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International Political Spillovers: □  
the case of labor market □  
regulation □

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International Political Spillovers:  
the Case of Labour Market Regulation

Giovanni Pica

## ABSTRACT

This paper explores how the political support for Labour Market Regulation (LMR) is affected by economic and political integration in a two-country OLG model. We model LMR as wage regulation and analyse three institutional settings: Autarchy, Economic Union and Political Union. In Autarchy capital cannot flow across borders and each country sets its most preferred level of regulation. In the Economic Union capital markets are integrated, while political decisions are not. In the Political Union a common level of LMR is set at a centralized level. In Autarchy, LMR may endogenously arise if the economy is dynamically efficient. In this case, despite the distortions generated in the labour market, LMR increases the welfare of the young, because it raises their permanent income, their savings and the steady state capital stock. In the Economic Union, capital outflows make the implementation of LMR more costly and provide incentives for each country to undercut the rival in order to attract capital. Thus, a race-to-the-bottom takes place and the steady state level of LMR decreases, harming the young individuals. The Political Union restores, under symmetry, the autarchic outcome and welfare levels. The asymmetric case is also analysed.

*JEL Classification:* J30-J50-J60-F21-L5

*Keywords:* Globalisation, Under-employment, Factor mobility, Political integration, OLG model, Dynamic efficiency, Factor shares, Political economy, Economic integration.

## NON-TECHNICAL SUMMARY

In recent years, the discussion on the effects of the so-called “globalisation process” has raised a lot of interest and has involved a very broad audience. Most of the attention has been devoted to the analysis of the distributional consequences of deeper economic integration, the main concern being that tighter economic links may restrict *domestic* choices on social policies. On these grounds, in June 1992, the Danes rejected the Maastricht treaty and the French came very close to doing the same. In both countries there was a widespread fear that economic integration might undermine the labour and social standards implemented since then.

Surprisingly enough, despite the vast echo raised by these events, very little economic research has been conducted thereafter to rigorously sort out the reasons of the opposition to economic integration and to identify the winners and the losers of the globalisation process. Economists mostly addressed the issue in an informal way, failing to take into account two key features, namely (i) that economically integrated countries *strategically* interact among each other and (ii) that policies are endogenous.

In particular, this paper analyses how capital markets integration affects the incentives to regulate the labour market, distinguishing three different institutional arrangements: Autarchy, Economic Union and Political Union. Autarchy is a setting in which capital does not flow across borders and each country sets its most preferred level of labour market regulation. The Economic Union is characterised by integrated capital markets in which countries *compete*. In the Political Union a common level of LMR is set at a centralised level.

We work within an overlapping generation model where individuals work when young and are retired when old. As a consequence, the factor-structure of agents’ income sources changes over time. When young, individuals earn from labour income; when old, they earn from capital income. We model Labour Market Regulation (LMR) as wage regulation and maintain the assumption that the wage rate is set through a political process where both workers (the young) and capitalists (the old) may intervene through lobbying activities, whose effectiveness depend on the (exogenous) political power of each group. Capitalists are always against LMR, because

it decreases the interest rate. Workers face a trade-off. On the one hand, they support LMR because it increases their labour income. On the other hand they anticipate that high LMR will harm them in the second period of their lives. The paper discusses how this trade-off is affected by capital markets integration and by political integration.

1. **Autarchy.** We first analyse the benchmark case of Autarchy. In order to understand what are the incentives to regulate the labour market, notice that, since LMR raises the labour income and decreases the interest rate, *it transfers resources over time*. However, agents have also available the standard tool to intertemporally transfer resources, namely the market. Thus, the young support the implementation of a regulated wage, only if it transfers resources at better terms than those offered by the market. The condition for this to happen is that the economy is *dynamically efficient*, i.e. there is no over-accumulation of capital and therefore the interest rate is not too low. To understand why, observe that giving up one unit of resources in the second period allows agents to get  $\frac{1}{1+r}$  units in the first period, when using the market. Therefore, the higher the interest rate, the less they get and the more likely that wage regulation offers more convenient terms. Under dynamic efficiency, and if the output loss generated by LMR is not too large,<sup>1</sup> LMR arises in steady state and raises the capital stock. The latter effect takes place because the rise of the income of the young fosters savings.<sup>2</sup>

2. **Economic Union.** In this context agents are allowed to invest savings both in their home country and abroad, and each country sets its most preferred level of LMR taking into account that the rival replies optimally. In the case of perfect capital mobility and symmetry, each country has the incentive to *slightly* undercut the rival's wage and get all the capital. Thus, no LMR arises in steady state. The general lesson is that, in this setting, (i) LMR is more costly because it reduces the *current* capital stock either through larger capital outflows or through smaller capital inflows and (ii) strategic interaction further decreases the incentives to regulate the labour market because each country tries to undercut the rival. Therefore there is less LMR in steady state.

3. **Political Union.** In the symmetric case the Political Union triv-

ially restores the Autarchic outcome, because policy centralisation avoids competition for capital. In the asymmetric case, the outcome lies between the autarchic ones and depends on the relative political power of the countries inside the union.

As a final step, the paper ranks the three institutional settings according to the *behind the veil of ignorance* welfare criterion. It finds that, under symmetry, Autarchy and Political Union deliver a higher welfare compared to the Economic Union where a lower level of LMR is implemented. The reason is that LMR allows, under dynamic efficiency, to raise workers' permanent income because it transfers resources over time at better terms than the market. The analysis of the asymmetric case, along with a number of caveats on the welfare analysis, is also presented.

To conclude, first the paper sheds new light on the political economy of labour market regulation in the context of overlapping generation models and highlights the unexplored link between LMR and dynamic efficiency. Moreover, it shows that globalisation (i.e. strategic interaction in an open economy setting) may reduce the support for labour regulation and this, surprisingly enough, may not be welfare enhancing, despite the lower level of distortions.

# 1 INTRODUCTION<sup>1</sup>

Economic theory suggests that economic integration generates welfare gains. Gains from trade are the most obvious source. Further benefits stem from increased labour and capital mobility that put pressure on uncompetitive labour market practices, reduce rigidities and lead to a more efficient allocation of resources. Still, we do observe political opposition to the process of economic integration, in most cases due to the fear that it may affect countries labour and social standards.<sup>2</sup> In recent years, economic discussions and political agendas have been increasingly focusing on the effects of the so-called “globalisation” process on the welfare state and on redistributive policies.<sup>3</sup> One interesting and most debated issue, addressed in this paper, concerns the distributional effects of economic integration taking place through labour market institutions. In other words, we analyse the distributional effects of changes in labour market regulation that (endogenously) follow from increased economic integration. The literature on the political economy of labour market institutions, dating back to Wright (1986), has, to my knowledge, overlooked this issue. Moreover, this literature has failed to formally take into account that, in an economically integrated environment, countries strategically interact among each other when setting national policies. This paper aims at filling these gaps and analyses the effects of capital market integration in a world where Labour Market Regulation (LMR) is endogenous, agents are heterogenous, and countries compete for capital.

We set up a two-country standard OLG model where the young own no assets and work, and the old are retired and live off their savings. We explore three institutional settings: Autarchy, Economic Union and Political Union. In Autarchy capital does not flow across borders and each country implements its most preferred level of regulation. In the Economic Union capital markets are integrated, while political decisions are not. In the Political Union a common level of LMR is set at a centralised level.

In the model, we compress LMR to one dimension and assume that the policy variable is the wage rate, that may therefore differ from the market clearing level.<sup>4</sup> Whenever this is the case, we assume, for simplicity, work-

sharing.

In the model, LMR is set through a political process where both workers (the young) and capitalists (the old) may intervene through lobbying activities. Since the factor-structure of agents’ income sources changes over time, the same happens to the agents’ preferences over LMR.<sup>5</sup> The old never support LMR, because it reduces the rate of return of capital. The young face a trade-off. They favor it because it raises labour income, but they anticipate that they will dislike it in the second period.

We first analyse Autarchy and show that in a closed economy LMR may endogenously arise in steady state. A necessary condition for this is that the economy is *dynamically efficient*.<sup>6</sup> To understand the intuition, observe that, under dynamic efficiency, the young would endorse the implementation of the *reverse* of a social security scheme that, in each period, transfers resources from the old to the young. The young and all future generations are made better off by such a scheme because it raises their permanent income by shifting resources from the second to the first period at better terms than those offered by the market ( $1 > 1/(1+r)$ ). Absent non-distortionary tools, the young may mimic them using LMR that, *de facto*, transfers resources over time because it raises the labour income and it decreases the interest rate. However, also for LMR to provide better terms than the market the economy must be dynamically efficient, because the interest rate must be high enough.

The introduction of LMR also introduces distortions in the labour market. Thus, a further necessary condition to have it in steady state is that the output losses due to labour market distortions are not too large. To parameterise their size, we assume that, when not working in the firm, workers may produce the same good by means of a constant returns technology in labour. The production losses generated by LMR are smaller the higher the productivity of the backyard technology.<sup>7</sup> Summing up, LMR arises in Autarchy if (i) the economy is dynamically efficient, (ii) the productivity of the backyard technology is high enough, and (iii) the young have enough political power.

Notice that, differently from the previous literature on endogenous labour market institutions, LMR arises in steady state neither because of

rent-seeking behaviour, nor because it provides insurance against labour market risk. Rather, because it shifts resources over time in a way that is unfeasible to the market, thus raising the permanent income of the young. This, in turn, props up savings,<sup>8</sup> fosters capital accumulation and leads to a larger steady state capital stock.<sup>9</sup>

In the symmetric two-country setting with integrated capital markets and no labour mobility, dubbed as Economic Union, countries have incentives to undercut the foreign country wage in order to attract capital. The more capital markets are integrated, i.e. the lower the cost of investing abroad, the more costly the implementation of LMR and the larger the returns from undercutting the rival. A standard *race-to-the-bottom* takes place and steady state wages are lower than in Autarchy.

In the Political Union, on top of economic integration, there is also political integration. Thus, in the symmetric case, the Political Union trivially restores the Autarchic outcome, because policy centralisation prevents competition for capital to take place.

When it comes to comparing the three environments, since we focus on steady states, it seems reasonable to adopt the point of view of a young person, and wonder in which setting she would prefer to spend her whole lifetime. In this OLG context, this is equivalent to the adoption of the *behind the veil of ignorance* welfare criterion.

In the symmetric case, whenever LMR would arise in the autarchic steady state, the young prefer to live in Autarchy or in the Political Union, because in the Economic Union competition for capital prevents LMR to be implemented. The welfare of the young is higher in the settings where there are larger distortions, because the welfare losses caused by the productive inefficiencies are outweighed by the rise in the permanent income and in the capital stock generated by LMR.

We also analyse the case where countries are asymmetric. In the Economic Union steady state, the country in which the support for regulation is stronger sets a higher wage. Therefore, it suffers from capital outflows. If the degree of asymmetry between countries is low enough, Political Union and Autarchy still generate a higher steady state welfare, relative to the Economic Union, in both countries. This happens because capital flows

are relatively small. Thus, both countries - even the one that enjoys capital inflows - are better off if they get rid of the race-to-the-bottom effect triggered by capital competition.

As the degree of asymmetry becomes substantial capital flows become relevant. In this case the recipient country is better off in the Economic Union steady state because of the large capital inflows. In contrast, the more regulated country is always better off in the Autarchic steady state, and it will typically prefer the Political to the Economic Union, because it prevents capital outflows.

