DISCUSSION PAPER

0305

UNIONS, WAGE DIFFERENTIAL AND INDETERMINACY

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Abstract

In this paper, we are interested in the influence of labor market structure and wage differential on the occurrence of endogenous fluctuations. In this way, we introduce a dual labor market in an overlapping generations model. In the first sector, the wage comes from bargain between producers and unions, whereas the wage is perfectly competitive in the other sector. In this framework, we compare the conditions for indeterminacy respect to two different bargaining processes: the right to manage model and the efficiency bargaining model. We show that not only the labor market structure and the union bargaining power have an influence on local indeterminacy, but also the technological features.

Keywords: indeterminacy, dual labor market, unions, capital intensity

JEL classification: E32 J21 J23

1 Introduction

Recently, an increasing number of contributions allowed to better understand the sources of the occurrence of endogenous fluctuations. If product market imperfections have largely been exploited to explain these ones (Benhabib and Farmer [1999]), only a few economists is interested in the role of the the imperfection of the labor market. Notably, on one hand, some of them have introduced wage rigidities through efficiency wages (Coimbra [1999], De Palma and Seegmuller...
while on the other hand, others authors are interested in the influence of the market power of unions (Aloi and Lloyd-Braga [2001], Coimbra, Lloyd-Braga, and Modesto [1999], Jacobsen [2000], Lloyd-Braga and Modesto [2001]). Our paper belongs to the second kind of analysis. However, all existing papers ignore an important stylized fact, linked to the presence of unions, which is the existence of a wage differential within a dual labor market. As it is well-known, this approach has been developed by McDonald and Solow [1985]. In our paper, we consider a such framework in a dynamic macroeconomic model considering successively the two usual bargaining processes: the right to manage model initially developed by Nickell and Andrews [1983] and the efficiency bargaining model introduced by McDonald and Solow [1981]. The purpose of our work is to compare the conditions for indeterminacy in function of the nature of the contract, and the importance of the union bargaining power.

In order to do that, we introduce a dual labor market in an overlapping generations model. More precisely, a final good is produced by two sectors, an unionized and non-unionized one. This kind of segmented labor market notably refers to the economies where all workers cannot take advantage from the bargaining between firms and unions, as it is the case in USA or Australia. In these countries, the coverage rate does not concern non-unionized workers. Moreover, we assume that the unionized sector benefits from labor sector specific externalities. In this framework, we analyze local dynamics in order to study if the type of bargaining and union mark-up may influence the occurrence of indeterminacy. We can summarize our results as follows. If the capital intensity is greater in the non-unionized sector, indeterminacy always emerges whatever the level of union bargaining power and the kind of the bargaining. On the contrary, if the capital intensity is greater in the unionized sector, local indeterminacy only appears in the efficiency model, when the union bargaining power is high enough. So, the occurrence of indeterminacy does not only depend on the labor market structure, but also on technological features. In this sense, our conclusion can be related to Benhabib and Mishimura [1985], who analyze the role of capital intensity in multi-sector infinitely horizon models.

We organize the paper as follows. In section 2, we present the basic framework and the dual labor market. In section 3, we analyze the local dynamics. We conclude in the last section.

1For more details about union behavior, see Farber [1986], Oswald [1985].
2 The model

In this section, we first present consumer behavior and technologies. Then, we consider the two types of bargaining between firms and unions. More precisely, we begin by the case of wage bargaining and we continue with the case of efficiency bargaining.

2.1 The basic framework

In this paper, we consider an overlapping generations model with perfect foresight and discrete time, $t = 1, 2, \ldots, \infty$. At each period, a generation of consumers appears and lives two periods. The population of each generation is constant and equals to $\bar{L} > 2$. The households consume at the two periods of their life a unique final good which is the numeraire. When young, each consumer supplies or not one unit of labor ($d_t = \{0, 1\}$). The labor income is spent in final good $C_{1t}$ or saved through the purchase of capital $\tilde{K}_t$. The capital fully depreciates after one period of production. When old, he rents to firms the capital good at the expected rate $r_{t+1}$ and consumes the final good $C_{2t+1}$. At the first period, a generation of old live only one period and has the capital stock as unique endowment. Then, the problem solved by the consumer born at $t \geq 1$ is:

$$\max C_{1t}^aC_{2t+1}^{1-a} - vd_t$$  \hfill (1)

subject to

$$C_{1t} + \tilde{K}_t = w_{it}d_t$$  \hfill (2)

and

$$C_{2t+1} = r_{t+1}\tilde{K}_t$$  \hfill (3)

where $a \in (0, 1)$, $v > 0$ and $w_{it}$ is the wage of the consumer if he is employed in the sector $i = 1, 2$. We derive the following conditions:

$$C_{1t} = aw_{it}d_t$$  \hfill (4)

$$C_{2t+1} = (1 - a)r_{t+1}w_{it}d_t$$  \hfill (5)

and

$$\tilde{K}_t = (1 - a)w_{it}d_t$$  \hfill (6)

