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Endogenous Labor Market Rigidities and Family Ties

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PRELIMINARY

Abstract

Much has been written about institutional differences between European and North American labor markets, and about their role in determining the large and persistent differences between the unemployment rates in Europe and US over the last fifteen-twenty years. The objective of this paper is to answer the question: why have these differences in labor market flexibility emerged and why do they persist? First, evidence is presented showing that, in countries with high employment protection policies, credit market imperfections are more severe and young people live longer in the family. Then a general equilibrium, overlapping generations model is developed to explicitly capture the relationship between degree of employment protection, family structure and credit market imperfections. In this context, the endogenous response of the family structure to credit market imperfections, gives rise to conditions in which differences in labor market rigidities emerge as the outcome of a dynamic and repeated bargaining process between generations.

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1. Introduction

Much has been written about institutional differences between European and North American labor markets, and about their role in determining the large and persistent differences between the unemployment rates in Europe and US over the last twenty years. In this paper we want to move our understanding of the European unemployment dilemma one step further and answer the question: why have these differences in labor market institutions emerged and why do they persist?

The focus of this study is on employment protection policies. Recent work has analyzed how these policies affect labor market outcomes and a common finding is that employment protection policies entail substantial welfare losses.[2] Some authors[3] have explained their emergence in the context of insider-outsider models in which employment protection is supported by incumbent employees at the expenses of unemployed workers.

In this paper a different approach is proposed: it is shown that in an economy characterized by credit markets imperfections, employment protection policies arise endogenously and benefit all agents in the economy, even when labor markets are perfectly competitive.

There are two elements that are key for this result and that have not been stressed in the literature. The first observation is that employment protection policies have a strong intergenerational redistributive effect: they increase employment of old workers at the expense of employment of young workers. Second, interactions within the family may offset intergenerational distorsions. As a result it is shown that, if faced with borrowing constraints, young people live longer with their family, and can actually benefit from a policy that protects the employment of the old generation.

The first part of this work presents new evidence on the relationship between degree of employment protection, family structure and credit market imperfections. A cross-country comparison for industrialized economies shows the existence of a strong positive correlation between degree of employment protection and degree of credit market imperfection. Moreover, in countries where the policy is stricter, young people live longer with their families, the employment rate for head of households is higher and the employment to population ratio for youth is

[2] Bentolila and Bertola (1990), Hopenhayn and Rogerson (1993), Millard and Mortensen (1994), Alvarez and Veracierto (1999) .

[3] See Saint-Paul (1999)

lower.

I then develop a general equilibrium, two period lived overlapping generation model to address this evidence. Young agents face borrowing constraints and choose which fraction of their youth to spend living in the family and which fraction to spend on the labor market. When living with their parents, they enjoy the same consumption level of the old generation, but suffer a disutility from not being independent. The firm every period decides how many young workers and how many old workers to hire. There is uncertainty over the productivity of young workers. This uncertainty is resolved at the beginning of the following period. In this context the policy is introduced as a constraint on the firing decision of the firm: it requires the firm to keep a certain fraction of old workers that were hired when young, regardless their productivity. A high degree of protection implies that a high fraction of workers hired when young keep their jobs when old.

The steady state consequences of a given degree of protection are then analyzed. The direct effect of the policy is an increase in the employment level of the old generation. Optimal hiring decisions by firms also imply that, when the policy is introduced, firms reduce their labor demand for young workers, thus decreasing their equilibrium wage. These two effects change the trade off young workers face when choosing their living arrangements, increasing the return of living with their parents. It follows that, a steady state with protection is characterized by lower employment of young people, higher employment of old people and higher fraction of young generation living with the family than the steady state characterized by no policy. Moreover, in economies where borrowing constraints are tighter, young people choose to live longer with their parents and thus benefit more from a policy that redistributes from young to old. As a consequence, the degree of protection that maximizes steady state welfare in the economy with borrowing constraints is always higher than the one that maximizes welfare in the economy where agents do not face any borrowing constraints.

Finally, the degree of employment protection is endogenized and it emerges as the outcome of a dynamic repeated bargaining process between the two generations. It is shown that, for a large range of parameter values, a positive degree of protection is chosen. Moreover, the equilibrium degree of protection emerging in the economy with borrowing constraints is starkly different from the one arising in the economy without borrowing constraints. In particular, for a large region of parameter values, in the economy where young people cannot borrow full protection arises as an equilibrium outcome, while in the economy with perfect credit markets no protection is ever introduced.

2. Empirical Evidence

This section is organized in three parts: the first presents the available evidence on cross-country differences in labor market institutions and performances, the second is dedicated to the analysis of the relationship between degree of employment protection and family structure, as summarized by the living arrangements of the youth, and the last explores the relationship between family structure and credit market imperfections.

2.1. Labor Market Institutions and Performance

During the 1970s, on the eve of the first oil price shock, many European countries significantly strengthened the notice and severance pay requirements imposed on employers who carried out collective dismissals. This process generated substantial differences in the degree of employment protection across countries. Table 1 reports a ranking of countries based on the strictness of the legislation governing collective dismissal in the early 1980s. This is based on a weighted average of four different indicators of EPL strictness proposed respectively by Bertola (1990), the International Organization of Employers, and the OECD[4]. This last measure takes into account four dimensions of protection: procedural inconvenience, severance and notice period, treatment of unfair dismissals, and regulation of fixed-term contracts and temporary employment.

[4]The weight of each indicator is the inverse of the coefficient estimated when that indicator is regressed on the weighted average itself.

Table 1. Comparison of EPL indicators and ranking by "strictness"

	Maximum pay and notice period	OECD index	International Organization of Employers	Ranking by Bertola	Average ranking
EC					
Belgium	8.50	10.50	2.5	9.0	17
Denmark	4.50	3.25	1.0	2.0	5
France	3.50	9.50	2.5	8.0	14
Germany	4.50	12.00	2.5	6.0	15
Greece	13.25	11.00	2.5	9.1	18
Ireland	14.00	2.75	1.5	6.0	12
Italy	13.00	14.25	3.0	10.0	21
Netherlands	4.00	7.25	2.5	3.0	9
Portugal	17.00	12.50	2.0	9.5	19
Spain	15.00	11.25	3.0	10.0	20
United Kingdom	6.00	2.25	0.5	4.0	7
EFTA					
Austria	14.75	9.0	1.5	7.6	16
Finland	6.00	10.50	1.0	5.5	10
Norway	6.00	9.75	1.5	5.9	11
Sweden	6.00	8.50	2.0	7.0	13
Switzerland	5.00	1.75	0.9	3.2	6
Non-European					
Canada	1.25	1.65	0.6	2.0	3
United States	0.00	0.36	0.4	1.0	1
Australia	3.00	3.26	0.9	3.1	4
New Zealand	0.25	0.72	0.4	1.3	2

Source: OECD Jobs Study 1995

It emerges that there is substantial variation in the degree of protection across countries. In particular, Italy, Spain, Portugal and Greece exhibit the strictest legislations, while US, Canada, Denmark and UK are collocated at the opposite end of the spectrum, with France and Germany and Austria characterized by

intermediate levels.