This paper belongs to the literature on the political economy of labour market institutions. Typically, this literature specifies models where the decisive voter is an employed agent who enjoys labour market rents due to microeconomic frictions that generate downward wage rigidity.<sup>10</sup> Thus, labour market rigidities arise in political equilibria, reduce the aggregate surplus and, under risk neutrality, decrease aggregate welfare. However, labour market regulation has also been shown to arise as a second-best option, under financial market imperfections,<sup>11</sup> since it may provide *risk-averse* workers with insurance against labour market risks that *laissez-faire* arrangements may be unable to supply. In this paper, LMR arises because it allows to shift resources over time at better terms than those provided by the market, and improves the welfare of the current and future young generations by increasing their permanent income, their savings and the steady state capital stock.

We also relate to papers that analyse how wages are affected by economic integration when countries strategically interact and labour markets are unionised.<sup>12</sup> In a static context, Naylor (1998) explores the effect of trade, Zhao (1995) the effects of FDI and Danthine and Hunt (1994) the effects of the reduction of the degree of centralisation of wage bargaining due to deeper economic integration.<sup>13</sup>

The paper is organised as follows. Section 2 illustrates the fundamentals of the model economy. Section 3 analyses Autarchy and characterises the autarchic *economic* equilibrium (subsection 3.1), the autarchic *politico-economic* equilibrium and the autarchic *steady state* (subsection 3.2). Section 4 and 5 explore the Economic Union and the Political Union. Section

6 discusses welfare and section 7 concludes.

## 2 THE MODEL

We consider two countries, the home country and the foreign country, and analyse their interaction within an overlapping generations model. We first describe the production technologies and the assumptions concerning the labour market (subsection 2.1). We then turn to the household behaviour (subsection 2.2). We refer to the domestic country, the description of the foreign country being completely analogous.

### 2.1 Production and labour market

A single good  $Q$  is produced in each country through a Cobb-Douglas technology that makes use of labour  $N$  and capital  $K$ . The (net) production function is

$$Q = K^\gamma N^{1-\gamma} - \delta K$$

where  $\delta \in [0, 1]$  is the depreciation rate of capital. There is free entry in the market and firms take prices as given. The firms' demands for labour and capital are therefore standard:

$$N(K, w) = K \left( \frac{1-\gamma}{w} \right)^{\frac{1}{\gamma}} \quad (1)$$

$$K(N, r) = N \left( \frac{\gamma}{r + \delta} \right)^{\frac{1}{1-\gamma}} \quad (2)$$

with  $w$  and  $r$  denoting the wage and the interest rate.

The total mass of workers equals 1 and each worker inelastically supplies 1 unit of labour, so that  $N \leq 1$ . The wage is not determined in a competitive fashion. It is set in the political arena in a way specified in section 3.2. If the regulated wage lies above the competitive level, the labour market does not clear, employment is determined by the labour demand, and there is under-employment. In this case, for simplicity, we

assume work-sharing, i.e. each worker reduces her work-time. If the regulated wage lies below the competitive level, competition among producers drives it up to the competitive level. Hence, the regulated wage acts as a wage floor.<sup>14</sup>

A second crucial assumption is that workers are provided with a home production technology that allows them to produce  $Q$  using a constant returns technology in labour. We denote by  $U$  the productivity of labour in such a backyard technology.<sup>15</sup>

The equilibrium in the labour market is characterised as follows. Suppose that  $w \geq U$  is the going regulated wage.<sup>16</sup> Then, from (1),  $\hat{K}(w) \equiv \left( \frac{w}{1-\gamma} \right)^{\frac{1}{\gamma}}$  denotes the minimum level of capital such that the labour market clears at the wage  $w$ , i.e.  $\hat{K}(w)$  is such that  $N(K, w) = 1$ , for all  $K \geq \hat{K}(w)$ . Then, the labour market is characterised by one of the two following regimes.

1. The capital stock is large enough, namely  $K \geq \hat{K}(w)$ . In this case, the labour market clears, i.e.  $N(K, w) = 1$ , and the labour income is given by the competitive wage  $w^c(K) = (1-\gamma)K^\gamma$ . From (2), the interest rate is  $r(K) = \gamma K^{\gamma-1} - \delta$ . Nobody makes use of the home production technology, since  $U \leq w \leq w^c(K)$ .
2. The capital stock is low enough, namely  $K < \hat{K}(w)$ . In this case, the regulated wage is larger than the competitive market-clearing wage, i.e.  $w > w^c(K)$ , and employment is pinned down by the labour demand  $N(K, w)$ .

We call the latter regime the *under-employment* regime. In this regime each worker works  $N(K, w)$  units of time in the firm, and  $1 - N(K, w)$  units of time in her backyard. Total labour income is given by:

$$y(w, K) = N(K, w)w + (1 - N(K, w))U = K \left( \frac{1-\gamma}{w} \right)^{\frac{1}{\gamma}} (w - U) + U \quad (3)$$

Notice that, taking capital as given, total labour income is increasing in the regulated wage  $w$ , if the latter does not exceed the threshold  $\frac{U}{1-\gamma}$ , which represents the wage that a monopoly union would set:<sup>17</sup>

$$\frac{\partial y(K, w)}{\partial w} = K \left( \frac{1-\gamma}{w} \right)^{\frac{1}{\gamma}} \left( \frac{U - (1-\gamma)w}{\gamma w} \right) > 0 \text{ if } w < \frac{U}{1-\gamma} \quad (4)$$

Using (1) and (2), and imposing the zero profit condition, the interest rate can be expressed as follows:

$$r(w) = \gamma \left( \frac{1-\gamma}{w} \right)^{\frac{1-\gamma}{\gamma}} - \delta \quad (5)$$

The interest rate is decreasing in the wage rate. Given the demand for capital and labour, firms make zero profits only if the no arbitrage condition (5) holds.

## 2.2 Households

Agents live two periods. We assume no population growth. In period  $t$ , the young work and earn an income  $y(K_t, w_t)$ . When old, they retire and live off their savings. Old agents are allowed to invest their savings both at home and abroad. We assume that capital mobility is not perfect. Investing abroad may be costly because of extra informational costs related to legal issues or because it is more difficult to follow up foreign investments. Therefore, the cost is higher the higher the total amount of savings invested abroad. In order to capture these features, we assume that, for each agent, the overall cost of investing abroad is increasing and convex in the total amount of savings she is investing abroad.<sup>18</sup> This assumption also captures the empirical observation that portfolios are strongly biased towards domestic assets.<sup>19</sup>

Life unfolds according to the following timing. At the beginning of period  $t$  the wage  $w_t$  is set. This, combined with the initial capital stock, determines employment  $N(K_t, w_t)$ , labour income  $y(K_t, w_t)$  and the interest rate  $r(w_t)$ . Accordingly, consumption and savings decisions are taken.

At the beginning of period  $t+1$ , after the wage  $w_{t+1}$  is set, savings are invested.

Agents maximise the present discounted value of their lifetime utility and have rational expectations. We assume that the instantaneous utility function is logarithmic.<sup>20</sup> Thus, the problem of a young consumer in the home country, reads as follows:

$$\max_{c_t^y, c_{t+1}^o, \eta_{t+1}} \ln c_t^y + \frac{1}{1+\theta} \ln c_{t+1}^o \quad (6)$$

*s.t.*

$$c_t^y + s_t = y_t \quad (7)$$

$$c_{t+1}^o = s_t [\eta_{t+1} (1 + r_{t+1}^*) + (1 - \eta_{t+1}) (1 + r_{t+1})] - \frac{(\mu \eta_{t+1} s_t)^2}{2} \quad (8)$$

$$\eta_{t+1} \in [0, 1] \quad (9)$$

$c_t^y$ ,  $s_t$ ,  $c_{t+1}^o$ ,  $y_t$  denote, respectively, consumption when young, savings, consumption when old and labour income at time  $t$ .<sup>21</sup> The domestic and foreign (net) interest rates are denoted respectively by  $r_{t+1}$  and  $r_{t+1}^*$ .<sup>22</sup> The share of savings invested abroad is denoted by  $\eta_{t+1}$ . The function  $(\mu \eta_{t+1} s_t)^2 / 2$  represents the total cost of investing abroad. We parameterise capital mobility with  $\mu \geq 0$ , thus encompassing the cases of perfect capital mobility ( $\mu = 0$ ) and no capital mobility ( $\mu \rightarrow +\infty$ ). The domestic and foreign interest rates  $r_{t+1}$  and  $r_{t+1}^*$ , and the income  $y_t$  are taken as given by individuals. The solution to this problem delivers three regimes.

- A. In the first regime the domestic interest rate is (weakly) larger than the foreign one, i.e.  $r_{t+1}^* \leq r_{t+1}$ . Agents invest all their wealth at home ( $\eta_{t+1} = 0$ ). In this case, we get the standard consumption and savings functions, irresponsive to changes in the interest rate, that arise with logarithmic utility.

$$\eta_{t+1} = 0 \quad (10)$$

$$s_t = \frac{y_t}{2 + \theta} \quad (11)$$

$$c_t^y = \frac{1 + \theta}{2 + \theta} y_t \quad (12)$$

$$c_{t+1}^o = \frac{y_t}{2 + \theta} (1 + r_{t+1}) \quad (13)$$

In the other regimes, the domestic interest rate is smaller than the foreign one, and agents invest (part of) their savings abroad.

*B.* If the labour income is high enough, savings are relatively high and only part of them are invested abroad, because of the convex cost of moving capital abroad, i.e.  $0 < \eta_{t+1} < 1$ . In this case (domestic and foreign) interest rates do matter for consumption and savings. In particular, a rise in the domestic interest rate increases total savings (equation (15) below) because agents invest less abroad ( $\eta_{t+1}s_t$  goes down), incur in smaller transaction costs, and have incentives to save more. Formally, if  $y_t \geq \bar{y}$ , with  $\bar{y} = (2 + \theta) \frac{r_{t+1}^* - r_{t+1}}{\mu^2} + \frac{1}{2} \left( \frac{r_{t+1}^* - r_{t+1}}{\mu} \right)^2 \frac{1 + \theta}{1 + r_{t+1}}$ , then:

$$\eta_{t+1} = \frac{r_{t+1}^* - r_{t+1}}{s_t \mu^2} < 1 \quad (14)$$

$$s_t = \frac{1}{2 + \theta} \left( y_t - \frac{1}{2} \left( \frac{r_{t+1}^* - r_{t+1}}{\mu} \right)^2 \frac{1 + \theta}{1 + r_{t+1}} \right) \quad (15)$$

$$c_t^y = \frac{1 + \theta}{2 + \theta} \left( y_t + \frac{1}{2} \left( \frac{r_{t+1}^* - r_{t+1}}{\mu} \right)^2 \frac{1}{1 + r_{t+1}} \right) \quad (16)$$

$$c_{t+1}^o = \frac{1 + r_{t+1}}{1 + \theta} c_t^y = \quad (17)$$

$$= \frac{1 + r_{t+1}}{2 + \theta} \left( y_t + \frac{1}{2} \left( \frac{r_{t+1}^* - r_{t+1}}{\mu} \right)^2 \frac{1}{1 + r_{t+1}} \right) \quad (18)$$

*C.* Finally, in regime *C* income is relatively low ( $y_t < \bar{y}$ ) and all savings are invested abroad, i.e.  $\eta_{t+1} = 1$ . In this regime the domestic interest rate does not matter, because the relevant interest rate is

the foreign one. Formally: if  $r_{t+1}^* > r_{t+1}$  and  $0 < y_t < \bar{y}$ :

$$\eta_{t+1} = 1 \quad (19)$$

$$s_t = \frac{1}{3 + \theta} y_t + \frac{(1 + r_{t+1}^*)(2 + \theta)}{(3 + \theta)\mu^2} - \quad (20)$$

$$\frac{\sqrt{[(1 + r_{t+1}^*)(2 + \theta) + y_t \mu^2]^2 - 2y_t \mu^2 (1 + r_{t+1}^*)(3 + \theta)}}{(3 + \theta)\mu^2}$$

$$c_t^y = \frac{2 + \theta}{3 + \theta} y_t - \frac{(1 + r_{t+1}^*)(2 + \theta)}{(3 + \theta)\mu^2} \quad (21)$$

$$\frac{\sqrt{[(1 + r_{t+1}^*)(2 + \theta) + y_t \mu^2]^2 - 2y_t \mu^2 (1 + r_{t+1}^*)(3 + \theta)}}{(3 + \theta)\mu^2}$$

$$c_{t+1}^o = \frac{1 + r_{t+1}^* - \mu^2 s_t}{1 + \theta} c_t^y \quad (22)$$

In all regimes savings are positive and increasing in income. Moreover, they converge to  $\frac{y_t}{2 + \theta}$  both as  $\mu$  goes to zero (full capital mobility) and as  $\mu$  goes to infinity (Autarchy). The reason is that in both cases, the cost of investing abroad does not matter. In the first case because it is zero; in the second because no savings are invested abroad.<sup>23</sup>

The next section solves for the autarchic steady state. In Autarchy capital is prevented from flowing across borders ( $\mu \rightarrow +\infty$ ). In sections 4 and 5, we will move to the case where the cost of investing abroad is finite, and will distinguish between the Economic Union (section 4) and the Political Union (section 5).