Substituting (4) and (5) into (1), we obtain the indirect utility:

$$V_t = u(r_{t+1})w_{it}d_t - vd_t$$  \hfill (7)

with $u(r_{t+1}) = a^a(1 - a)^{1-a}r_{t+1}^{1-a}$. The consumer decides to work if $V_t > 0$, not to work if $V_t < 0$ and is indifferent between working and not working if $V_t = 0$. 

3
In other words, the consumer chooses to supply one unit of labor if the wage is greater or equal to the reservation wage given by

$$\bar{w}_t = \frac{v}{u(r_{t+1})} \quad (8)$$

Concerning the production, we assume that there are two sectors, within firms produce the unique final good. The main difference between these two sectors comes from the structure of labor market. Indeed, in the first sector, the employees are represented by unions while in the second sector, the labor market is perfectly competitive. We implicitly refer to economies where all workers can not benefit of the advantage connected to bargaining between firms and unions. As an example, it is the case in the United States and Australia where the non-unionized workers have not the same right than the unionized workers. A second difference between the two sectors is due to technologies. More precisely, the share of capital and labor are different and the unionized sector benefits of sector specific labor externalities. Formally, the production in the first sector is the following:

$$Y_{1t} = A\bar{L}_t^{\delta}k_1^{\alpha}L_1 t \quad (9)$$

where $Y_{1t}$ denotes the production, $L_1t$ the number of employees, $k_{1t}$ the capital-labor ratio and $\bar{L}_t$ the externality which is taken as given by the firm. Concerning parameters, $\alpha \in (0, 1)$ is the capital share, $A > 0$ a scaling parameter and $\delta > 0$.

In the second sector, the production is given by:

$$Y_{2t} = Ak_{2t}^{\beta}L_2 t \quad (10)$$

where $Y_{2t}$ is the production, $L_2t$ the number of employees, $k_{2t}$ the capital-labor ratio and $\beta$ is the capital share ($\beta \in (0, 1)$, $\beta \neq \alpha$). In the following, we present the two types of bargaining that can take place in the unionized sector.

Before presenting the different bargaining types, we can note that the input markets in the second sector are perfectly competitive. So, the interest rate and the real wage are:

$$r_t = A\beta k_{2t}^{\beta-1} \quad \text{and} \quad w_{2t} = A(1 - \beta)k_{2t}^{\beta} \quad (11)$$

We assume that all workers are not employed in the unionized or non-unionized sectors ($L_{1t} + L_{2t} < \bar{L}$). Consequently, the economy is characterized by underemployment and the competitive wage is equal to the reservation wage or more formally

$$w_{2t} = \bar{w}_t \quad (12)$$

In the following, we study the labor market structure. More precisely, we analyze the determination of wages in the unionized sector and the allocation of workers between the two sectors.
2.2 Right to manage bargaining

There exists one union which represents all employees of the primary sector. The aim of the union is to maximize the sum of utilities of all of its members. It is not difficult to remark that the objective function of the union is:

\[ u(r_{t+1})(w_{1t} - \bar{w}_t)L_{1t} \]  

(13)

Concerning the firms, we suppose that before the bargaining process begin they have already committed to rent a certain level of capital. Since we consider the right to manage bargaining, the wage represent the only variable which is bargained. The level of the labor is chosen by the producers. The outcome of the bargaining process is the solution of the following generalized Nash bargaining:

\[
\max_{w_{1t}} [Y_{1t} - w_{1t}L_{1t}]^{1-\gamma}[u(r_{t+1})(w_{1t} - \bar{w}_t)L_{1t}]^\gamma
\]

(14)

s.t. \[ w_{1t} = (1 - \alpha)\tilde{A}\bar{L}_{11}^\delta k_{1t}^\alpha \]  