Several studies have analyzed the role of these differences in employment protection legislation in determining large differences in labor market performances. In particular, empirical studies indicate that job security legislation reduces employment, discourages labor market participation and prolong unemployment duration.[5] What emerges from a closer look to the data however, is that the EPP have also a strong redistributive effect of the unemployment risk across agents of different age and family status. In particular countries with more stringent employment protection are characterized by: (1) Lower unemployment rate for married men and higher for young people living in the family and (2) Lower employment-population ratio for young people.

Table 2 shows the distribution of unemployment by family status, that is the percentage of unemployment attributed to each member of the family in several countries: the fractions that accrue to the head of the family and to the youth living in the family are very similar in US., Canada, Denmark, and United Kingdom that is, in all the least protected countries, while in Italy, Greece, Portugal and Spain the share of total unemployment of the youth living in the family is from two to five times higher than that of the head of the household, indicating that the protection policies have a redistributive role of the unemployment risk across generations. This fact is confirmed by the data of Table 3. The head of the household in Italy has an unemployment rate that is one-fourth of the Canadian one and less than one-half the one in US. On the other hand, the unemployment rate of the youth is at least twice as high. A similar pattern can be observed for all the countries with strict employment protection legislation.

[5] Lazear (1990), Nickell (1997), Di Tella and MacCulloch (1999).

Table 2

Distribution of unemployment by family status, 1992
(as a percentage of total unemployment)

	In families				Not in family	
	Husbands	Wives	Single parents	Youth	Total	Youth
EC						
Belgium	14.3	30.6	8.5	15.4	25.5	9.1
Denmark	14.6	22.4	10.7	3.9	49.5	19.9
France	21.3	34.2	5.0	17.0	18.9	10.5
Germany	22.0	27.3	4.2	7.3	34.7	6.5
Greece	11.0	21.0	1.7	37.4	16.3	7.6
Ireland	30.5	15.6	2.9	26.0	20.6	6.5
Italy	8.2	21.6	0.6	43.7	14.7	4.5
Netherlands	16.1	23.9	4.5	18.0	34.8	11.5
Portugal	12.7	32.5	2.1	31.5	10.0	8.4
Spain	17.6	19.9	1.3	33.2	12.8	4.2
United Kingdom	29.8	19.9	3.5	20.7	23.8	11.2
North America						
Canada	26.2	22.7	3.9	22.6	17.0	3.8
United States	20.4	15.6	10.1	22.5	20.5	8.5

Source: OECD Jobs Study (1995).

Table 3
Unemployment by family status, 1992
(as a percentage of the labour force)

	In families				Not in family	
	Husbands	Wives	Single parents	Youth	Total	Youth
EC						
Belgium	2.5	8.3	18.6	14.7	9.7	12.9
Denmark	5.0	8.4	17.7	8.1	11.2	12.6
France	4.8	10.0	18.6	23.6	10.9	15.6
Germany	2.4	4.9	9.2	3.0	5.7	4.9
Greece	1.9	7.4	12.7	25.7	10.4	21.4
Ireland	12.3	16.0	30.7	24.1	15.0	20.1
Italy	2.0	10.5	7.5	29.1	10.3	21.6
Netherlands	3.3	8.5	16.4	10.5	9.7	12.2
Portugal	1.3	4.9	4.4	8.6	4.3	9.2
Spain	7.0	18.9	18.8	31.0	17.7	27.2
United Kingdom	6.7	5.8	16.9	13.7	13.1	14.3
North America						
Canada	8.4	9.1	18.0	17.8	13.4	16.8
United States	4.8	4.8	9.6	16.6	7.5	10.3

Source: OECD Jobs Study (1995).

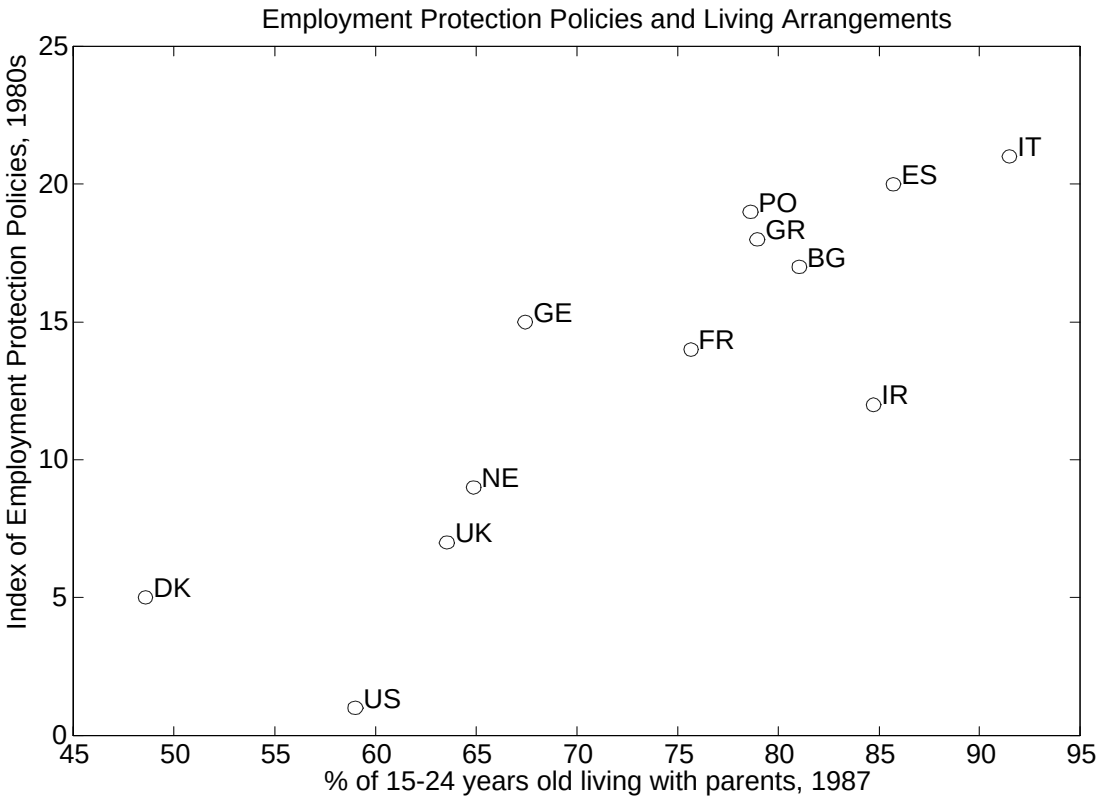
Figure 2.1 plots the employment to population ratio of young people, between the age of 15 and 24, against the degree of employment protection policy for several countries in 1993. Young people appear particularly disadvantaged in Spain, Italy, France, Greece and Spain that are the most protected countries. While in other studies differences in the employment ratio of young people have been linked to the value of the minimum wage ratio, it is interesting to notice that all the northern european countries like Norway, Denmark and Finland are characterized by high minimum wage but also high employment among youth. On the other hand, these countries display low degree of employment protection.

Figure 2.1:

2.2. .EPL and living arrangements

Figure 2.2 plots a scatter diagram of the ranking based on the strictness of EPL shown in Table 1, against data on the living arrangements of young people for 11 countries in 1987. The data on the living arrangements are given by the results of a survey conducted by the Commission of the European Communities in 10 European countries together with data for the US.[6] The data show the percentage of people between the ages of 15-24 living with their parents.