### 3 AUTARCHY

Subsection 3.1 solves for the *economic* equilibrium. We then turn to the *politico-economic equilibrium* and the *politico-economic steady state* in subsection 3.2.

### 3.1 Autarchic economic equilibrium

Let us first define the autarchic economic equilibrium.

**Definition 1** Given an initial capital stock and a sequence of wages  $\{w_t\}_{t=0}^{\infty}$ , an economic equilibrium is defined as a sequence of allocations  $\{s_t, c_t^y, c_t^o, K_t, N_t\}_{t=0}^{\infty}$ , and factor prices  $\{r_t\}_{t=0}^{\infty}$ , such that, in every period,

1. consumers maximise their lifetime utility (6) subject to (7), (8), (9);
2. firms maximise profits, i.e. (1) and (2) hold;
3. employment is determined by (1);
4. capital and goods markets clear, i.e.  $K_{t+1} = s(w_t, K_t)$  for all  $t$ .

In Autarchy, capital does not flow across countries. Hence, consumption when young, savings and consumption when old are as in equations (11), (12), and (13) and the equilibrium condition  $K_{t+1} = s(w_t, K_t)$  for all  $t$  reads as follows:

$$K_{t+1} = \frac{1}{2+\theta} y(K_t, w_t) \text{ for all } t \quad (23)$$

Given  $w_t$ , in period  $t$  the labour market is in the under- or full-employment regime depending on the capital stock level. If, at time  $t$ ,  $K_t \geq \widehat{K}(w_t)$  then full-employment obtains. Viceversa, if  $K_t < \widehat{K}(w_t)$ , the economy is in the under-employment regime. Hence, the equilibrium condition (23) can be rewritten as follows:<sup>24</sup>

$$K_{t+1} = \begin{cases} \frac{1}{2+\theta} \left[ K_t \left( \frac{1-\gamma}{w_t} \right)^{\frac{1}{\gamma}} (w_t - U) + U \right] & \text{if } K_t < \widehat{K}(w_t) \\ \frac{1}{2+\theta} (1-\gamma) K_t^\gamma & \text{if } K_t \geq \widehat{K}(w_t) \end{cases} \quad (24)$$

Since we will confine our analysis to steady states in which the regulated wage will be constant, we analyse the *stationary* economic equilibrium, where, given a constant regulated wage  $w$ , the capital stock is constant. The next lemma describes it.<sup>25</sup>

**Lemma 1** The stationary economic equilibrium characterises as follows:

1. If the regulated wage is low enough, i.e.  $w \leq (1-\gamma) \left( \frac{1-\gamma}{2+\theta} \right)^{\frac{\gamma}{1-\gamma}}$ , the equilibrium displays full-employment, with:

$$K^F = \left( \frac{1-\gamma}{2+\theta} \right)^{\frac{1}{1-\gamma}} > \widehat{K}(w)$$

$$w^c(K^F) = (1-\gamma) \left( \frac{1-\gamma}{2+\theta} \right)^{\frac{\gamma}{1-\gamma}}$$

2. If the regulated wage is high enough, i.e.  $w > (1-\gamma) \left( \frac{1-\gamma}{2+\theta} \right)^{\frac{\gamma}{1-\gamma}}$ , the equilibrium displays under-employment, with:

$$K^A(w) = \frac{U}{2+\theta - \left( \frac{1-\gamma}{w} \right)^{\frac{1}{\gamma}} (w-U)} \in \left( \frac{U}{2+\theta}, \widehat{K}(w) \right)$$

The under-employment capital stock is such that

$$\frac{\partial K^A}{\partial w} \geq 0 \text{ for } w \in \left( w^c(K^F), \frac{U}{1-\gamma} \right)$$

$$\frac{\partial K^A}{\partial U} \geq 0 \text{ for } w \geq w^c(K^F)$$

**Proof.** Available at [www.econ.upf.es/~pica](http://www.econ.upf.es/~pica) or from the author upon request. ■

If the competitive wage, evaluated at the stationary capital stock  $K^F$  and denoted by  $w^c(K^F)$ , is larger than the regulated wage, then a full-employment equilibrium arises.<sup>26</sup> Put it differently, the competitive stationary capital stock  $K^F$  is large enough to make the regulated wage not binding and make the labour market clear.

Under-employment occurs if the regulated wage is larger than the full-employment equilibrium wage. In this case the equilibrium capital stock depends on the regulated wage in a non monotonic fashion. In particular, it is increasing in the regulated wage if the latter is low enough, (i.e.  $w \in [w^c(K^F), U/(1-\gamma)]$ ) and decreasing otherwise. The reason is that,

as emphasised by (4), if the regulated wage is lower than the threshold  $U/(1-\gamma)$ , total labour income is increasing in  $w$ . Hence, savings and capital are also increasing in the regulated wage.<sup>27</sup> Finally, the under-employment capital stock is increasing in the home production productivity  $U$ . The higher  $U$ , the higher the labour income and savings, and the higher the capital stock.

Figure 1 depicts the capital accumulation path for a given fixed wage (solid bold line). At  $K_t = \hat{K}(w)$ , the under- and full-employment accumulation paths cross. For  $K_t < \hat{K}(w)$ , the economy is on the under-employment accumulation path, i.e. the straight line  $K_{t+1} = \frac{y(K_t, w)}{2+\theta}$ , while for  $K_t > \hat{K}(w)$  is on the full-employment accumulation path, i.e. the concave curve  $K_{t+1} = \frac{w^c(K_t)}{2+\theta}$ . The stationary capital stock of the standard competitive OLG is  $K^F$ . In the figure, the economy converges to the under-employment equilibrium  $K^A(w) > K^F$ .

Let us also mention that the economy might be in a third regime, call it the *home production regime*, in which labour income equals  $U$ . This regime occurs if and only if  $U$  is higher than both the regulated and the stationary competitive wage, i.e.  $U > \max(w, w^c(K^F))$ . In this case,  $K_t = \frac{U}{2+\theta}$  for all  $t$ . In order to rule out this uninteresting possibility, we assume that  $U \leq w^c(K^F) \equiv (1-\gamma) \left(\frac{1-\gamma}{2+\theta}\right)^{\frac{\gamma}{1-\gamma}}$ .

We now turn to the determination of the political equilibrium.

### 3.2 Autarchic politico-economic steady state

The wage rate is determined in the political arena. The key tool to analyse the political outcome are the value functions of the young and the old, denoted respectively by  $V^y(\cdot)$  and  $V^o(\cdot)$ :

$$V^y(w_t; w_{t+1}, K_t) = \ln c^y(w_t, K_t) + \frac{1}{1+\theta} \ln c^o(w_t; w_{t+1}, K_t) \quad (25)$$

$$V^o(w_t; K_t) = \ln c^o(w_t, K_t) = \ln K_t (1+r(w_t)) \quad (26)$$

where  $c^y(w_t, K_t)$  - the consumption of the young - does *not* depend on period  $t+1$  wage, due to the log utility that makes the first period consumption independent of the interest rate.

## Autarchic Economic Equilibrium

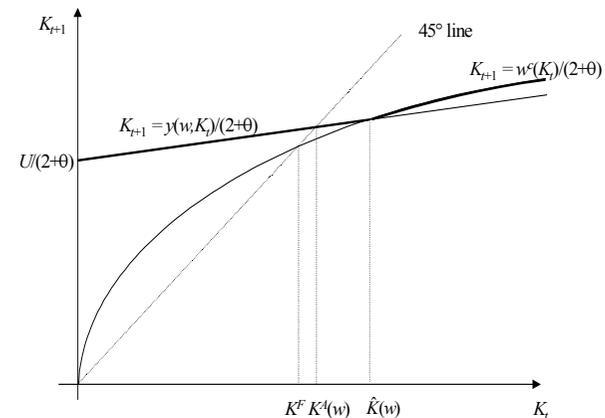


Figure 1: Solid bold line: capital accumulation path, given  $w$ . The under- and full-employment paths cross at  $K_t = \hat{K}(w)$ . For  $K_t < \hat{K}(w)$  the economy is on the under-employment accumulation path. For  $K_t > \hat{K}(w)$  the economy is on the full-employment accumulation path. Parameters values:  $\gamma = \frac{1}{2}$ ,  $\theta = \delta = .05$ ,  $U = \underline{\underline{U}} + \frac{w^c(K^F) - \underline{\underline{U}}}{2} = 0.101626$ ,  $w = w^c(K^F) + .025 = 0.146951$ .

We assume that both workers and capitalists are able to intervene in the political process and affect the political outcome through some kind of lobbying activities. In particular, we assume that the wage rate  $w_t$  is set by maximizing a political aggregator given by the convex combination of the lifetime preferences of the young and of the old, with the weights reflecting the political power of each group. The political aggregator reads as follows.

$$W(w_t; w_{t+1}, K_t) = \alpha V^y(w_t; w_{t+1}, K_t) + (1 - \alpha) V^o(w_t; K_t)$$

where  $\alpha \in [0, 1]$ . The function  $W(w_t; w_{t+1}, K_t)$  describes the preference mapping on  $w_t$  of the society, given expectations on  $w_{t+1}$  and the capital stock  $K_t$ .

The fully dynamic voting model, however, is not analytically tractable.<sup>28</sup> One simple way to make it simpler is to assume that agents choose over constant policy sequences, i.e. the wage is set *once-and-for-all*. In this case, neglecting unimportant constant terms, the political aggregator looks as follows:

$$W(w; K_t) = \alpha \frac{2 + \theta}{1 + \theta} \ln c^y(w, K_t) + \left(1 - \alpha \frac{\theta}{1 + \theta}\right) \ln(1 + r(w)) \quad (27)$$

where  $K_t$  denotes the *given* capital stock in place when the wage choice is to be made.<sup>29</sup> This assumption, that allows to get transparent analytical results, has been used several times in the political economy literature because of the substantial simplification it brings about.<sup>30</sup> Its main advantage is that agents do not have to be concerned with the effects of their vote today on future political decisions.<sup>31</sup> This assumption may be justified as being an approximation to a world where voting cycles are long. The drawback is that we have to neglect transitional dynamics (along which agents' perceptions that  $w$  is constant are incorrect) and have to focus on steady states, where the wage is indeed constant. Notice, however, that the political outcome would not change if, in steady state, the ballots were to be (unexpectedly) repeated.