(15)

where \( \gamma \in (0, 1) \) denotes the bargaining power of the union. We can deduce from the first order condition:\(^2\)

\[ w_{1t} = \frac{1 - \alpha(1 - \gamma)}{1 - \alpha} \bar{w}_t \]  

(16)

Once the wage is determined, firms choose the level of capital that maximizes their profit \( Y_{1t} - \frac{1 - \alpha(1 - \gamma)}{1 - \alpha} \bar{w}_tL_{1t} - r_tK_{t-1} \). We obtain:

\[ r_t = \alpha\tilde{A}\bar{L}_{11}^\delta k_{1t}^{\alpha-1} \]  

(17)

We can note that zero profit condition is satisfied. Assuming the perfect mobility of capital, the interest rates of the two sectors are the same:

\[ \alpha\tilde{L}_{1t}k_{1t}^{\alpha-1} = \beta k_{2t}^{\beta-1} \]  

(18)

Using (11), (12) and (15), equation (16) can be rewritten:

\[ (1 - \alpha)\tilde{k}_{1t}^\alpha \tilde{L}_{1t}^\delta = \frac{1 - \alpha(1 - \gamma)}{1 - \alpha} (1 - \beta)k_{2t}^\beta \]  

(19)

\(^2\)The expected interest rate \( r_{t+1} \) is taken as given by firms and union.
From (18) and (19), we can determine the capital labor ratio in each sector:

\[ k_{1t} = \left( \frac{1 - \alpha (1 - \gamma)}{1 - \alpha} \right)^{\frac{\beta - 1}{\beta - \alpha}} \left( \frac{1 - \beta}{1 - \alpha} \right)^{\frac{\beta - 1}{\beta - \alpha}} \left( \frac{\alpha}{\beta} \right)^{\frac{\delta}{\beta - 1}} \frac{\bar{L}}{L_{1t} - \alpha} \equiv \hat{k}_{1t} \]  

(20)

\[ k_{2t} = \left( \frac{1 - \alpha (1 - \gamma)}{1 - \alpha} \right)^{\frac{\alpha - 1}{\beta - \alpha}} \left( \frac{1 - \beta}{1 - \alpha} \right)^{\frac{\alpha - 1}{\beta - \alpha}} \left( \frac{\alpha}{\beta} \right)^{\frac{\delta}{\beta - 1}} \frac{\bar{L}}{L_{1t} - \alpha} \equiv \hat{k}_{2t} \]  

(21)

Before determining the intertemporal equilibrium, we present the efficiency bargaining model.

### 2.3 Efficiency bargaining

In the case of efficiency bargaining, firms and union determine together the wage and employment in the primary sector. So, the outcome of the bargaining process is now the solution of the following generalized Nash bargaining:

\[
\max_{(w_{1t}, L_{1t})} \left[ Y_{1t} - w_{1t}L_{1t} \right]^{1-\gamma} \left[ u(r_{t+1})(w_{1t} - \bar{w}_t)L_{1t} \right]^{\gamma}
\]  

(22)

where \( \gamma \in (0, 1) \) denotes the bargaining power of the union. From the first order conditions, we derive:

\[ w_{1t} = (1 - \alpha (1 - \gamma))A \bar{L}^\delta L_{1t} L_{1t}^{\alpha} \]  

(23)

\[ \bar{w}_t = (1 - \alpha)A \bar{L}^\delta L_{1t} L_{1t}^{\alpha} \]  

(24)

The figure 1 represents the dual labor market within an efficiency bargaining model.

The firms choose the level of capital which maximizes the profit, taken as given the level of wage and employment (equations (23) and (23)) in the primary sector. Since the profit can be written as follows \( (1 - \gamma)Y_{1t} - (1 - \gamma)\bar{w}_t L_{1t} - r_t K_{1t-1} \) the real interest rate is equal to

\[ r_t = (1 - \gamma)\alpha A \bar{L}^\delta L_{1t} L_{1t}^{\alpha - 1} \]  

(25)

which ensures that profits are zero at the equilibrium. Since the capital mobility between the two sectors is perfect, the interest rate levels are the same. Using (11) and (25), we obtain:

\[ (1 - \gamma)\alpha \bar{L}^\delta L_{1t} L_{1t}^{\alpha - 1} = \beta k_{2t}^{\beta - 1} \]  