[6] Eurobarometer 28.1. Question nr. 167. The data for US are from Zeng Yi (1994) and Youth Indicator nr. 14, Bureau of the Census.

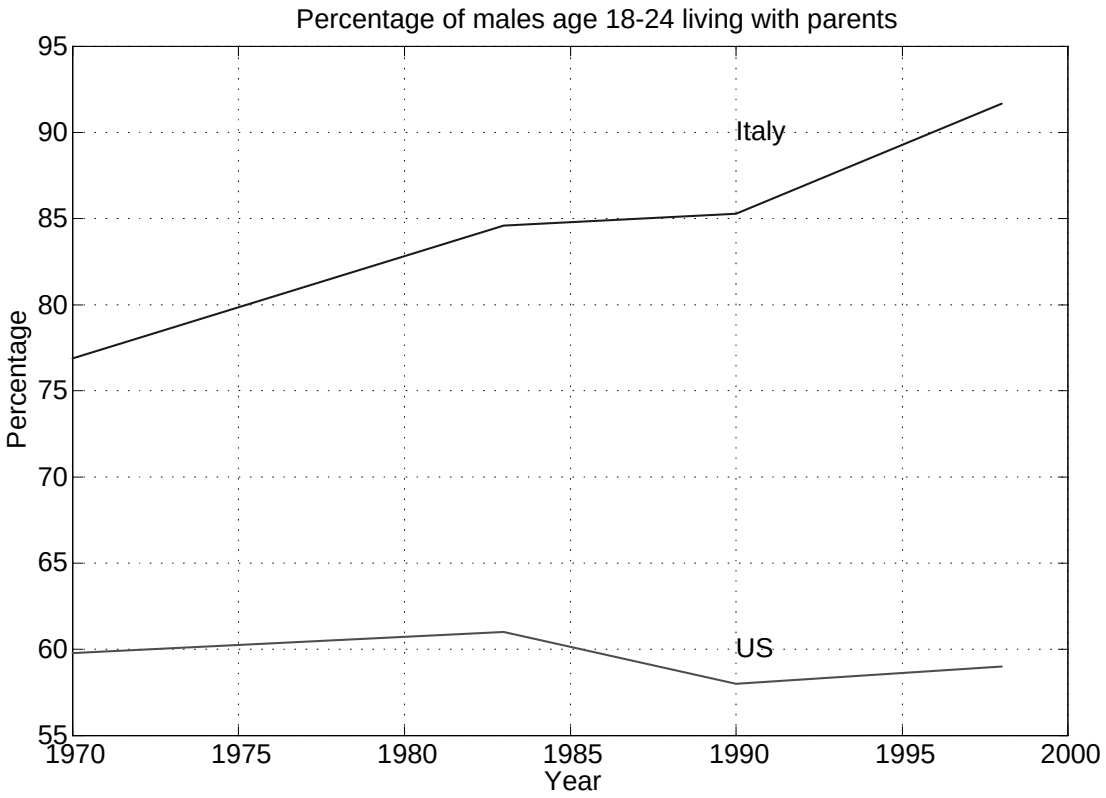


Source: Eurobarometer Survey, Commission of the European Communities.
OECD Job Study 1994, Table 6.7, Average Ranking.

Figure 2.2:

This figure shows that the countries characterized by stricter employment protection legislations are those where the percentage of young people living at home is higher. This positive relationship between percentage of young people living at home and strictness of EPL seems quite robust: the correlation and the Spearman coefficients are, respectively, 0.91 and 0.94.

If we restrict the attention to Italy and US, that is the least and most protected countries, we notice very large differences in the living arrangements of young people. Figure 2.3 and Figure 2.4 plot the percentage of males living with their parents in the period 1970-1998. In particular, Figure 2.3 describes the living arrangements of the young population aged 18-24 and Figure 2.4 focuses on the

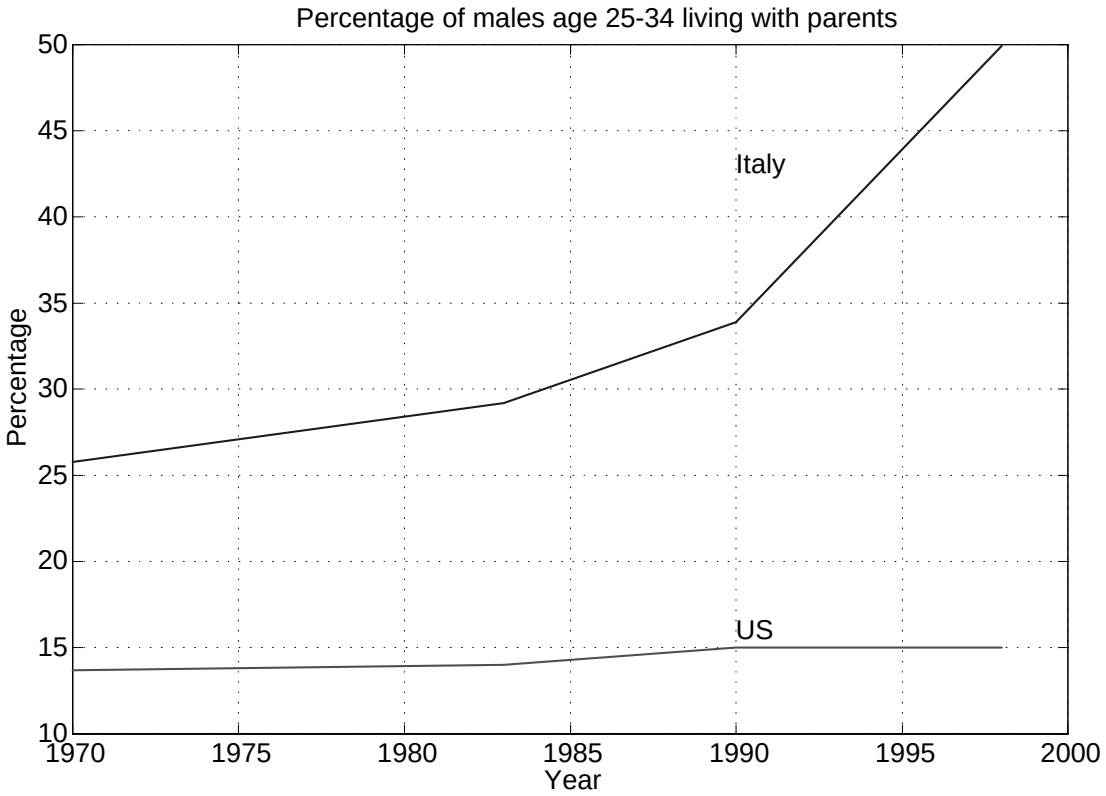


Source for Italy: Istat, Indagine Multiscopo and Billari (1998).

Source for US: Bureau of the Census, CPS, Table AD-1 and CPR, Series P-20.