Another viable way to get analytical results is to assume *myopic behaviour*, namely that agents simply do not take into account the effects

of today's political decision over the next period wage. This amounts to assume that agents are atomistic and cannot influence aggregate variables (the capital stock). In this case the young behave like a monopoly union and their preferred wage is  $\frac{U}{1-\gamma}$  independent of  $K_t$ . Under this assumption, the political aggregator, neglecting constant terms, reads as follows:

$$W(w_t; w_{t+1}, K_t) = \frac{\alpha'}{1 + \theta} [(2 + \theta) \ln c^y(w_t, K_t) + \ln(1 + r(w_{t+1}))] + (1 - \alpha') \log(1 + r(w_t)) \quad (28)$$

Since under myopic behaviour  $r(w_{t+1})$  does not depend on  $w_t$ , expressions (27) and (28) are equivalent up to a rescaling of  $\alpha'$ , meaning that they deliver the same result up to a rescaling of the political weights. Therefore, in what follows, we concentrate on the once-and-for-all wage setting assumption, keeping in mind that the results under myopic behaviour are qualitatively equivalent. We consequently denote the capital stock in place at the time where the political decision is made by  $K_0$ .

The formal definitions of politico-economic equilibrium and steady state are as follows.

**Definition 2** For each given level of the capital stock, a **politico-economic equilibrium** is a function  $\tilde{w}(K_0)$  that maximises the political aggregator on the set of feasible wages.<sup>32</sup> Formally:

$$\tilde{w}(K_0) = \arg \max_{w \in \Omega(K_0)} W(w; K_0)$$

In a politico-economic equilibrium capital is taken as given. However, *in steady state*, the capital stock depends on the wage rate via economic equilibrium. Therefore, a wage  $w^A$  is a *steady state wage* only if it generates a capital stock level  $K^A(w^A)$  such that, given  $K^A(w^A)$ , the  $w^A$  maximises the political aggregator. Formally:

**Definition 3** A **politico-economic steady state** is a wage  $w^A$  such that  $\tilde{w}(K^A(w^A)) = w^A$ .

We now turn to the analysis of the conflict of interests between old and young individuals.

### 3.2.1 The conflict of interest between workers and capitalists

Before discussing the outcome of the political process, let us analyse the preferences of the young and of the old people separately, under the once-and-for-all wage setting assumption. Let us rewrite the value functions (25) and (26) as follows:

$$V^y(w; K_0) = \ln \frac{1+\theta}{2+\theta} y(w, K_0) + \frac{1}{1+\theta} \ln \left( \frac{y(w, K_0)}{2+\theta} (1+r(w)) \right) \quad (29)$$

$$V^o(w; K_0) = \ln K_0 (1+r(w)) \quad (30)$$

where  $y(w, K_0)$  and  $r(w)$  are given by (3) and (5) in the under-employment regime and by the competitive prices in the full-employment regime. Proposition 1 establishes the conditions under which a conflict of interest emerges between the young and the old, i.e. under which the young do want to raise the wage above the old's most preferred level.<sup>33</sup>

**Proposition 1** *If the economy is dynamically efficient, i.e.  $\gamma \geq \frac{\delta}{2+\theta+\delta}$ , there exists a threshold  $\underline{U} < w^c(K^F)$  and an interval  $[\underline{K}_0(U), \overline{K}_0(U)]$  such that, if  $U \in [\underline{U}, w^c(K^F)]$ , and  $K_0 \in [\underline{K}_0(U), \overline{K}_0(U)]$  there is a conflict of interest between workers and capitalists.*

**Proof.** Available at [www.econ.upf.es/~pica](http://www.econ.upf.es/~pica) or from the author upon request. ■

The intuition is as follows. Old individuals live off their savings. The higher the interest rate, the happier they are. Given the negative relation between wages and the interest rate (see equation (5)), capitalists dislike high wages and support the implementation of the lowest possible wage.

On the contrary, the young may support LMR. The above proposition tells us that three conditions are needed for this to be true. *First*, the economy must be dynamically efficient. This implies that the (competitive) stationary capital stock is lower than the level that maximises aggregate consumption and the net interest rate is positive.<sup>34</sup> In this case, the young and all future generations are better off if, *in each period*, 1 unit of resources is transferred from the old to the young, i.e. the reverse of a social security

scheme is implemented. The reason is that the market transfers resources from the second to the first period at a rate equal to  $\frac{1}{1+r}$ , while the reverse of the social security scheme provides a rate equal to 1. Thus, if  $r > 0$ , the latter scheme raises the permanent income of the young and makes them better off. Absent non-distortionary tools, the young may achieve the same objectives by using LMR that, *de facto*, transfers resources over time by raising the labour income and decreasing the interest rate. However, for LMR to get support, it must provide better terms than the market. This may happen only under dynamic efficiency (i.e. a positive  $r$ ).

However, LMR introduces distortions in the labour market. The *second* condition takes care of the size of the production losses, that are parameterised by  $U$ . If  $U$  is high enough,  $U \geq \underline{U}$ , the fall in the aggregate production is not so high to outweigh the above described gains generated by LMR.<sup>35</sup>

*Third*, the capital stock must belong to the interval  $[\underline{K}_0(U), \overline{K}_0(U)]$ . This (more technical) condition is required because of the *once-and-for-all* wage setting assumption. It makes sure that the potentially chosen wages are feasible i.e. they stay in place in *all future periods*.<sup>36</sup>

Figure 2 depicts the conflict of interest. The dashed-dotted line represents the minimum *constant* wage implementable in steady state as a function of  $K_0$ .<sup>37</sup> The old always support the lowest possible wage, and therefore their preferred wage is represented precisely by the dashed-dotted line. The solid line represents the preferred wage of the young  $w^y(K_0, U)$ , which is non decreasing in  $K_0$ . If  $K_0$  is very low, namely lower than  $\underline{K}_0(U)$ , then the young support the lowest feasible wage.<sup>38</sup> As  $K_0$  goes up, the elasticity of income with respect to the wage increases and therefore the benefits of raising the wage go up. In this range, namely for  $K_0 \in [\underline{K}_0(U), \overline{K}_0(U)]$ , young agents support a wage larger than the one supported by the old.<sup>39</sup> As  $K_0$  keeps growing the conflict must eventually disappear, because the competitive wage goes up and becomes larger than the monopoly union wage  $\frac{U}{1-\gamma}$ .

As  $U$  becomes lower (and approaches  $\underline{U}$ ) the interval  $[\underline{K}_0(U), \overline{K}_0(U)]$  shrinks and  $w^y(K_0, U)$  shifts down. At  $U = \underline{U}$  the only point contained in the set is  $K^F$  and  $w^y(K_0, U)|_{K_0=K^F} = w^c(K^F)$ .

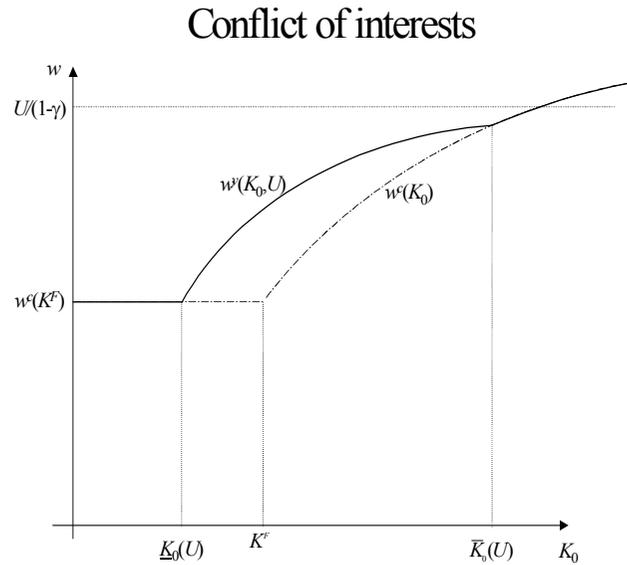


Figure 2: Conflict of interest.

### 3.2.2 Autarchic politico-economic equilibrium

The political aggregator  $W(w; K_0)$  that aggregates the preferences of workers and capitalists looks as follows:

$$W(w; K_0) = A + \alpha \frac{2 + \theta}{1 + \theta} \ln y(w; K_0) + \left(1 - \alpha \frac{\theta}{1 + \theta}\right) \ln(1 + r(w)) \quad (31)$$

where  $A = \alpha \ln \frac{1 + \theta}{2 + \theta} - \alpha \frac{1}{1 + \theta} \ln(2 + \theta) + (1 - \alpha) \ln K_0$  does not depend on the wage.

Figure 3, that depicts  $\tilde{w}(K_0, U, \alpha)$  the wage that maximises (31), resembles very much figure 2. The figures are obviously equal if the young are the dictators, i.e.  $\alpha = 1$ . As  $\alpha$  goes down the interests of the old are weighted more. The set  $[\underline{K}_0(U, \alpha), \overline{K}_0(U, \alpha)]$  - where binding regulation takes place - becomes narrower and  $\tilde{w}(K_0, U, \alpha)$  shifts down. The same happens as  $U$  goes down.

### 3.2.3 The steady state

In steady state the economic equilibrium and the politico-economic equilibrium must be mutually consistent. Figure 4 depicts both the economic and the politico-economic equilibria, i.e. the schedules  $K^A(w)$  and  $\tilde{w}(K, U, \alpha)$ . The unique steady state lies at the point where  $\tilde{w}(K, U, \alpha)$  and  $K^A(w)$  cross.

**Proposition 2** *If workers have enough political power ( $\alpha > \underline{\alpha}(U)$ ), the economy is dynamically efficient ( $\gamma \geq \frac{\delta}{2 + \theta + \delta}$ ) and productivity at home is large enough ( $U \in [\underline{U}, w^c(K^F)]$ ), then:*

1. *The steady state wage  $w^A(U, \alpha)$  is larger than the competitive wage OLG wage  $w^c(K^F)$*
2. *Workers steady state welfare is larger than in the competitive steady state.*

### Autarchic politico-economic equilibrium

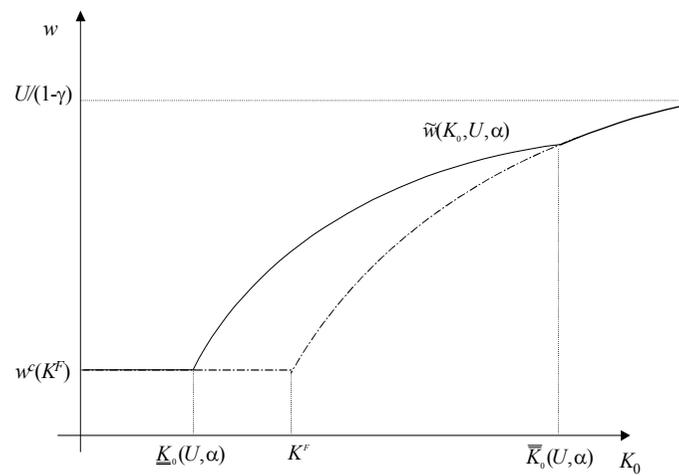


Figure 3: Solid line: economy preferred wage  $\tilde{w}(K_0, U, \alpha)$  as a function of the capital stock. Dashed-dotted line: minimum *feasible* constant wage implementable.

### Autarchic Steady State

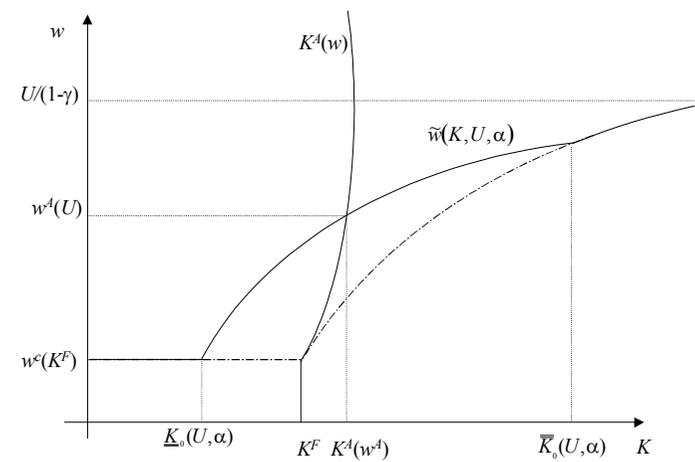


Figure 4: Autarchic steady state.