(26)
Furthermore, since the secondary sector is perfectly competitive, the wage in this sector is equal to the reservation wage. Using (11) and (24), this condition leads to:

\[(1 - \alpha)\bar{L}_{1t}^\delta k_{1t}^\alpha = (1 - \beta)k_{2t}^\beta\]  \hfill (27)

From equations (26) and (27), we can deduce the level of capital labor ratio in each sector:

\[k_{1t} = \left(\frac{(1 - \gamma)\alpha}{\beta}\right)^{\beta - \alpha} \left(\frac{1 - \beta}{1 - \alpha}\right)^{\beta - \alpha} \frac{\delta}{\bar{L}_{1t}^{\beta - \alpha}} \equiv \tilde{k}_{1t}\]  \hfill (28)

\[k_{2t} = \left(\frac{(1 - \gamma)\alpha}{\beta}\right)^{\beta - \alpha} \left(\frac{1 - \beta}{1 - \alpha}\right)^{\beta - \alpha} \frac{\delta}{\bar{L}_{2t}^{\beta - \alpha}} \equiv \tilde{k}_{2t}\]  \hfill (29)

In what follows, we define the intertemporal equilibrium considering successively the case of the right to manage bargaining and the efficiency bargaining.

### 2.4 Intertemporal equilibrium

At equilibrium, \(L_{1t} = L_{1t}\). Moreover, since we assume underemployment, the equilibrium on the labor market is \(L_{1t} + L_{2t} + L_{ut} = \bar{L}\), where \(L_{ut}\) represents the level of underemployment. Concerning the capital market, we can remark that the aggregate level of capital \(K_{t-1} = K_{1t-1} + K_{2t-1} = k_{1t}L_{1t} + k_{2t}L_{2t}\). Using (6)
and (8), we obtain the two following dynamic equations:

\[
\begin{align*}
  k_{1t+1}L_{1t+1} + k_{2t+1}L_{2t+1} &= (1 - a)(w_{1t}L_{1t} + w_{2t}L_{2t}) \\  w_{2t} &= \frac{v}{a^a(1 - a)^{1-a}r_{t+1}^{1-a}}
\end{align*}
\]  

(30)  

(31)

These two equations describe a two-dimensional dynamic system. Indeed, for all bargaining, given \((L_{1t}, L_{2t})\), the relations (30) and (31) allow to determine \((L_{1t+1}, L_{2t+1})\). Obviously, the expressions linking \(w_{1t}, w_{2t}, r_t, k_{1t}\) and \(k_{2t}\) to \(L_{1t}\) and \(L_{2t}\) depends on the bargaining model considered.

**Definition 1** An intertemporal equilibrium with perfect foresight is a sequence \((L_{1t}, L_{2t}) \in \mathbb{R}_+^2, t = 1, 2, \ldots, \infty\), such that (30) and (31) are satisfied, where

(i) \(w_{1t}, w_{2t}, r_t, k_{1t}\) and \(k_{2t}\) are defined by (15), (11), (20) and (21) in the right to manage bargaining;

(ii) \(w_{1t}, w_{2t}, r_t, k_{1t}\) and \(k_{2t}\) are defined by (23), (11), (28) and (29) in the efficiency bargaining model.

In the next section, we study how the bargaining type affects the local dynamics and the indeterminacy of the steady state.

## 3 Local dynamics

The aim of this section is to analyze the occurrence of indeterminacy of the steady state. We establish that the bargaining power and the capital intensity of each sector affect the local dynamics. Moreover, we also show that the way to bargain between firms and union yields different results. In order to do that, we first determine the existence of a steady state in the two bargaining models. Then, we characterize the local dynamics by differentiating the dynamic system (30) and (31).

### 3.1 Indeterminacy in the right to manage model

In the right to manage model, the dynamic system (30) and (31) can be written:

\[
\begin{align*}
  \dot{k}_{1t+1}L_{1t+1} + \dot{k}_{2t+1}L_{2t+1} &= (1 - a) \left[ (1 - \alpha)A\dot{k}_{1t}^{\alpha}L_{1t}^{1+\delta} + (1 - \beta)A\dot{k}_{2t}^{\beta}L_{2t} \right] \\  (1 - \beta)A\dot{k}_{2t}^{\beta} &= \frac{v}{a^a(1 - a)^{1-a} \left[ A\beta\dot{k}_{2t}^{\beta-1} \right]^{1-a}}
\end{align*}
\]  

(32)  

(33)

\(^3\)For convenience, the dynamics is generated by \((L_{1t}, L_{2t})\), but it is important to note that there is a predetermined variable, which is the aggregate capital.
where \( \hat{k}_{1t} \) and \( \hat{k}_{2t} \) are given by (20) and (21), which only depend on \( L_{1t} \).