Figure 2.3:

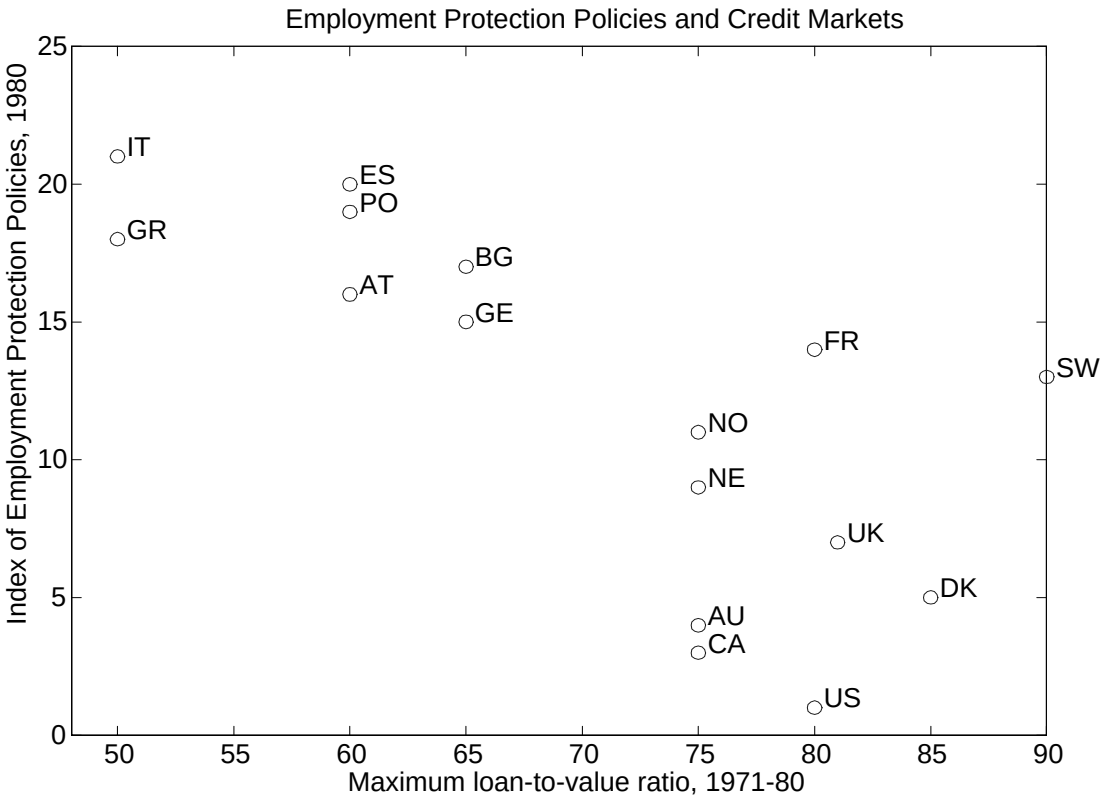
fraction of the population between the age of 25 and 34. The data for the US regarding the age class 18 -24 include the young people that have left home to go to college in the percentage living at home in order to control for this widespread phenomenon in US. Moreover, the people belonging to this second age group have already completed their studies, so the emerging differences cannot be due to the different school systems in place in the two countries. Very large and increasing differences emerge: it is particularly striking to notice that in Italy 50% of the people between the age of 25 and 34 are still living with their families..



Source for Italy: Istat, Indagine Multiscopo and Billari (1998).

Source for US: Bureau of the Census, CPS, Table AD-1 and CPR, Series P-20.

Figure 2.4:



Source: Jappelli and Pagano, QJE, 1994
OECD Job Study 1994, Table 6.7, Average Ranking.

Figure 2.5:

2.3. EPL and Capital Market Imperfections

In this section we explore the evidence on the relationship between degree of employment protection and credit markets. Figure 2.5 plots the maximum loan to value ratio (LTV) against the degree of employment protection for 16 countries. The LTV ratio refers to conventional housing loans and is an indicator of the availability of credit to households. There is a strong negative correlation between degree of employment protection and credit availability: the countries where the maximum LTV is the lowest are Italy, Spain, Greece and Portugal, that are also the most protected countries.

Summarizing, there is strong empirical evidence that the most protected countries are also characterized by: (1) Low employment to population ratio for young people and high for old people, (2) High percentage of young people living at home, (3) Significant credit market imperfections.

In the next section I develop a model that provides an useful framework to address these facts.

3. The Economy

3.1. Preferences

The economy is populated by a sequence of two-period-lived overlapping generations. Each generation consists of a continuum of identical agents. Each agent is born attached to an old agent.

When young, agents decide how to split their total endowment of time (normalized to 1) between staying at home with their parents and staying on their own. When living at home young agents do not work and their consumption is an increasing function $h(.)$ of their parents consumption level. When on their own they supply labor and finance consumption with labor income or by borrowing from the market. Young agents value independence. When old, agents supply labor inelastically and repay their debts. Preferences of an individual born at time t are given by:

$$\log(c_t^y) + A\log(1 - s_t) + \beta\log(c_t^o) \tag{3.1}$$

where c_t^y is total consumption when young, s_t is the fraction of time spent with the family over the first period of life and c_t^o is consumption when old. Consumption is restricted to be nonnegative in every period, and s_t to be between 0 and 1.

3.2. Technology

The consumption good is produced by a large number of firms that hire young and old workers. Each agent in the economy may be productive or unproductive and the fraction of productive agents in each generation is equal to p. The productivity of an agent is only revealed when the agent is old. A productive worker that works n unit of time provides n units of labor input while an unproductive worker provides 0 units of labor input, regardless of the time worked. Firms, when hiring young workers, cannot distinguish the productive ones while have perfect

information on the productivity of old workers. This implies that employing young workers for n^y units of time provides pn^y units of labor input. The constant returs to scale technology available to each firm is summarized by:

$$F(n^y, n^p, n^u) = pn^y + zn^p$$

where n^y denotes the units of time provided by young workers, $n^p$and n^u denote, respectively, the units of time provided by productive and unproductive old agents employed in a given period and $z \geqslant 1$ is a constant that captures differences in productivity between young and old productive workers..

The protection policy is modeled as a constraint on the hiring decision of the firm: it requires the firm to employ each old worker, regardless of his productivity, for a fraction $\theta \in [0, 1]$ of the time he worked when young. This implies that when a firm hires young workers for a fraction n^y of time, next period it has to hire each old worker for at least θn^y units of time.