**Proof.** Available at [www.econ.upf.es/~pica](http://www.econ.upf.es/~pica) or from the author upon request. ■

The first condition needed for LMR to arise in steady state and raise the welfare of the young is, quite obviously, that workers have enough political power. Second, the economy must be dynamically efficient and third  $U$  must be high enough. The intuition is the following.

Under dynamic efficiency the labour income share  $1 - \gamma$  is relatively low. Thus, the competitive wage is low and young individuals have poor resources. Savings are low and there is little capital accumulation.<sup>40</sup> Therefore, the stationary capital stock is also low and the returns on capital are relatively high. In particular, they are higher than zero, the economy steady state growth rate. It is well-known that, in this case, the welfare of the current and all future young generations is increasing in the steady state capital stock. Absent other non-distortionary policy tools, LMR indeed raises the permanent income of the young, their savings and the steady state capital stock. However, it also generates inefficiencies, due to the labour market distortions that prevent output to be maximised. The fall in production is decreasing in the home production productivity  $U$ . Therefore, if  $U$  is not too low the negative effect of labour market distortions does not outweigh the positive effect of having a higher capital stock.

All this implies that, under the above specified conditions, the young prefers to live in a regulated steady state where the wage is permanently higher than the competitive level. In such a steady state factor prices are such that agents are able to achieve a higher steady state welfare, despite the inefficiency generated in the labour market.

## 4 ECONOMIC UNION: CAPITAL MARKETS INTEGRATION

We now turn to the two-country setting. In this section we assume that capital markets are integrated, thus capital flows across borders. Each

country sets its most preferred wage level. We label this setting as Economic Union, (henceforth EU).

Notice that in the open economy setting the capital stock is *not* a state variable any longer, since old individuals can choose, at the beginning of the period, where to invest their savings. Thus,  $K_t$  is not fixed at the beginning of period  $t$ , and depends on the interest rates differential which, in turn, depends on the wages differential. Therefore, the state variables are the (domestic and foreign) asset holdings.

### 4.1 EU economic equilibrium

As in the previous section, we first analyse the economic equilibrium, keeping policy variables fixed, and then turn to the political determination of wages and explore the politico-economic steady state.<sup>41</sup> The economic equilibrium defines as follows.

**Definition 4** *Given the initial levels of the domestic and foreign assets and given the policies  $\{w_t\}_{t=0}^{\infty}$  and  $\{w_t^*\}_{t=0}^{\infty}$  of domestic and foreign wages, an economic equilibrium is defined as domestic and foreign allocations  $\{s_t, c_t^y, c_t^o, \eta_t, K_t, N_t\}_{t=0}^{\infty}$  and  $\{s_t^*, c_t^{y*}, c_t^{o*}, \eta_t^*, K_t^*, N_t^*\}_{t=0}^{\infty}$ , domestic and foreign factor prices  $\{r_t\}_{t=0}^{\infty}$  and  $\{r_t^*\}_{t=0}^{\infty}$  such that, in both countries and in every period,*

1. *consumers maximise their lifetime utility (subject to the appropriate constraints);*
2. *firms maximise profits;*
3. *employment is determined by labour demand;*
4. *capital and goods markets clear*

In each country total investments are now given by the sum of domestic and foreign investments. Hence, the last condition of the above definition

reads as follows:

$$K_{t+1} = (1 - \eta_{t+1}) s_t + \eta_{t+1}^* s_t^* \quad (32)$$

$$K_{t+1}^* = \eta_{t+1} s_t + (1 - \eta_{t+1}^*) s_t^* \quad (33)$$

for all  $t$ .

The next lemma characterises the *stationary* economic equilibrium as a function of (constant)  $w$  and  $w^*$ . We focus on the case where  $w^* \geq w$ , as the case  $w^* \leq w$  is perfectly symmetric.<sup>42</sup>

First notice that the stationary competitive domestic wage, denoted by  $w_E^c(K_E^F(w^*, \mu))$ , is increasing in the foreign wage rate. To see why, suppose that countries are in a stationary competitive equilibrium. If they are symmetric, in equilibrium there are no capital flows. Thus, the competitive capital stock and wages are equal to the autarchic levels. Suppose now that in the foreign country a higher regulated wage  $w^*$  is implemented. Then in equilibrium, capital flows towards the home country, and raises the competitive wage  $w_E^c(K_E^F(w^*, \mu))$ .<sup>43</sup> Let us now characterise the stationary equilibrium described in lemma 2.

If the regulated wages are sufficiently high in both countries (case 1 in lemma 2) under-employment takes place in both countries. Since  $w^* \geq w$ , the level of the *domestic* capital stock is weakly larger than the autarchic level, because of the capital inflows coming from the foreign country. On the contrary, the *foreign* capital stock is lower than in Autarchy, both because capital flies abroad and because savings decrease (investing abroad is costly).

If the domestic wage is lower than the domestic competitive level, while the foreign wage is larger than the domestic competitive level, full-employment obtains *only* in the home country (case 2 in lemma 2). The domestic (foreign) capital stock is higher (lower) than the autarchic level, because foreigners invest part of their savings in the home country. The higher the foreign wage, the higher (lower) the domestic (foreign) capital stock.

Finally, if also the foreign wage is lower than the domestic competitive level, full-employment obtains in both countries (case 3 in lemma 2). Formally:

**Lemma 2** *In a stationary economic equilibrium, with  $w^* \geq w$ , the domestic and foreign capital stocks characterise as follows:*

1. *Both countries are in under-employment regime if  $w_E^c(K_E^F(w^*, \mu)) < w < w^*$ :*

$$K^E(w, w^*) = \frac{U + (2 + \theta) \frac{r(w) - r^*(w^*)}{\mu^2}}{2 + \theta - \left(\frac{1-\gamma}{w}\right)^{\frac{1}{\gamma}} (w - U)}$$

$$K^{*E}(w, w^*) = \frac{U - \frac{r(w) - r^*(w^*)}{\mu^2} (2 + \theta) - \frac{1}{2} \frac{(r(w) - r^*(w^*))^2}{\mu^2} \frac{1 + \theta}{(1 + r^*(w^*))}}{2 + \theta - \left(\frac{1-\gamma}{w^*}\right)^{\frac{1}{\gamma}} (w^* - U)}$$

where  $w_E^c(K_E^F(w^*, \mu)) \geq (1 - \gamma) \left(\frac{1-\gamma}{2+\theta}\right)^{\frac{\gamma}{1-\gamma}}$  is the competitive domestic wage, and is such that

$$\frac{dw_E^c(K_E^F(w^*, \mu))}{dw^*} \in [0, 1]$$

$$\lim_{\mu \rightarrow \infty} \frac{dw_E^c(K_E^F(w^*, \mu))}{dw^*} = 0$$

$$\lim_{\mu \rightarrow 0} \frac{dw_E^c(K_E^F(w^*, \mu))}{dw^*} = 1$$

2. *The home country stationary equilibrium displays full-employment, if  $w \leq w_E^c(K_E^F(w^*, \mu))$ . Then, the stationary competitive capital stock is implicitly defined by*

$$K^E - \frac{(1 - \gamma) (K^E)^\gamma}{2 + \theta} - \frac{\gamma (K^E)^{\gamma-1} - \delta - r(w^*)}{\mu^2} = 0$$

*The foreign country stationary equilibrium displays under-employment if  $w^* \geq (1 - \gamma) \left(\frac{1-\gamma}{2+\theta}\right)^{\frac{\gamma}{1-\gamma}}$ :*

$$K^{*E}(w, w^*) = \frac{U - \frac{\gamma (K^E)^{\gamma-1} - \delta - r^*(w^*)}{\mu^2} (2 + \theta) - \frac{1}{2} \frac{(\gamma (K^E)^{\gamma-1} - \delta - r^*(w^*))^2}{\mu^2} \frac{1 + \theta}{(1 + r^*)}}{2 + \theta - \left(\frac{1-\gamma}{w^*}\right)^{\frac{1}{\gamma}} (w^* - U)}$$

3. Finally, if  $w \leq w^* \leq (1 - \gamma) \left(\frac{1 - \gamma}{2 + \theta}\right)^{\frac{1}{1 - \gamma}}$ , then  $w_E^c(K_E^F(w^*, \mu)) = (1 - \gamma) \left(\frac{1 - \gamma}{2 + \theta}\right)^{\frac{1}{1 - \gamma}}$ , and both countries are in a stationary full-employment equilibrium:

$$K^E = K^{*E} = \left(\frac{1 - \gamma}{2 + \theta}\right)^{\frac{1}{1 - \gamma}}$$

**Proof.** Available at [www.econ.upf.es/~pica](http://www.econ.upf.es/~pica) or from the author upon request. ■

We now turn to the politico-economic equilibrium and steady state.

## 4.2 EU politico-economic steady state

Let the function  $W(w; s_0, s_0^*, w^*)$  describe the domestic preferences on the regulated wage, given the (domestic and foreign) asset holdings, and given the foreign wage  $w^*$ . Analogously, let  $W^*(w^*; s_0, s_0^*, w)$  be the foreign country political aggregator. Let us now introduce some definitions.

**Definition 5** For each level of the domestic and foreign assets  $(s_0, s_0^*)$  and of the foreign wage  $w^*$ , a **domestic politico-economic equilibrium** is a function  $\bar{w}(s_0, s_0^*, w^*)$ , that maximises the domestic political aggregator on the set of feasible wages. Formally

$$\bar{w}(s_0, s_0^*, w^*) = \arg \max_{w \in \Omega(s_0, s_0^*, w^*)} W(w; s_0, s_0^*, w^*)$$

In a politico-economic equilibrium domestic assets, foreign assets and the foreign wage are taken as given and the wage is chosen so as to maximise the political aggregator.<sup>44</sup> However, in a domestic steady state, domestic and foreign assets holdings depend on the domestic wage rate  $w$  and on the foreign wage  $w^*$  via economic equilibrium, i.e.  $s_0 = s_0(w, w^*)$  and  $s_0^* = s_0^*(w, w^*)$ . The same happens abroad. Therefore, a domestic politico-economic steady state is a mapping of the foreign wage  $w^*$  into the domestic wage, telling the level of the domestic steady state wage for each level of the foreign wage. This function, denoted by  $\tilde{w}(w^*)$ , may be understood as a reaction function.

**Definition 6** A **domestic politico-economic steady state** is a function  $\tilde{w}(w^*)$  implicitly defined by the following functional equation:

$$\bar{w}(s_0(\tilde{w}(w^*), w^*), s_0^*(\tilde{w}(w^*), w^*), w^*) = \tilde{w}(w^*)$$

Given the domestic and foreign politico-economic steady states  $\tilde{w}(w^*)$  and  $\tilde{w}^*(w)$ , the steady state is readily defined.