A steady state of this dynamic system is a solution of equations (32) and (33) such that \( L_{1t} = L_{1t+1} \) and \( L_{2t} = L_{2t+1} \). We establish the existence of a steady state \( (L_1, L_2) = (1, 1) \) by choosing appropriate values of the scaling parameters \( A > 0 \) and \( v > 0 \). From the relation (32), we derive the unique value of \( A \):

\[
A = \frac{\hat{k}_1 + \hat{k}_2}{(1 - a) \left[ (1 - \alpha)\hat{k}_1^\alpha + (1 - \beta)\hat{k}_2^\beta \right]} \tag{34}
\]

where

\[
\hat{k}_1 = \left( \frac{1 - \alpha(1 - \gamma)}{1 - \alpha} \right) \left( \frac{\beta - 1}{\beta - \alpha} \right) \left( \frac{1 - \beta}{1 - \alpha} \right) \left( \frac{\alpha}{\beta} \right) \left( \frac{\beta - 1}{\beta - \alpha} \right) \tag{35}
\]

\[
\hat{k}_2 = \left( \frac{1 - \alpha(1 - \gamma)}{1 - \alpha} \right) \left( \frac{\alpha - 1}{\beta - \alpha} \right) \left( \frac{1 - \beta}{1 - \alpha} \right) \left( \frac{\alpha}{\beta} \right) \left( \frac{\alpha}{\beta - \alpha} \right) \tag{36}
\]

Substituting this value of \( A \) in the relation (33), there is an unique \( v > 0 \) ensuring the existence of \( (L_1, L_2) = (1, 1) \). ⁴

In order to study local indeterminacy, we differentiate the system (32) and (33) in the neighborhood of \( (L_1, L_2) = (1, 1) \). Since the Jacobian matrix is triangular, we derive easily the two eigenvalues:

\[
\lambda_1 = (1 - a)(1 - \beta)A\hat{k}_2^{\beta-1} \tag{37}
\]

\[
\lambda_2 = \frac{\beta}{(1 - a)(1 - \beta)} \tag{38}
\]

We can note that \( \lambda_2 \in (0, 1) \) if \( 1 - a > \beta/(1 - \beta) \). Furthermore, using (34), (35) and (36) \( \lambda_1 \) can be rewritten:

\[
\lambda_1 = \frac{\alpha - 1}{\beta(1 - \alpha)}(1 - \alpha(1 - \gamma)) + 1 - \alpha \frac{2 - \alpha(2 - \gamma)}{\equiv \hat{\lambda}_1(\gamma)} \tag{40}
\]

It is not difficult to see that \( \hat{\lambda}_1(\gamma) \) is monotone with respect to \( \gamma \). Furthermore, we

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⁴Since we study the dynamics in the neighborhood of the steady state, we do not analyze uniqueness or multiplicity of stationary solutions.
can compute $\hat{\lambda}_1(0)$ and $\hat{\lambda}_1(1)$:

$$
\hat{\lambda}_1(0) = \frac{\alpha(1 - \beta)}{\beta} + 1 - \alpha 
\hat{\lambda}_1(1) = \frac{\alpha (1 - \beta)}{2 - \alpha} + 1 - \alpha
$$

We can notice that $\hat{\lambda}_1(0)$ and $\hat{\lambda}_1(1)$ are greater than 1 if $\alpha > \beta$, whereas $\hat{\lambda}_1(0)$ and $\hat{\lambda}_1(1)$ are positive and smaller than 1 if $\alpha < \beta$. These findings allows us to establish the following proposition:

**Proposition 1** Assume that $1 - a > \beta/(1 - \beta)$. In the right to manage model, the steady state is a saddle when $\alpha > \beta$ and is a sink (locally indeterminate) if $\alpha < \beta$.

We continue the study by analyzing the efficiency bargaining model.