3.3. Firm's problem

The presence of the policy makes the problem of the firm dynamic: the firm in every period decides the labor demand of young and old workers subject to the constraint imposed by the policy. By n_y we denote the state variable for the firm, that is the time worked by young workers employed in the previous period. Let N_y be the aggregate state for the economy and let's assume the level of protection policy θ to be constant. Let's also assume that the time t price of a unit of the consumption good in period $t+1$ is exogenously given and equal to q. Given factor prices functions $w^y(N_y, \theta)$ and $w^o(N_y, \theta)$, and the law of motion for the aggregate state variables $N'_y(N_y, \theta)$, the firms' profit maximization problem can be written as

$$\begin{aligned} & W(N_y, n_y; \theta) \qquad (3.2) \\ = & \max_{n'_y, n^p, n^u} \left[F(n'_y, n^p, n^u) - w^y(N_y; \theta)n'_y - w^o(N_y; \theta)\left(n^p + n^u\right)\right] + qW(N'_y, n'_y; \theta) \end{aligned}$$

$$\begin{aligned} s.t. \qquad n^u &\geq \theta(1-p)n_y \qquad (3.3) \\ n^p &\geq \theta p n_y \qquad (3.4) \\ N'_y &= N'_y(N_y, \theta) \qquad (3.5) \end{aligned}$$

If there was no policy firms would never hire unproductive workers and thus it is immediate to show that constraint 3.3 will be always binding if $\theta > 0$ and thus

we can substitute $\theta(1-p)n_y$ for n^u in 3.2. For now we will ignore constraint 3.4 and later we will show that it will never be binding in equilibrium The first order and envelope conditions imply that:

$$w^y(N_y;\theta) = p - q\theta(1-p)w^o(N'_y;\theta)$$

$$w^o(N_y;\theta) = z$$

By substituting the second equation in the first we get:

$$w^y(N_y;\theta) = p - q\theta(1-p)z$$

From this equation it emerges the equilibrium wage paid to young workers will be a decreasing function of the level of protection and of the fraction of unproductive workers in the economy.

3.4. Consumers' problem

It is assumed that at the beginning of each period, before uncertainty over their productivity is resolved, old agents can access an insurance market. With probability p an an old agent will be productive, will work the entire period, and earn a wage $w^o(N_y;\theta)$. With probability $(1-p)$ he will be unproductive and thus will work and earn a wage only for a fraction θn_y of the period, where n_y is the time he worked when young. Optimal decision by the agents and zero profit for the insurance companies imply that labor income plus net insurance payments will be equalized across productive and unproductive agents and equal to[7] $z\,[p + (1-p)\theta N_y]$.

Let's turn to the problem each young agent is solving. The individual state is c^o_{t-1}, the consumption level of his parent in the current period. For now we will assume that the function $h(.)$ relating consumption of young agents when home with consumption of their parents is the identity function. This is equivalent to assume that, within the family, consumption of the old agents is a public good . Given the aggregate state variable N_y, the level of protection θ, the individual state c^o_{t-1}, and functions for the wages $w^y(N_y;\theta)$ and $w^o(N_y;\theta)$ of young and old workers, optimal decision rules for the current young are functions for living arrangement $s(N_y, c^o_{t-1};\theta)$ and borrowing $b(N_y, c^o_{t-1};\theta)$ that solve the following dynamic programming problem:

$$V(N_y, c^o_{t-1};\theta) = \max_{s_t, b_t} \log(c^y_t) + A\log(1-s_t) + \beta\log(c^o_t)$$

[7] See the appendix for a detailed description of the insurance problem.

$$
\begin{aligned}
s.t. \qquad c_t^y &= s_t c_{t-1}^o + (1-s_t) w^y(N_y;\theta) + qb \\
c_t^o &= z\left[p + (1-p)\theta N_y'\right] - b \\
N_y' &= N_y'(N_y,\theta) \\
s &\geq 0 \qquad b \leq \overline{b}
\end{aligned}
$$

where $\overline{b}$ is the borrowing constraint.

The first order conditions are given by

$$
\begin{aligned}
c_t^y \leq c_t^o \qquad\qquad\qquad\qquad &= if \;\; b < \overline{b} \\
\frac{[c_{t-1}^o - w^y(N_y;\theta)]}{c_t^y} \leq \frac{A}{(1-s_t)} \qquad &= if \;\; s_t > 0
\end{aligned}
$$

4. Equilibria for a given policy

I first analyze the economy given an exogenous and constant degree of protection. In order to highlight the role of credit markets imperfections, two extreme cases are considered: one in which no borrowing is allowed and $\overline{b} = 0$ and one in which the borrowing constraint is never binding.

Definition 4.1. *An equilibrium, given policy choice θ, is a list of functions $V(N_y, c_{t-1}^o;\theta)$, $W(N_y, n_y;\theta)$, $s(N_y, c_{t-1}^o;\theta)$, $b(N_y, c_{t-1}^o;\theta)$, $c_t^y(N_y, c_{t-1}^o;\theta)$, $c_t^o(N_y, c_{t-1}^o;\theta)$, $n_y'(N_y, n_y;\theta)$, $n^p(N_y, n_y;\theta)$, $n^u(N_y, n_y;\theta)$, $N_y'(N_y;\theta)$,$w^y(N_y;\theta)$, $w^o(N_y;\theta)$ such that these functions satisfy:*

- the consumers' problem.
- the firms' problem.
- the consistency of individual and aggregate decisions, that is, the conditions $n_y'(N_y, N_y;\theta) = N_y'(N_y,\theta)$.
- prices are competitive.
- the market of young workers clears: $n_y'(N_y, n_y;\theta) = 1 - s(N_y, c_{t-1}^o;\theta)$
- the market of old productive workers clears: $n^p(N_y, n_y, \theta) = p$
- the time worked by old unproductive agents is consistent with the policy: $n^u = \theta N_y$

4.1. The economy with $\overline{b} = 0$

In this section the attention is restricted to the case in which no borrowing is allowed. I first define a steady state and then present some comparative statics results. Also to simplify we will assume $q = \beta = 1$.

4.1.1. Stationary Equilibrium for given θ

Definition 4.2. *A steady state for this economy is an equilibrium in which all variables are constant over time.*

- The F.O.C. for the firms and the labor market clearing conditions imply that in a stationary equilibrium:

$$\begin{aligned} w^o &= z \\ w^y &= p - \theta(1-p)z \\ c^o &= z\left(p + (1-p)\theta(1-s)\right) \end{aligned}$$

Notice that for $z > 1$ it will always be that $c^o > w^y$ so that young agents always increase their current consumption by staying at home longer and that $c^o \in [zp, p]$.

The first order conditions for the consumers imply:

$$\frac{[c^o - w^y]}{c^y} \leq \frac{A}{1-s} \qquad = if \;\; s_t > 0$$

This can be written as:

$$\frac{c^o - w^y}{sc^o + (1-s)w^y} \leq \frac{A}{1-s} \qquad = if \;\; s_t > 0 \tag{4.1}$$

This implies that in a stationary equilibrium s must satisfy[8]:

$$\begin{aligned} s &= \max\left(\frac{c^o - w^y(1+A)}{(c^o - w^y)(1+A)}, 0\right) \\ 1-s &= \min\left(\frac{Ac^o}{(c^o - w^y)(1+A)}, 1\right) \end{aligned} \tag{4.2}$$

[8] If the solution is interior ($s \in (0,1)$) then s is the (unique) positive root of the following quadratic equation :
$as^2 + bs + c = 0$ where:
$a = -z(1-p)\theta(1+A)$
$b = z(1-p)\theta(1+A) + zp(1+A) - w^y(1+A)$
$\quad +z(1-p)\theta$
$c = -zp - z(1-p)\theta + w^y(1+A)$

Proposition 4.3. *There exists a unique steady state for this economy.*

Proof.

We will consider two cases:

1. Case 1 (Corner Solution for s)

$$A > \frac{p(z-1) + 2z(1-p)\theta}{p - \theta(1-p)z} \tag{4.3}$$

   If the parameters satisfy 4.3 then from 4.1 it follows that $s = 0$. In this case existence and uniqueness follow immediately.