**Definition 7** A **politico-economic steady state** is the Nash equilibrium of the policy game between the two countries, i.e. a pair  $(w^E, w^{*E})$  such that:

$$\begin{aligned} w^E &= \tilde{w}(w^{*E}) \\ w^{*E} &= \tilde{w}^*(w^E) \end{aligned}$$

Having defined the equilibrium concept we turn to the value functions of the agents. The value function of the young looks as follows:<sup>45</sup>

$$V^y(w; s_0, s_0^*, w^*) = \frac{2 + \theta}{1 + \theta} \ln c^y(y(w; s_0, s_0^*, w^*), w, w^*) + \frac{1}{1 + \theta} \ln(1 + r(w))$$

where  $c^y(y(w; s_0, s_0^*, w^*), w, w^*)$  is as in equations (12) or (16) and is affected by  $s_0^*$  through the current capital stock (see (32)). Labour income  $y(w, s_0, s_0^*, w^*)$  and the interest rate  $r(w)$  are as in equations (3) and (5) if the economy is in the under-employment regime and equal the competitive levels if the economy is in the full-employment regime. The value function of the old is:

$$\begin{aligned} V^o(w, s_0, w^*) &= \ln s_0(\eta(w, s_0, w^*)(1 + r^*(w^*)) + (1 - \eta(w, s_0, w^*)) \times \\ &\quad \times (1 + r(w)) - \frac{(\mu\eta(w, s_0, w^*))^2 s_0}{2}) \end{aligned}$$

Notice that  $s_0^*$  does not affect the individuals that are currently old, since the current capital stock does not influence their choices. In the open economy framework, the old are less harmed by high domestic wages, to the extent that they can invest abroad.

The political aggregator, up to an additive constant, reads as follows:<sup>46</sup>

$$W(w; s_0, s_0^*, w^*) = \alpha \left( \frac{2 + \theta}{1 + \theta} \ln c^y(w, s_0, s_0^*, w^*) + \frac{1}{1 + \theta} \ln(1 + r(w)) \right) + (1 - \alpha) \ln((1 + r(w)) + \eta(w, s_0, w^*) \times \left( r^*(w^*) - r(w) - \frac{(\mu\eta(w, s_0, w^*))^2 s_0}{2} \right) \quad (34)$$

We assume that the economy is the range of parameters such that labour market regulation arises in the autarchic steady state, and analyse what happens in the open economy framework.

#### 4.2.1 The domestic reaction function

It is interesting to characterise the slope of the domestic reaction function  $\tilde{w}(w^*)$ . First, notice that in case of perfect capital mobility ( $\mu \rightarrow 0$ )  $d\tilde{w}(w^*)/dw^* \rightarrow 1$ , because with no adjustment costs wages must equalise across countries.<sup>47</sup> If  $\mu$  is infinitely high, the rival's wage simply does not affect the domestic wage, and therefore  $d\tilde{w}(w^*)/dw^* \rightarrow 0$ . However, between these two extremes cases, the slope of the reaction function is not always positive. Indeed, it turns out that there is a big difference between the case in which the home country attracts capital and the case in which capital flows from the home country.

Figure 5 (panels (a) and (b)), depicts the *domestic* reaction function, and the *domestic* competitive wage as a function of  $w^*$ . The reaction function is given by the solid line. The competitive wage is given by the dashed line. The horizontal line depicts the autarchic wage level (or better, the autarchic reaction function). Finally, the dotted line is the 45° line. When the domestic reaction function lies below the 45° line, the home country is attracting capital because  $\tilde{w}(w^*) < w^*$ . In this range, the reaction function is always increasing in  $w^*$  (both in panel (a) and (b)). The intuition is that an increase in  $w^*$  makes foreigners invest more in the home country, and raises the domestic capital stock. A higher capital stock increases the elasticity of the labour income with respect to the wage, thus providing incentives to the young to increase the wage in the *domestic*

### EU domestic reaction function

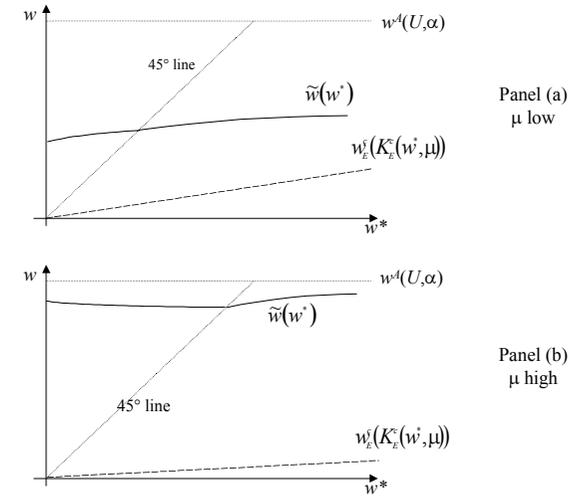


Figure 5: Domestic reaction function: domestic steady state that would arise for each level of the foreign wage.

steady state.<sup>48</sup> Hence, when the country attracts capital, the foreign and the domestic wage are strategic complements.

When the domestic reaction function lies above the 45° line, the domestic wage is larger than the foreign one, i.e.  $\tilde{w}(w^*) > w^*$ , and the old in the home country invest abroad. Two mechanisms running in opposite directions now affect the slope of the reaction function. As  $w^*$  goes up,  $r^*(w^*)$  goes down, and so does the rate of return on assets that agents get.<sup>49</sup> On the one side, this gives stronger incentives to domestic capitalists to lower the domestic wage, so as to raise  $r(w)$  and increase the total returns on assets. On the other side, the rise in  $w^*$  increases the amount of savings invested in the home country from abroad, and makes the domestic capital stock grow. This raises workers incentives to increase the wage.<sup>50</sup>

If  $\mu$  is high enough the first mechanism prevails. The higher the cost of investing abroad the more capitalists are harmed by a high domestic wage, because it is more costly to divert savings to the foreign market. Hence, when the foreign wage goes up - and  $\mu$  is high - capitalists fiercely struggle for a decrease of the domestic wage. On top of that, when  $\mu$  is high, a rise in  $w^*$  does not increase much the domestic capital stock and workers incentives to raise the domestic wage. As a result, when  $\mu$  is high the domestic reaction is negatively sloped in the range where  $\tilde{w}(w^*) > w^*$ .

If  $\mu$  is low, by the opposite reasoning, the second mechanism prevails and  $\tilde{w}(w^*)$  is increasing in  $w^*$ . Hence, strategic complementarity arises only if the adjustment cost  $\mu$  is not too high. For instance, this is the case in figure 5 panel (a), while the opposite happens in panel (b).<sup>51</sup>

The comparative statics with respect to  $U$ ,  $\alpha$  and  $\mu$  is straightforward. The higher  $U$  the larger the gains from wage increases, and therefore  $\tilde{w}(w^*; \mu, U, \alpha)$  shifts up. As  $\alpha$  goes up, workers are more powerful, and again  $\tilde{w}(w^*; \mu, U, \alpha)$  shifts up. Finally, as  $\mu$  goes down, the reaction function rotates, shifting down for low values of  $w^*$  and up for high values of  $w^*$  (with the slope approaching unity in the limiting case  $\mu \rightarrow 0$ ): when suffering capital outflows (low values of  $w^*$ ) a smaller  $\mu$  increases the size of capital outflows, and provides incentives to deregulate the labour market. When enjoying capital inflows (high  $w^*$ 's) a lower  $\mu$  raises capital inflows and, consequently, the level of LMR.

#### 4.2.2 EU politico-economic steady state: the symmetric case

In this section we analyse the steady state wage policies under the assumption that countries are identical in terms of preferences, technology and political power of the young and the old. We refer to domestic wage, being the outcome symmetric. We will denote the steady state wages in a symmetric equilibrium as  $w_s^E(\mu, U, \alpha)$ , the superscript  $E$  referring to the institutional setting (Economic Union) and the subscript  $s$  to the fact that countries are symmetric.

### EU Symmetric Steady State

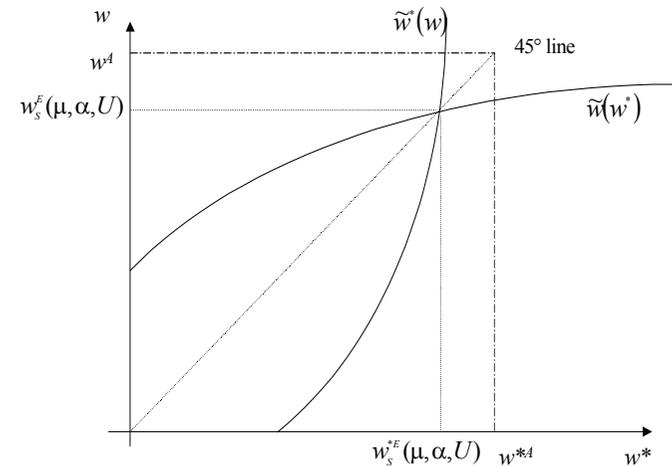


Figure 6: EU symmetric steady state

The symmetric Nash equilibrium lies at the point where the two reaction functions cross (see figure 6). This point, as shown in proposition 3, lies always below the autarchic steady state wage level. As the cost of investing abroad becomes higher, the wages go up approaching the autarchic levels. Moreover, the steady state wages are increasing in the home production productivity  $U$ , and in the political power of the young  $\alpha$ .

The intuition for these results is straightforward. When capital can flow across borders, LMR is more costly because it reduces the *current* capital stock either through larger capital outflows or through smaller capital inflows and strategic interaction further decreases the incentives to regulate the labour market because each country has incentives to undercut the rival. Therefore there is less LMR in steady state. Clearly, the lower the cost of investing abroad, the higher the incentives to deregulate the labour market and the lower the steady state wage, because of the larger capital outflows that make labour market regulation the more costly. Moreover, the higher  $U$  the more workers' are willing to regulate the labour market because of the lower losses incurred when not employed. Finally, the higher  $\alpha$  the more powerful the young and the more regulated the domestic labour market for each level of the foreign one.

The next proposition characterises the symmetric steady state.

**Proposition 3** *In a symmetric Economic Union, the (domestic) steady state wage  $w_S^E(\mu, U, \alpha)$  cannot be larger than the autarchic steady state wage  $w^A$ , i.e.  $w_S^E(\mu, U, \alpha) \leq w^A$  the equality holding for  $\mu \rightarrow \infty$ . Moreover, it is increasing in the cost of investing abroad  $\mu$ , in the home production productivity  $U$ , and in the political power of the young  $\alpha$ .*

**Proof.** Available at [www.econ.upf.es/~pica](http://www.econ.upf.es/~pica) or from the author upon request. ■

#### 4.2.3 *EU politico-economic steady state: asymmetries in $U$ and $\alpha$*

Let us now suppose that the two countries differ in the home production productivity  $U$ .<sup>52</sup> For instance, let us assume that  $U^* > U$ . The equilib-

rium wages are as follows:<sup>53</sup>

**Proposition 4** *If  $U^* > U$ , the foreign steady state wage is larger than the domestic one, i.e.*

$$w_{AS}^{*E}(U^*, U, \mu, \alpha) > w_{AS}^E(U, U^*, \mu, \alpha)$$

*Moreover, both wages are larger than the steady state wages arising in the Symmetric outcome with a lower  $U^*$  equal to  $U$ , i.e.*

$$\begin{aligned} w_{AS}^{*E}(U^*, U, \mu, \alpha) &> w_S^{*E}(U, \mu, \alpha) = w_S^E(U, \mu, \alpha) \\ w_{AS}^E(U, U^*, \mu, \alpha) &> w_S^E(U, \mu, \alpha) = w_S^E(U, \mu, \alpha) \end{aligned}$$

**Proof.** Available at [www.econ.upf.es/~pica](http://www.econ.upf.es/~pica) or from the author upon request. ■

If  $U^* > U$ , in the foreign country there is bigger support for regulation, and therefore the foreign reaction function  $\tilde{w}^*(w)$  in figure 6 shifts rightward. The domestic regulated wage also goes up with respect to the symmetric case, due to the strategic complementarities arising in the range where the foreign wage is larger than the domestic one. Thus both wages go up, the foreign one being larger than the domestic one.<sup>54</sup>

An analogous proposition may be written in term of  $\alpha$ , the main message being that with  $\alpha^* > \alpha$ , the political power of the young individuals in the foreign country is higher, and this shifts the foreign reaction function  $w^*(\cdot)$  rightward. Thus, again, both the foreign and the domestic wage go up, with the foreign wage being larger than the domestic one.