### 3.2 Indeterminacy in the efficiency bargaining model

In the efficiency bargaining model, the dynamic system (30) and (31) can be written:

$$
(1 - \beta)\tilde{k}_{2t} = \frac{\alpha (1 - \beta)}{a^a(1 - a)^{1-a} [A\beta \tilde{k}_{2t-1}]^{1-a}}
$$

where $\tilde{k}_{1t}$ and $\tilde{k}_{2t}$ are given by (28) and (29), which only depend on $L_{1t}$.

As in the previous model, a steady state of this dynamic system is a solution of equations (43) and (44) such that $L_{1t} = L_{1t+1}$ and $L_{2t} = L_{2t+1}$. We choose appropriate values of $A > 0$ and $v > 0$ ensuring the existence of a steady state $(L_1, L_2) = (1, 1)$. From the relation (43), we derive the unique value of $A$:

$$
A = \frac{\tilde{k}_1 + \tilde{k}_2}{(1 - a) \left( 1 - \alpha(1 - \gamma) \right) \tilde{k}_1^\alpha + (1 - \beta) \tilde{k}_2^\beta}
$$

where

$$
\begin{align*}
\tilde{k}_{1t} &= \left( \frac{(1 - \gamma)\alpha}{\beta} \right) \frac{\beta}{\beta - \alpha} \left( \frac{1 - \beta}{1 - \alpha} \right) \frac{\beta - 1}{\beta - \alpha} \\
\tilde{k}_{2t} &= \left( \frac{(1 - \gamma)\alpha}{\beta} \right) \frac{\alpha}{\beta - \alpha} \left( \frac{1 - \beta}{1 - \alpha} \right) \frac{\alpha - 1}{\beta - \alpha}
\end{align*}
$$
Substituting this value of \( A \) in the relation (44), there is an unique \( v > 0 \) ensuring the existence of \( (L_1, L_2) = (1, 1) \).

Differentiating the system (43) and (44) in the neighborhood of \( (L_1, L_2) = (1, 1) \), we obtain the two eigenvalues:

\[
\lambda_1 = (1 - a)(1 - \beta)A\tilde{k}_2^{-1} \\
\lambda_2 = \frac{\beta}{(1 - a)(1 - \beta)}
\]

As in the previous section, \( \lambda_2 \) is smaller than 1 if \( 1 - a > \beta/(1 - \beta) \). Moreover, using (45), (46) and (47) \( \lambda_1 \) can be rewritten:

\[
\lambda_1 = \frac{\alpha \beta(1 - \beta)(1 - \gamma) + 1 - \alpha}{2 - \alpha(2 - \gamma)} \equiv \tilde{\lambda}_1(\gamma)
\]

We can first remark that \( \tilde{\lambda}_1(\gamma) \) is decreasing. Secondly, we can determine \( \tilde{\lambda}_1(\gamma) \) when \( \gamma = 0 \) and \( \gamma = 1 \):

\[
\tilde{\lambda}_1(0) = \frac{\alpha(1 - \beta) + 1 - \alpha}{2(1 - \alpha)} \\
\tilde{\lambda}_1(1) = \frac{1 - \alpha}{2 - \alpha}
\]

We note that \( \tilde{\lambda}_1(1) \in (0, 1) \), \( \tilde{\lambda}_1(0) > 1 \) if \( \alpha > \beta \) and \( \tilde{\lambda}_1(0) < 1 \) otherwise. Then we can compute the value \( \gamma \) such that \( \tilde{\lambda}_1(\gamma) = 1 \) which is given by \( \gamma = 1 - \beta/\alpha \). From these results, we can deduce the following proposition:

**Proposition 2** Considering the efficiency bargaining model, we assume that \( 1 - a > \beta/(1 - \beta) \). If \( \alpha < \beta \), the steady state is always a sink (locally indeterminate). If \( \alpha > \beta \), the steady state is a saddle if \( \gamma < \tilde{\gamma} \) and is a sink (locally indeterminate) if \( \gamma > \tilde{\gamma} \).

### 3.3 Discussion

We can summarize the results obtained in two preceding sections as follows. When the capital intensity of the non-unionized sector is greater than in the unionized sector, local indeterminacy emerges whatever the form of the bargain and the level of bargaining power. On the contrary, when the capital intensity of the unionized sector is higher than in the non-unionized one, local dynamics depend on the
type of contract and the level of bargaining power. More precisely, endogenous fluctuations cannot occur in the right to manage model, whereas they can emerge in the efficiency bargaining model if the bargaining power is sufficiently high (see Tab. 1).