2. Case 2 (Interior Solution for s)

$$A < \frac{p(z-1) + 2z(1-p)\theta}{p - \theta(1-p)z} \tag{4.4}$$

   If the parameters satisfy 4.4 then from 4.1 it follows that $s \in (0, 1)$.

- Existence of a steady state.

Let:

$$G(c^o) = c^o - zp - z(1-p)\theta \frac{Ac^o}{(c^o - w^y)(1+A)}$$

A steady state exists if $\exists c^o \in [zp, z]$ such that:

$$G(c^o) = 0 \tag{4.5}$$

Since:

$$G(zp) < 0 \quad \textit{and} \quad G(z) > 0$$

existence follows from the continuity of $G(.)$.

- Uniqueness.

$$G'(c^o) = 1 + \frac{A(1-p)\theta z}{1+A} \frac{w^y}{(c^o - w^y)^2} > 1 \qquad \forall c^o \in [zp, z]$$

  This implies that $G(.)$ is monotonically increasing, thus there exists a unique value of c^o such that 4.5 is satisfied.

■

Proposition 4.4. *The unique steady state is globally stable.*

Proof.

The dynamic relationship between variables at different points in time is given by:

$$c_t^o = \begin{cases} zp + z(1-p)\theta & if \quad c_{t-1}^o < w^y(1+A) \\ zp + z(1-p)\theta \frac{A}{1+A} \frac{c_{t-1}^o}{(c_{t-1}^o - w^y)}, & if \quad c_{t-1}^o \geq w^y(1+A) \end{cases}$$

and its derivative is equal to:

$$\frac{\partial c_t^o}{\partial c_{t-1}^o} = \begin{cases} 0 & if \quad c_{t-1}^o < w^y(1+A) \\ -\frac{A(1-p)\theta z}{1+A} \frac{w^y}{(c_{t-1}^o - w^y)^2} = D(c_{t-1}^o) < 0 & if \quad c_{t-1}^o \geq w^y(1+A) \end{cases} \tag{4.6}$$

In order to guarantee global stability we need to show that whenever $\frac{\partial c_t^o}{\partial c_{t-1}^o} < 0$ it is also $\left| \frac{\partial c_t^o}{\partial c_{t-1}^o} \right| < 1$.

We first notice that $D(c_{t-1}^o)$ is increasing on the interval (zp, z).

$$\frac{\partial D(c_{t-1}^o)}{\partial c_{t-1}^o} = \frac{A(1-p)\theta z}{1+A} \frac{2w^y(c_{t-1}^o - w^y)}{(c_{t-1}^o - w^y)^4} > 0$$

This implies its absolute value is decreasing. Then we show that $D(zp)$ is less than 1. $D(c_{t-1}^o)$ can be rewritten as:

$$D(c_{t-1}^o) = \frac{zw^y\theta(1-p)(1-s_t)}{c_{t-1}^o(c_{t-1}^o - w^y)}$$

$$D(c_{t-1}^o)\big|_{c_{t-1}^o = zp} = \frac{w^y\theta(1-p)(1-s_t)}{p[(z-1)p + \theta(1-p)z]}$$

This shows that $D(c_{t-1}^o)$ is decreasing in z. For $z = 1$ it becomes:

$$D(c_{t-1}^o) = \frac{w^y(1-s)}{p} = \frac{[p - \theta(1-p)](1-s_t)}{p} < 1$$

Since the $D(c_{t-1}^o)$ is less than 1 at its maximum point on the interval (zp, z) it is less than 1 on the entire interval. This implies that

$$\frac{\partial c_t^o}{\partial c_{t-1}^o} = \begin{cases} 0 & if \quad c_{t-1}^o < w^y(1+A) \\ -1 < D(c_{t-1}^o) < 0 & if \quad c_{t-1}^o \geq w^y(1+A) \end{cases}$$

It follows that the sequence $\{c_t^o\}$ converges to c^o for any initial $c^o \in [zp, z]$.

■

Notice that the dynamics of the systen can display either oscillatory (cobweb type cycle) convergence or immediate (one step) convergence depending on the values of the parameters. In particular if the steady state value for $s \in (0,1)$ then convergence is oscillatory.

This result implies that old agents' consumption (and employment) is inversely related to their own parents' level of consumption (and employment). If the parents have spent at home most of their youth, so that their employment level when old is low, then also their consumption will be low. This reduces the benefit for their sons to live at home. It follows that the young generation will spend more time working on the market, thereby increasing (for $\theta > 0$) their employment and their consumption in the following period.

4.1.2. Comparative Statics

I now analyze the effect of a change in the degree of employment protection on the living arrangements of the young people and on the welfare of the economy.

Proposition 4.5. *The fraction of time young agents spend at home living with their parent is an increasing function of the degree of employment protection, that is:*

$$\frac{\partial s}{\partial \theta} \geq 0 \qquad > if \qquad s \in (0,1)$$

Proof.

From the consumers' F.O.C. (assuming interior solution for s):

$$(c^o - w^y)U_{c^y} - U_s = 0$$

Let $g = (c^o - w^y)$. By the Implicit Function Theorem we have:

$$\begin{aligned} \frac{\partial s}{\partial \theta} &= \frac{-g_\theta U_{c^y} - gU_{c^y c^y}(w_\theta^y + sg_\theta)}{g_s U_{c^y} + gU_{c^y c^y}(g + sg_s) - U_{ss}} \\ &= \frac{-g_\theta U_{c^y} - gU_{c^y c^y}(w_\theta^y + sg_\theta)}{g^2 U_{c^y c^y} + g_s U_{c^y} + sgU_{c^y c^y} g_s - U_{ss}} \end{aligned} \tag{4.7}$$

where:

$$\begin{aligned} g_\theta &= z(1-p)(2-s) \\ g_s &= -z(1-p)\theta \\ w_\theta^y &= -(1-p)z \end{aligned}$$

It's easy to show that the numerator of this ratio is always negative given the concavity of $U(.)$. The term in brakets can be written as:

$$w_\theta^y + sg_\theta = -z(1-p)(1-s)^2$$

and is always negative. At the denominator the first and last terms are always negative by concavity. It remains to show that:

$$\begin{aligned} U_{c^y} &\geq sgU_{c^y c^y} \\ \frac{1}{c^y} &\geq \frac{sg}{(c^y)^2} \\ \frac{1}{sg + w^y} &\geq \frac{sg}{(sg + w^y)^2} \\ sg + w^y &\geq sg \end{aligned}$$

This implies that the denominator of 4.7 is also negative and completes the proof. ■

Proposition 4.6. *If A and z satisfy the condition: $A < \frac{z-1}{z}$ then there exist a steady state equilibrium with a positive protection policy yielding to the representative generation higher welfare than the steady state with no protection.*

Proof.

