best achievable way.

3.4 Automatic stabilizers: Blanchard and Katz error correction terms

We make use here of Blanchard and Katz's (1999) microfoundation of the wage Phillips curve which adds a wage share error correction term to the wage PC of this section. This microfounded type of Phillips curve extends the wage PC in the following way:

$$\hat{w}_1 = \beta_{we}(e_1 - \bar{e}_1) - \beta_{wv}(v_1 - v_1^*) + \hat{p} \tag{32}$$

We stress that the Blanchard and Katz (1999) approach makes use of a reservation wage (in a wage curve not Phillips curve setup) that is independent from the other labor market so that we now have v_1 in the implied wage Phillips curve in place of its extension by a v_2 expression in the preceding section. The dynamics to be investigated now reads:

$$
\begin{aligned}
\dot{v}_1 &= [\beta_{we}(e_1 - \bar{e}_1) - \beta_{wv}(v_1 - v_1^*)]v_1 \tag{33}\\
\dot{e}_1 &= [\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)v_1) - \delta]e_1. \tag{34}
\end{aligned}
$$

Making use of the Liapunov function:

$$H(v_1, e_1) = \int_{e_1^*}^{e_1} \beta_{we}(\tilde{e}_1 - e_1^*)/\tilde{e}_1 \ d\tilde{e}_1 - \int_{v_1^*}^{v_1} (\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)\tilde{v}_1) - \delta)/\tilde{v}_1 \ d\tilde{v}_1$$

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we get with respect to these dynamics the result:

$$
\begin{aligned}
\dot{H} &= H_{v_1}\dot{v}_1 + H_{e_1}\dot{e}_1 \\
&= -(\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)\tilde{v}_1) - \delta)\hat{v}_1 + \beta_{we}(e_1 - \bar{e}_1)\hat{e}_1 \\
&= -(\bar{x}(1 - (1 + a\bar{y}_1/\bar{y}_2)\tilde{v}_1) - \delta)(-\beta_{wv}(v_1 - v_1^*)) \\
&= (\bar{x}(1 + a)(v_1^* - v_1)\beta_{wv}(v_1 - v_1^*) = -\bar{x}\beta_{wv}(v_1 - v_1^*)^2 \leq 0
\end{aligned}
$$

The above potential function H is easily shown to be of the following qualitative form:
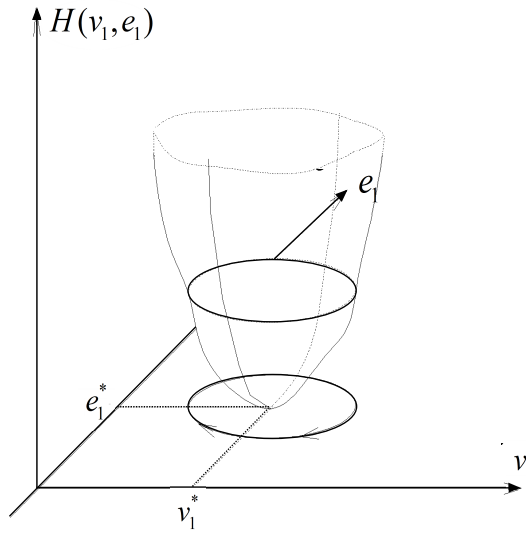

Figure 8: A Liapunov function for the dynamics of this section

Setting $\beta_{wv} = 0$ implies – due to the above – that the function $H(v_1, e_1)$ is constant along the trajectories of the simple Goodwin model this implies. The orbits of the above dynamics are then (as is well known) all closed curves, obtained by projecting the height lines in the figure 8 into the phase space of v_1, e_1.

The unrestricted Goodwin employment cycle with $\beta_{wv} > 0$ is however loosing height in the shown graph of the function H: Adding the Blanchard and Katz error correction term implies therefore that the dynamics are then globally convergent to the steady state of the economy, due to the facts that a) the function H is a global sink and b) the value of H is decreasing along the trajectories as was calculated above. To put it differently: The trajectories of the dynamics with the Blanchard and Katz error correction switched on are (nearly) always pointing inwards with respect to the closed orbits structure of the original Goodwin model. They must therefore converge to the steady state.

Since the cycles that so far resulted from either minimum or maximum real wages are tangent to these restrictions, we get from the above that they are only needed once to restrict the unrestricted excessive cycle to them. Thereafter such bounds are no longer necessary, since the next cycle remains inside of these bounds and converges to the steady state eventually. We thus get from the microfounded wage PC of Blanchard and Katz (1999) type, at least for Europe as their study is concerned, that minimum and maximum wages will dampen the fluctuations of the unrestricted reserve army mechanism significantly and make it thereafter convergent to its long run equilibrium position.

4 Conclusions

In this paper we departed from the conventional discussion of the impact of minimum wage legislation, which is only partial in nature, by considering the macroeconomic effects of such legislation or agreements between capital and labor. We think that sector specific rules concerning minimum wages can only be discussed against the background of such macrofoundations where the medium- and long-run consequences of minimum wages are the focus of interest and not so much the short-run adjustment problems such a legislation may cause.

Especially we have showed that for both labor market specifications (with queuing and with segmentation features) the introduction of a redistribution scheme (unemployment benefit and eventually wage subvention from a fund) do neither change the equilibrium values of the system nor its dynamics. We modified for the segmentation model, as it is a more realistic model for Europe, the redistribution scheme by introducing a minimum wage, i.e. a wage level that will not vary with the state of the fund but that is exogenously fixed by law. In this case too the equilibrium values are not altered, provided the minimum wages (for workers type 1 and 2 respectively) are not set too generously. The dynamics is reduced within bounds (defined by these minimum wages). So far, the minimum wage increases welfare in reducing the volatility of the cyclical up's and down's. The introduction of an error-correction term à la Blanchard and Katz (1999) in the Phillips curve even dampen the cyclical volatility toward the equilibrium values, still without affecting their levels.