## 5 POLITICAL UNION: INSTITUTIONAL INTEGRATION

We think of a Political Union as an institutional arrangement in which policy decisions are centralised and the wage is set at a common level in

the two countries. We assume that in a Political Union decisions are taken by maximizing a weighted sum of the two countries' political aggregators:

$$\begin{aligned} & \max_{w, w^*} \beta W(w; s_0, s_0^*, w^*) + (1 - \beta) W^*(w^*; s_0^*, s_0, w) \\ & \text{s.t.} \\ & w = w^* \end{aligned}$$

with the weights reflecting the relative influence of each country inside the union.

In the symmetric case,  $W(w; \cdot) = W^*(w^*; \cdot)$ , the outcome is trivial, and is given by the (common) autarchic wage. If there are asymmetries, the wage lies between the autarchic wages of the two countries,  $w_{AS}^P(U, U^*, \alpha, \alpha^*, \mu) \in [w^A(U, \alpha, \mu), w^{*A}(U^*, \alpha^*, \mu)]$ .

## 6 WINNERS AND LOSERS: AUTARCHY vs. ECONOMIC AND POLITICAL UNION

In this section, we perform the following exercise. We suppose that an individual has to choose where to live her whole life and faces three possibilities: country A, country B and country C. Country A is a closed economy. Country B belongs to a Economic Union and country C to a Political Union. All countries are in steady state and are otherwise identical. We keep assuming that the conditions of proposition 2 hold and that LMR arises in the autarchic steady state.

Although this exercise does allow to rank the different institutional settings from the points of view of young and old individuals, it does not allow to conclude that agents would support *shifts* from an institutional setting to another. The reason is that, as we focus on steady states, we do not take into account costs and benefits that policy *changes* may trigger during the transition from one steady state to the other.

### 6.1 The symmetric case

The choice between Autarchy and Political Union is straightforward. From section 5, we know that any agent - young or old - is indifferent between country A and C, Autarchy and Political Union, because they deliver identical steady state outcomes. More interesting is the comparison between Economic Union on the one side, Autarchy and Political Union on the other side.<sup>55</sup>

Workers, i.e. young individuals, prefer Autarchy and the Political Union (country A and C) to the Economic Union (country B). They are better off in a more regulated environment. The reason, as emphasised when characterizing the autarchic steady state (section 3.2.3), is that labour market regulation allows to raise the first period income of agents, that consequently save more, thus fostering capital accumulation and allowing the economy to reach a steady state with a larger capital stock. Therefore, under dynamic efficiency, LMR raises the steady state welfare of the young and it is optimal for them to support it. Economic integration, by lowering the level of LMR, harms the young that are therefore better off in a Political Union. Notice, however, that in this model the gains from economic integration are underestimated because of the absence of gains from trade.

As to the old the result is ambiguous. LMR on the one side reduces the interest rate, and on the other side raises the capital stock. Thus, the effect on the second period consumption level is not clear-cut. However, since we focus on steady states, it does not make much sense to look at the old agents' welfare. The relevant agents to look at, in terms of welfare, are the young. We may stretch this argument even more and interpret the welfare of the young as welfare tout court under the *behind the veil of ignorance* criterion. This well-known and widely used welfare criterion ranks steady states (and the associate distribution of types in heterogeneous agents models) by asking which steady state would an agent choose *before* knowing her type. In OLG models heterogeneity is fully driven by age and the distribution of types is such that the ex-ante probability of being a worker is 1 and the probability of being a capitalist is zero. This is why in this model the *behind the veil of ignorance* welfare criterion coin-

cides with the point of view of a young person and, consequently, delivers the conclusion that the Political Union is superior to the Economic Union. Notice, however, that this result may survive also in a model with a full-fledged distribution of assets where agents may be capitalists at birth. For instance, the presence of bequests (with a stochastic component) would generate a full-fledged asset distribution, and there would be a positive ex-ante probability of being a capitalist at birth. In this case, the incentives to regulate the labour market - and the welfare results that follow - would survive if the steady state wealth distribution is sufficiently skewed, i.e. the ex-ante probability of receiving a bequest is low enough.

## 6.2 The asymmetric case

Now we suppose that countries are asymmetric, and compare the steady states arising in the three different institutional settings, by adopting the point of view of a young person. In order to perform the same exercise as before, we assume that there are two sets of countries. A set of “domestic” countries  $D$  where the home production productivity  $U$  is high and a set of “foreign” countries  $F$  where  $U^*$  is low, i.e.  $U > U^*$ .

In each set  $i$  (with  $i = D, F$ ) there are three countries, A, B and C, where A is a closed economy, B belongs to a Economic Union and C to a Political Union. Finally, we suppose that some individuals (domestic guys) are forced to live in the set  $D$ , while others (foreign agents) are forced to live in the set  $F$ , and discuss which environment (country A, B or C) would be chosen by a domestic and a foreign person.

Let us first analyse the choice of a young person living in the set  $D$ . Being the domestic country more regulated,<sup>56</sup> in the Economic Union steady state, *both* the domestic wage and the capital stock are lower than in Autarchy. Hence, under the conditions of proposition 2, Autarchy must be preferred to the Economic Union. Moreover, the welfare level attained by a young agent in Autarchy is also larger than the welfare achieved in the Political Union, because the foreign country drives the Political Union steady state wage down.<sup>57</sup> As to the comparison between the Economic and Political Union, the welfare of a young agent is generally larger in the

Political Union. The reason is that the Political Union allows to get rid both of capital competition (that drives the wage down) and of the capital outflows.<sup>58</sup> Thus, Autarchy is preferred to the Political Union, which is preferred to the Economic Union.

We now turn to the ordering of a young individual, living in the less regulated set  $F$ . If asymmetries among countries are not large, capital inflows are not substantial and, by continuity from the symmetric case, both Autarchy and the Political Union are preferred to the Economic Union, because they allow to get rid of the negative externality that capital competition generates on wages. Differently, if asymmetries are sizeable, capital inflows become considerable. This makes the Economic Union deliver the highest welfare. Suppose, for instance, that  $U^*$  is so low that no support ever arises for LMR. Then, the Economic Union delivers a higher steady state welfare than both Autarchy and the Political Union, because of the capital inflows that increase the competitive wage.<sup>59</sup> Even in the extreme case where the foreign country has the power to unilaterally set the Political Union wage ( $\beta = 0$ ), the Economic Union would be superior, because the same policy, the competitive wage, would implemented in both worlds, but in the Political Union there would not be capital inflows.

Also in light of the discussion among European Union countries concerning policy centralisation, it is interesting to summarise the results on the comparison between Economic and Political Union. Maybe not surprising, the Political Union is preferred by *both* the domestic and the foreign guy *only if asymmetries are not sizeable*. Differently, the foreign guy (less prone to regulation) is better off in the Economic Union *no matter how large the political power of the foreign country inside the union*, while the domestic guy (more prone to regulation) is typically better off in the Political Union.

## 7 CONCLUSION

In the aftermath of the adoption of the Social Charter by all EEC member states but the UK, John Major motivated the rejection as follows:

“Europe can have the Social Charter. We shall have employment. [...] Let Jacques Delors accuse us of creating a paradise for foreign investors; I am happy to plead guilty”.<sup>60</sup>

This paper addresses the issue, illustrated by the above quotation, of how the incentives to set up labour market regulation are affected by capital markets integration in a world where countries behave strategically.

In order to do so, we consider a two-country OLG model where the wage rate is set through a political process in which the young (workers) and the old (capitalists) may intervene through lobbying activities. In OLG settings, under dynamic efficiency, the young support the implementation of transfer schemes that redistribute lump-sum from the old. The old are always against such schemes. If lump-sum transfer are assumed away and we only allow for LMR, the young are willing to regulate the labour market if being unemployed is not too costly. In this paper this means that the productivity of the backyard technology is not too low. Once LMR is implemented, workers save more and accumulate more capital. Then, provided that workers have sufficient political power, LMR endogenously arises in the autarchic steady state and, under dynamic efficiency, raises workers' welfare, despite the production inefficiency generated by the labour market distortion.

In the symmetric two-country setting with integrated capital markets, LMR becomes more costly and each country has incentives to undercut the rival's regulated wage, in order to attract capital. Hence, in steady state, wages are lower than in Autarchy. The lower the more capital markets are integrated. Therefore workers' welfare (or as we argued welfare tout court under the *behind the veil of ignorance* criterion) is larger in Autarchy than in the Economic Union. As a consequence, a Political Union, where a common wage level is set for the two countries, also delivers a higher steady state welfare relative to the Economic Union.

The analysis of the asymmetric case shows that, if asymmetries are sizeable, the steady state welfare of the country *less* prone to regulation is *never* larger in a Political Union. Differently, the steady state welfare of the country *more* prone to regulation is typically larger in the Political Union.

This conclusions may find a counterpart in the positions concerning the debate over policy centralisation at the European Union level of countries such as France, Germany and (from outside) the UK. However, the model is stylised enough to suggest not to push it too far.

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## Notes

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<sup>2</sup>The process of European integration, for instance, risked to be mined at the roots in several circumstances. In June 1992 the Danes voted to reject the Maastricht treaty and the French came very close to doing so.

<sup>3</sup>See among others Andersson and Konrad (2002), Bean et al (1998), Beissinger (2001), Krueger (2002), Rodrik (1997).

<sup>4</sup>Labour market regulation is, of course, a multi dimensional matter involving a number of different policies, such as employment protection, unemployment benefits, minimum wages and collective bargaining. All these policies have different - well known - effects on labour market outcomes. However, they do share one common feature, namely they all contribute to set a floor to the wage rate. Minimum wages in an obvious way. Unemployment benefits by raising workers' reservation wage. Employment protection and collective bargaining by raising workers' bargaining power.

<sup>5</sup>This is typical of OLG models, while it does not happen in infinite-horizon models where along a balanced growth path the preferences over policies of agents with different asset levels are stable over time (see Bertola (1993)).

<sup>6</sup>With zero population growth, an economy is dynamically efficient if the (net) marginal productivity of capital is larger than the economy's growth rate. Empirically, it seems that western economies are indeed dynamically efficient (see Abel et al. (1989)).

<sup>7</sup>Different modeling strategies may be adopted to parameterise the size of output losses due to LMR. See footnote 35.

<sup>8</sup>Under the empirically plausible condition that the interest elasticity of savings, if positive, is not too large.

<sup>9</sup>Notice the difference between OLG and infinitely lived agents models. In the latter class of models labour market rigidities reduce the remuneration of capital, thus depressing investments and the capital stock until wages and the interest rate are restored to the long-run equilibrium levels. Differently, in OLG models capital accumulation is taken care of by the young, whose income source is labour. Hence, the larger the labour income, the more the young save and the larger the capital stock, provided that savings are poorly responsive to changes in the interest rate. This is the mechanism through which LMR fosters capital accumulation. Relatedly, Uhlig and Yanagawa (1996) show that shifting

the tax burden from the young to the old leads in endogenous growth OLG models to *faster growth*. Bertola (1996) extends their results to the perpetual youth OLG model.

<sup>10</sup>See Saint-Paul (2000).

<sup>11</sup>See Hassler and Rodríguez Mora (1999) and Wright (1986) for a political economy approach. Related papers are Bertola (2002), Acemoglu and Shimer (1999), Drèze and Gollier (1993) where labour institutions are exogenous.