<table>
<thead>
<tr>
<th></th>
<th>$\alpha &gt; \beta$</th>
<th>$\alpha &lt; \beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right to manage</td>
<td>saddle</td>
<td>indeterminacy</td>
</tr>
<tr>
<td>Efficiency</td>
<td>indeterminacy ($\gamma &gt; \hat{\gamma}$)</td>
<td>indeterminacy saddle ($\gamma &lt; \hat{\gamma}$)</td>
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</tbody>
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Table 1: Local dynamics, bargaining contracts and capital intensity

We can note that these conclusions do not depend on the level of externalities. It means that, contrary to several existing papers, endogenous fluctuations can occur without strong increasing returns to scale, which is in accordance with recent empirical studies. However, $\delta > 0$ is necessary in order to keep a two-dimensional dynamic system because otherwise this last one collapses to a unique dynamic equation.

We now explain these results in more economic terms, and we begin with the case where the capital intensity is greater in the non-unionized sector. Assume that consumers expect a higher future interest rate which decreases the reservation wage. Since the non-unionized wage is equal to this reservation wage, the capital intensity decreases in this sector. From (20) and (21), it is not difficult to see that the labor and the capital-labor ratio in the unionized sector vary in the same direction. As a consequence, the wage earning and then the future capital stock decrease. This implies that the unionized labor and the capital-labor ratios of the two sectors go down. Finally, we can conclude that the future real interest rate raises which means that the expectations are self-fulfilling.

We continue by explaining the case where the capital intensity in the unionized sector is greater than in the other sector. Consider first the right to manage model. As before, assume a decrease of the reservation wage coming from an expectation of a higher future interest rate. This also decreases the capital-labor ratios in the two sectors but raises the level of employment in the unionized sector ((28) and (29)). These contrary effects lead to weak variations of the wage earning structure and then of future capital stock. Consequently, expectations cannot be self-fulfilling and it is independent on the level bargaining power. In the efficiency bargaining model, the same interpretation apply for a weak bargaining power. However, when this bargaining power becomes high enough, the effects of the capital-labor ratios of the two sectors dominate. First, they imply a decrease of the wage earning income and the future capital stock. Secondly, they allow also a increase of the future employment in the unionized sector, due to a decrease of
aggregate capital stock. Then the future interest rate raises which put in light that expectations are self-fulfilling.

We can also notice that the occurrence of endogenous fluctuations can be related to the issue of the intertemporal inefficiency. Since the population is constant and capital totally depreciates after one period of use, there is intertemporal inefficiency if the interest rate is smaller than one. At the steady state, \( r < 1 \) in the right to manage model when \( \alpha < \beta \). In the efficiency bargaining model, \( r < 1 \) when \( \alpha < \beta \) or \( \alpha > \beta \) and \( \gamma > \tilde{\gamma} \).

\[ \text{So, in our framework, the occurrence of indeterminacy is related to intertemporal inefficiency.} \]

4 Conclusion

In this paper, we show that the labor market structure can be a source of indeterminacy and then can explain endogenous fluctuations. Indeed, we can conclude that the bargaining power of unions and the bargaining process can play a role on local dynamics. However, the results also depend on the technological characteristics, more precisely the capital intensity in each sector.

Consequently, a policy, which aims to reduce the union bargaining power in order to stabilize the economic activity, has to be taken carefully. Indeed, our results show that if the capital intensity is greater in the non-unionized sector, such policy has no effects on the instability of the economy.

References


\[ \text{In the right to manage model, } r \text{ is given at the steady state by: } r = \frac{(1-\alpha)(1-\gamma)(1-\beta)(1-\alpha)+(\alpha(1-\beta))}{(1-\alpha)(1-\beta)(1-\gamma)(2-\gamma)}. \]

\[ \text{In the efficiency bargaining model, } r = \frac{\beta}{(1-\alpha)(1-\beta)} \frac{(1-\gamma)(2-\gamma)\alpha/\beta+1-\alpha}{2-\alpha(2-\gamma)}. \]

Under our assumption \( \beta < (1-a)(1-\beta) \), \( r < 1 \) when \( \alpha < \beta \) in the right to manage model, and if \( \alpha < \beta \) or \( \alpha > \beta \) and \( \gamma > \tilde{\gamma} \) in the efficiency bargaining model.