We conclude however from what has been shown in this paper that the introduction of a general level of minimum (or maximum) real wages for both skilled and unskilled labor into a supply-side macro model of fluctuating employment does

not do much harm to capital accumulation and employment even in the shorter run and does definitely and significantly improve the performance of the implied cyclical employment path in the course of time. The introduction of a minimum wage does not only decrease to a larger extent the severity of fluctuations in the unemployment rates than in the unrestricted case (where there is an unlimited functioning of the wage-price spiral and the reserve army mechanism), but can also avoid the social consequences of mass unemployment through basic income payments – and an employer of last resort, if meaningful activities of the unemployed are added to the reformulated social structure of accumulation. An advanced society, in which the principle of equal opportunities holds in its schooling system, and where the unskilled/skilled distinction is turned into a skilled/high skilled distinction, may be a very important ingredient in the working of such a social structure, where partial workforce degradation is avoided by meaningful qualification processes of the unemployed and also life-long learning of the employed, see Flaschel, Greiner and Luchtenberg (2008) for further details on such a scenario.

The traverse to such an educated flexicurity system, where the notion of unskilled labor no longer applies, is however much more difficult to analyze than the simple traverses shown in the preceding section that led us away from ruthless advantage taking (by workers in the boom and by capital in the depression) towards a workfare type social structure of accumulation with considerably less severe fluctuations in employment rates and income distribution. Of course, there are, here too, practical obstacles on the way towards such a social structure of accumulation, given for example by the factual sclerosis of existing social structures (degraded long-term unemployed persons, segmented labor markets, degrading job offers and more). Globalization may also represent a big challenge for our reformulated Goodwin employment cycle dynamics, concerning international competition for traded commodities and services, workforce migration, outsourcing and more. This however essentially demands that the baseline workfare system discussed in this paper needs further refinements e.g. along the lines proposed in the Flaschel (2008, ch.10).

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A Abbreviations

Table 1: Variables in (nearly) order of appearence

Symbol	Math. Def.	Description
$^-$, *		Exogenous variable resp. endogenous steady-state value
$\hat{x}$, $\dot{x}$		Growth rate of x resp. absolute change of x
$\bar{L}_1$		Labor supply of workers of type 1, exogenously fixed
$\bar{L}_2$		Labor supply of workers of type 2, exogenously fixed
$\bar{x}$	$= Y/K$	Output-capital ratio, exogenous productivity
Y		Output (real)
K		Capital (real)
$\bar{y}_1$	$= Y/L_1^d$	Exogenous labor productivity in labor market 1
$\bar{y}_2$	$= Y/L_2^d$	Exogenous labor productivity in labor market 2
L_1^d	$= Y/\bar{y}_1$	Workers (of type 1) employed in labor market 1
L_2^d	$= Y/\bar{y}_2$	Workers (of types 1 and 2) employed in labor market 2
w_1		Money wage (of workers type 1) in labor market 1
w_2		Money wage (of workers types 1and 2) in labor market 2
ω_1		Real wage (of workers types 1) in labor market 1
ω_2		Real wage (of workers types 1 and 2) in labor market 2
e_1	$= L_1^d/\bar{L}_1$	Employment rate of workers type 1 in labor market 1
e_2	$= L_2^d/\bar{L}_2$	Employment rate of workers type 2 in labor market 2
π^e	$= \hat{p}$	Expected inflation rate (of myopic type)
v_1	$w_1 L_1^d/pY$	Wage share of workers employed in labor market 1
	$= \omega_1/\bar{y}_1$	
v_2	$w_2 L_2^d/pY$	Wage share of workers employed in labor market 2
	$= \omega_2/\bar{y}_2$	
s_c , s_w	s_c=1, s_w=0	Propensities to consume resp. to save
δ		Depreciation rate of capital
l_1	$=\bar{L}_1/K$	Labor supply-capital ratio of workers of type 1
	$=\bar{x}/(e_1\bar{y}_1)$	
l_2	$=\bar{L}_2/K$	Labor supply-capital ratio of workers of type 2
	$=\bar{x}/(e_2\bar{y}_2)$	
l	$= l_1 + l_2$	
$v(2)$	$=w_2 L^d(2)/pY$	Wage share of workers type 2
	$\neq v_2$	
τ	(queuing model)	Contribution tax rate on wages in labor market 1

Table continues on next page...

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Symbol	Math. Def.	Description
ω_u	(queuing model)	Exogeneously set real unemployment benefits for unemployed workers of type 2
ω_{min}	(queuing model)	Exogeneously set real minimum wage in labor market 2
$\psi_1(r)$	with $\psi_1(0)=0$ and $\psi_1(r^*)=1$	Varying parameter regulating minimum wage payments in labor market 2
ψ_2	$= 0$ or 1	Dummy variable controlling the payment of unemployment benefits in dependence of the state of the fund (R).
R		Social security fund
r	$= R/K$	Fund-capital ratio
v_{min}	$=\omega_{min}/\bar{y}_2$ $< v_2^*$	exogenous variable, set by legislation
τ_1 , τ_2	(segmented model)	Contribution tax rate on wages in labor market 1 resp. in labor market 2
ω_{1u} , ω_{2u}	(segmented model)	Exogeneously set real unemployment benefits for unemployed workers of type 1 resp. of type 2
Coefficients		
β_{we} , β_{wv}		Coefficients of the Phillips curve (labor market 1)
a, b		Coefficients of the wage-setting rule in labor market 2

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