I want to show that:

$$\left.\frac{\partial U}{\partial \theta}\right|_{\theta=0} > 0$$

where U is the steady state level of utility. This can be written as:

$$\begin{aligned} \frac{\partial U}{\partial \theta} &= \frac{1}{c^y}\left[s\frac{\partial c^o}{\partial \theta} + \frac{\partial s}{\partial \theta}c_o + (1-s)\frac{\partial w^y}{\partial \theta} - \frac{\partial s}{\partial \theta}w^y\right] - \frac{\partial s}{\partial \theta}\frac{A}{1-s} + \frac{1}{c^o}\frac{\partial c^o}{\partial \theta} \quad (4.8) \\ \frac{\partial c^o}{\partial \theta} &= z(1-p)[(1-s) - \theta\frac{\partial s}{\partial \theta}] \\ \frac{\partial w^y}{\partial \theta} &= -z(1-p) \quad (4.9) \end{aligned}$$

Since when $A < \frac{z-1}{z}$ the first order condition holds with equality, we can rewrite it as:

$$\begin{aligned} \frac{\partial U}{\partial \theta} &= \frac{1}{c^y}\left[s\frac{\partial c^o}{\partial \theta} + (1-s)\frac{\partial w^y}{\partial \theta}\right] + \frac{1}{c^o}\frac{\partial c^o}{\partial \theta} \\ &= z(1-p)\left\{\frac{1}{c^y}\left[s\left((1-s) - \theta\frac{\partial s}{\partial \theta}\right) - (1-s)\right] + \frac{1}{c^o}[(1-s) - \theta\frac{\partial s}{\partial \theta}]\right\} \end{aligned}$$

computing this derivative in $\theta = 0$ yields

$$\left.\frac{\partial U}{\partial \theta}\right|_{\theta=0} = z(1-p)(1-s)\left[\frac{s-1}{c^y} + \frac{1}{c^o}\right] \tag{4.10}$$

The first term of this expression is always positive. It remains to show that the term in brakets is also positive. From the expression for s in 4.2 we have:

$$s|_{\theta=0} = \frac{z-1-A}{(1+A)(z-1)}$$

We can then substitute in the expressions for c^y and c^o:

$$\begin{aligned} c^y &= p[s(z-1)+1] \\ &= p\left[\frac{z-1-A}{(1+A)(z-1)}(s-1)+1\right] \\ &= \frac{zp}{1+A} \\ c^o &= zp \end{aligned}$$

Substituting in 4.10:

$$\left.\frac{\partial U}{\partial \theta}\right|_{\theta=0} = z(1-p)(1-s)\left[-\frac{A}{p(z-1)} + \frac{1}{zp}\right]$$

The expression in brakets is always positive for $A < \frac{z-1}{z}$.

■

Figure 4.1 plots the total utility of a representative generation as a function of the degree of employment protection for the case in which $A \leq \frac{z-1}{z}$. It emerges that the optimal level of employment protection is positive and equal to 1 for A low enough. Figure 4.2 shows that welfare is decreasing for $A > \frac{z-1}{z}$.

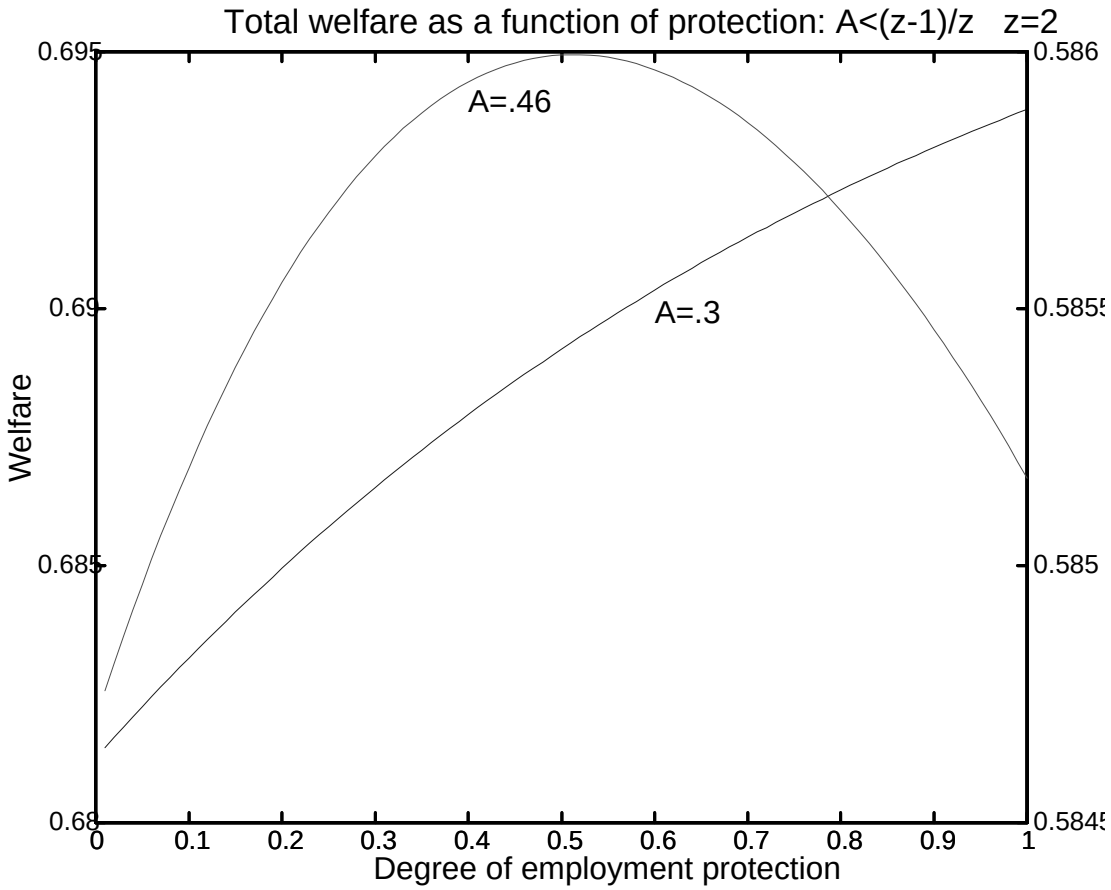


Figure 4.1:

This result suggests that in economies characterized by a low disutility from living at home relative to the productivity differential between old and young agents, the steady state with a positive level of protection yields higher utility then the one characterized by no protection. In an economy where the disutility from living at home is lower, there is a larger fraction of young people living at home in the steady state with no policy. For this fraction of people the introduction of the policy is welfare improving. It follows that in this economy the gains from the policy may outweight the losses.