<sup>12</sup>Accounting for strategic interaction among countries has proved useful also in analyzing endogenous fiscal policies. In a two-country framework, Persson and Tabellini (1992) find that increased capital mobility reduces capital taxation, but the effect is mitigated by the fact that voters appoint more leftish policy-makers less responsive to strategic considerations, as a response to lower mobility costs of capital; Perotti (2001) makes the point that moving from a decentralised to a centralised fiscal system may increase the distortionary effect of redistribution if labour markets are asymmetric and labour is not mobile; Rodrik and van Ypersele (2001) argue that capital mobility may be politically not sustainable unless international tax coordination is implemented.

<sup>13</sup>We are also connected to contributions that explore the effects on labour market outcomes of the relocation of economic activities, such as Markusen, Morey and Olewiler (1995), Motta and Thisse (1994), and Cordella and Grilo (1995), and to papers that analyse the effects of centralised monetary policy on the labour market as Bentolila and Saint-Paul (2000), Cukierman and Lippi (1999), Saint-Paul and Wasmer (1999).

<sup>14</sup>The most natural interpretation of this approach is that a minimum wage is implemented. However, other interpretations may also fit this setting. For instance, one may think of a model where a monopoly union sets the wage, firms decide the employment level, and *unemployment benefits* are determined in the political arena. The higher the unemployment benefits, the higher workers' outside option and, consequently, the wage rate. Alternatively, one may think of policies that ultimately affect wages through workers' or unions' bargaining power.

<sup>15</sup>Such an alternative technology may also be interpreted as being another sector, perhaps an informal one, that produces the same good. In a slightly different setting,  $U$  may represent the value of leisure.

<sup>16</sup> $U$  acts as a reservation wage. Hence, it is always the case that  $w \geq U$ .

<sup>17</sup>A monopoly union sets a wage that equals the outside option of the worker  $U$  times a markup  $\frac{1}{1-\gamma}$ , where  $\gamma$  is the inverse of the elasticity of the labour demand.

<sup>18</sup>This assumption may also be justified on the ground that information costs rise with the size of the investment, as long as larger investments imply more *diversification*, and therefore the need to gather more information.

<sup>19</sup>See Lewis (1995).

<sup>20</sup>This is consistent with the empirical finding that the intertemporal elasticity of substitution is low (see Hall (1988)).

<sup>21</sup>In this subsection we do not make explicit, for brevity, the fact that labour income and the interest rate depend on the wage.

<sup>22</sup>In the following, we will always label foreign variables with a superscript \*.

<sup>23</sup>Hence, savings are first decreasing and then increasing in  $\mu$  (recall that as  $\mu \rightarrow 0$ , regime *C* holds, while as  $\mu \rightarrow \infty$ , regime *B* holds).

<sup>24</sup>Notice that labour income  $y(K_t, w)$  and (therefore) savings are both continuous in  $K_t$ .

<sup>25</sup>For the sake of notational simplicity, in what follows, we make a slight abuse of notation, and denote  $w^c(K)|_{K=K^F}$  as  $w^c(K^F)$ .

<sup>26</sup>Notice that  $K^F = \left(\frac{1-\gamma}{2+\theta}\right)^{\frac{1}{1-\gamma}}$  is the stationary capital stock that arises in the standard, fully competitive, OLG economy.

<sup>27</sup>Notice that the interest rate does not affect savings because of the logarithmic utility. However, for the result to go through all is needed is that the interest elasticity of savings, if positive, is not too high. A CRRRA utility function, with a not too high relative risk aversion coefficient would deliver the same result.

<sup>28</sup>The reason is that agents realise that the current political decision affects the future choice. Therefore, they have incentives to distort the choice of the current wage  $w_t$  so as to influence next generation preferences by affecting the state variable of the economy, and bias the next period political outcome towards their most preferred level (see Krusell et al. (1997)).

<sup>29</sup>Notice that the assumption that the choice is made over a *constant* wage may be interpreted as reflecting the ability of the society to implement a political mechanism that excerpt agents' *true* preferences on a *constant* wage rate: when asked about their preferences, agents reveal the *constant wage that maximises their lifetime utility*.

<sup>30</sup>See for instance Bertola (1993), Hassler and Rodríguez Mora (1999), and Hassler, Rodríguez Mora, Storesletten, and Zilibotti (1999).

<sup>31</sup>Indeed, strategic voting does not appear to be empirically relevant. Hassler et al (2003) find only limited anecdotal evidence, namely *one* example in Israel, where it appeared to matter. Moreover, strategic considerations are less relevant the larger is the time-gap between ballots (see Hassler and Rodríguez Mora (1999)).

<sup>32</sup>The feasibility requirement is due to the fact that a *constant* policy is chosen. A *constant* policy  $\bar{w}(K_0)$  is feasible if indeed it stays in place forever, meaning that, given  $K_0$ , there will be no future capital stock level such that the wage  $\bar{w}(K_0)$  is not binding anymore. Another way of stating it is that in no future period the capital stock is such that  $\bar{w}(K_0)$  is lower than the competitive wage.

<sup>33</sup>Under myopic behavior, a conflict of interest between workers and capitalists *always* exists. The young behave like a monopoly union and their preferred wage is give by  $\frac{U}{1-\gamma}$ . The old always prefer the competitive wage.

<sup>34</sup>More generally the net interest rate is larger than the sum of the population growth rate and rate of technological progress (both are equal to zero in this paper).

<sup>35</sup>An alternative modeling device suitable to parameterise the size of labour market inefficiencies generated by LMR, is to specify a CES production function: the lower the elasticity of substitution between capital and labour, the smaller the distortions.

<sup>36</sup>On the one side, if the capital stock  $K_0$  is too low, the preferred wage is lower than the competitive *long-run* wage  $w^c(K^F)$ . On the other side, as the capital stock becomes larger, the current competitive wage also grows and becomes eventually larger than the preferred wage of the young which is bounded from above by the monopoly wage  $\frac{U}{1-\gamma}$ .

<sup>37</sup>The dashed-dotted line is given by  $\max(w^c(K^F), w^c(K_0))$ . If  $K_0 < K^F$ , the economy converges to  $K^F$  if  $w < w^c(K^F)$  (see proposition 1). Thus any wage smaller than  $w^c(K^F)$  is not feasible because it will eventually not be binding. If  $K_0 \geq K^F$  then any wage above the competitive one  $w^c(K_0)$  is feasible (see appendix for details).

<sup>38</sup>In this range, the preferred wage of the young is lower than  $w^c(K^F)$  and, if  $w < w^c(K^F)$ , the economy eventually converges to the competitive stationary equilibrium characterised by the capital stock  $K^F$  and the competitive wage  $w^c(K^F)$  (see lemma 1). Thus, such a low wage may not stay in place forever.

<sup>39</sup>Note that, when the young support a wage larger than the competitive one, they always support a wage smaller than the static monopoly wage  $\frac{U}{1-\gamma}$  (that maximises total labour income). This happens because young take into account (though discounting it) that a high wage will hurt them in the second period of their lives.

<sup>40</sup>This happens if the elasticity of savings with respect to the interest rate is low (if positive) or negative. Our log utility specification, displaying a constant intertemporal elasticity of substitution equal to 1, implies that such an elasticity is zero. All the results go also through with a constant intertemporal elasticity of substitution smaller than 1. For evidence of this being empirically plausible see Hall (1988).

<sup>41</sup>Recall that foreign variables are labeled with an asterisk \* and that  $\eta_{t+1}$  is the share of savings invested abroad by domestic capitalists.

<sup>42</sup>We will not consider the case  $\eta = 1$  (and  $\eta^* = 1$ ) since in equilibrium it is never the case that the domestic (foreign) country is left without capital.

<sup>43</sup>Not surprisingly  $\frac{dw_{\bar{w}}^c(K_E^F(w^*, \mu))}{dw^*} \rightarrow 0$  if  $\mu \rightarrow \infty$ , since in autarchy the foreign wage does not affect the domestic one, and  $\frac{dw_{\bar{w}}^c(K_E^F(w^*, \mu))}{dw^*} \rightarrow 1$  if  $\mu \rightarrow 0$ , since with full capital mobility the interest rates and the wages equalise across countries. The function  $w_{\bar{w}}^c(K_E^F(w^*, \mu))$  is fully characterised in lemma 2.

<sup>44</sup>As in autarchy, there is a feasibility requirement to satisfy due to the fact that a *constant* policy is chosen.

<sup>45</sup>In what follows we refer to the domestic political aggregator. The description of the foreign one is analogous.

<sup>46</sup>Lemma ?? in the appendix analyses the political aggregator.

<sup>47</sup>In this case, the reaction function is not properly defined as in the case of oligopoly models with price competition where each firm best reply is to *slightly* undercut the rival.

<sup>48</sup>Notice that in this regime consumers in the home country do not invest abroad, thus changes in  $w^*$  do not affect the interest rate they get. Things will be different in the regime  $\bar{w}(w^*) > w^*$ .

<sup>49</sup>Returns on assets are a convex combination of  $r(w)$  and  $r^*(w^*)$ , with the (endogenous) weights being  $\eta(w, w^*)$  and  $1 - \eta(w, w^*)$ .

<sup>50</sup>Despite knowing from numerical simulations (performed with Mathematica and available upon request) that the sign of  $\frac{d\bar{w}(w^*)}{dw^*}$  is positive for low values of  $\mu$  and negative for high values, it has not been possible to establish the uniqueness of a threshold value  $\bar{\mu}$  such that  $\frac{d\bar{w}(w^*)}{dw^*} < 0$  for all  $\mu > \bar{\mu}$  (see appendix for details).

<sup>51</sup>Also  $U$  enters the picture. The lower  $U$  the smaller the slope of the reaction function and the more the reaction function shifts downward.

<sup>52</sup>Asymmetries in the political power of young  $\alpha$  qualitatively deliver the same results.

<sup>53</sup>The subscript  $_{AS}$  stands for Asymmetric.

<sup>54</sup>Recall that for levels of  $w^*$  such that domestic regulated wage is smaller than the foreign one, the domestic reaction function is always increasing in  $w^*$ , while this is not the case if the domestic reaction function lies *above* the 45° degree line. Therefore, if  $U^* < U$ , the foreign reaction function  $\bar{w}^*(w)$  shifts left, and the steady state foreign wage becomes smaller than the domestic one. It is also smaller than the symmetric SS wage. However, whether the *domestic* regulated wage is larger or smaller than the symmetric SS wage depends on the slope of the domestic reaction function. If the latter is positive ( $\mu$  low), also the domestic regulated wage is smaller than the symmetric SS wage and if it is negative ( $\mu$  high), the domestic regulated wage is higher than the symmetric SS wage.

<sup>55</sup>Consistently with the modeling strategy of this paper where the degree openness  $\mu$  is exogenously given, it may be argued that Autarchy is in most cases not an option in the real world because national capital markets are irreversibly open and technology improvements have made the cost of investing abroad low. Therefore, the relevant and more interesting choice - also in light of the recent debate at the European Union level - is the one between the Economic and the Political Union.

<sup>56</sup>Recall that since  $U^* < U$ , in the home country there is stronger support for regulation. Hence, the domestic steady state wage is higher than the foreign one. This implies that the foreign interest rate is higher than the domestic one and capital flies from the domestic to the foreign country.

<sup>57</sup>Unless the home country has all the political power inside the union (i.e.  $\beta = 1$ ), in which case the Political Union and Autarchy outcomes are identical.

<sup>58</sup>However, if asymmetries are large *and* the political power of the domestic country inside the Union is very low, a domestic guy may prefer the Economic Union because if the PU steady state wage is so low that the lack of capital outflows does not compensate for it.

<sup>59</sup>It is easy to show that when the economy is competitive, capital inflows make the young (and all future generations) better off, and only harm the current old generation.

<sup>60</sup>Cited in Rodrik (1997).