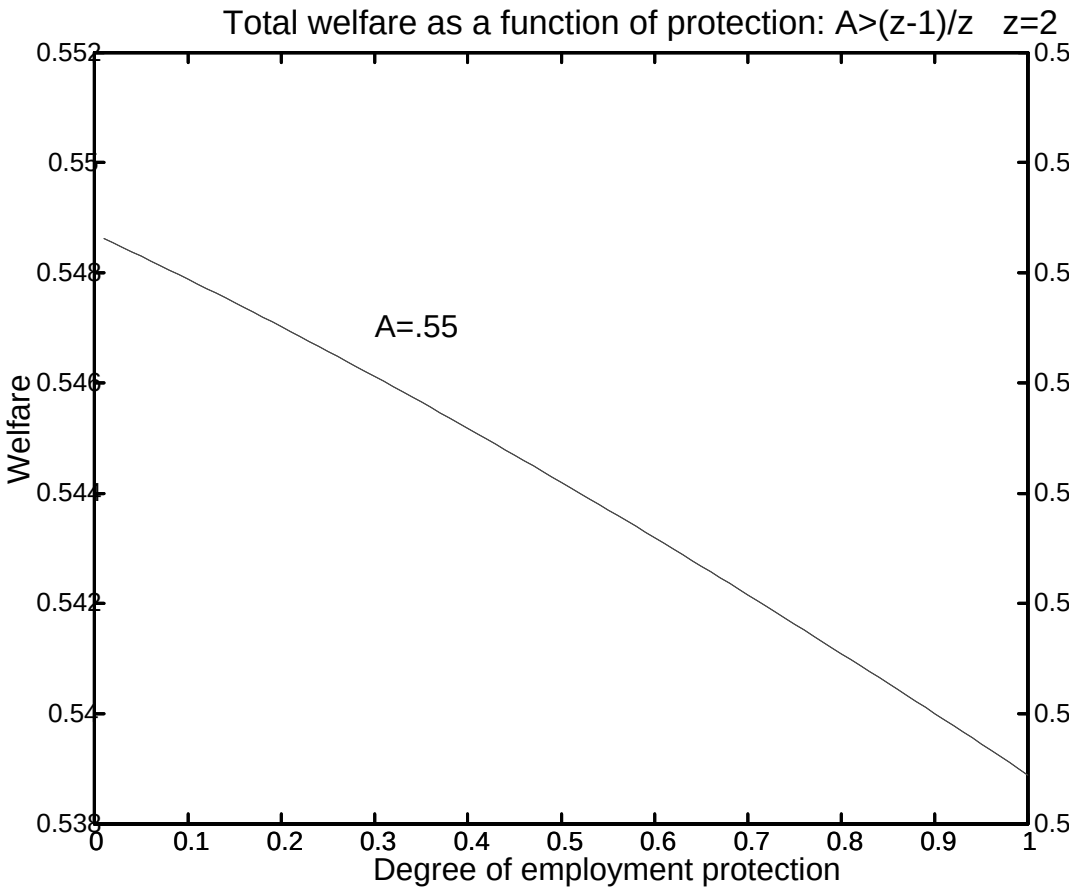

Total welfare as a function of protection: A>(z-1)/z z=2
Welfare
Degree of employment protection
A=.55
0.552
0.55
0.548
0.546
0.544
0.542
0.54
0.538
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Figure 4.2:

4.2. The Economy with $b < \overline{b}$ never binding

Let's now consider the economy where young people do not face any borrowing constraint and are actually free to borrow any amount of time t good at the world interest rate q that is constant and assumed equal to the rate of time preference that in turn is assumed equal to 1. We want to analyze the consequence of introducing a perfect credit market on the living arrangement decision of the young people and on the welfare implications of the employment protection policy.

4.2.1. Stationary Equilibrium for given θ

The F.O.C. for the firms and the labor market clearing conditions are now given by:

$$\begin{aligned} w^o &= z \\ w^y &= p - \theta(1-p)z \\ c^o &= zp + z(1-p)\theta(1-s) - b \end{aligned}$$

The F.O.C. for the consumers are:

$$c^o = c^y \tag{4.11}$$

$$\frac{[c^o - w^y]}{c^y} \leq \frac{A}{1-s} \qquad = if \;\; s_t > 0 \tag{4.12}$$

Equation 4.11 implies:

$$b = (1-s)(c^o - w^y)$$

Substituting in 4.12 we have:

$$\begin{aligned} b &= Ac^o \\ b &= A[zp + z(1-p)\theta(1-s) - b] \\ b &= A\frac{[zp + z(1-p)\theta(1-s)]}{1+A} \end{aligned} \tag{4.13}$$

Solving for s. Equation 4.11 can be written as:

$$c^o - b = sc^o + (1-s)w^y + b$$

Substituting the expression for b:

$$\begin{aligned} c^o - \frac{c^o A}{1+A} &= s\frac{c^o}{1+A} + (1-s)w^y + \frac{c^o A}{1+A} \\ (1-s-A)(zp + z(1-p)\theta(1-s) &= (1-s)(1+A)(p - z\theta(1-p)) \end{aligned}$$

This expression implies a quadratic form for $(1-s)$ that, for $\theta = 0$ reduces to[9]:

$$(1-s) = \frac{Az}{z-1-A} \tag{4.14}$$

Proposition 4.7. *There exists a unique steady state for this economy.*

Proof. See Appendix.

Proposition 4.8. *The unique steady state is locally stable.*

Proof. See Appendix.

4.2.2. Comparative Statics

We first characterize how decision variables react to changes in the policy. Similarly to the economy without borrowing when protection policy increases young agents spend more time at home. In this economy though agents also increase the amount they borrow since the policy redistributes their income from the first to the second period. This results are summarized in the following proposition

Proposition 4.9. *The optimal amount of borrowing and the fraction of time young agents spend at home are increasing functions of the degree of employment protection, that is:*

$$\frac{\partial b}{\partial \theta} \geq 0 \qquad \textit{and} \qquad \frac{\partial s}{\partial \theta} \geq 0$$

Proof.

It follows directly from 4.13:

$$\frac{\partial b}{\partial \theta} = \frac{Az(1-p)(1-s)}{1+A}$$

From the consumers' F.O.C.:

$$(c^o - w^y)U_{c^y} - U_s = 0$$

[9] $(1-s)$ is the solution of the quadratic equation:
$a(1-s)^2 + b(1-s) + c = 0$ where:
$a = z(1-p)\theta$
$b = zp - Az(1-p)\theta - (1+A)w^y$
$c = -Azp$

By the Implicit Function Theorem:

$$\frac{\partial s}{\partial \theta} = -\left[\frac{gU_{c^y c^y}(w^y_\theta + sg_\theta) + g_\theta U_{c^y} + gU_{c^y c^y} b_\theta}{g^2 U_{c^y c^y} + g_s U_{c^y} + sgU_{c^y c^y} g_s - U_{ss}}\right] \tag{4.15}$$

where:

$$\begin{aligned} g &= (c^o - w^y) \\ &= \frac{b}{A} - w^y \end{aligned}$$

$$\begin{aligned} g_\theta &= z(1-p)\left[\frac{2-s+A}{1+A}\right] \\ b_\theta &= \frac{Az(1-p)(1-s)}{1+A} \\ w^y_\theta &= -z(1-p) \\ g_s &= -\frac{z(1-p)\theta}{1+A} \end{aligned}$$

The denominator is always negative[10]. The numerator always positive. The first term is positive if the expression in brakets is negative, that is:

$$\begin{aligned} sg_\theta + w^y_\theta &\leq 0 \\ z(1-p)\left[\frac{s(2-s+A)}{1+A} - 1\right] &\leq 0 \end{aligned}$$

This is negative if and only if:

$$s(2-s+A) \leq 1+A \tag{4.16}$$

The LHS of this expression is increasing in s for $s \in [0,1]$. Since 4.16 is satisfied for $s = 1$ it follows that it is always satisfied. This implies that the first term of the numerator is always positive or equal to zero. It is left to show that the sum of the last two terms is always positive.

$$\begin{aligned} g_\theta U_{c^y} &> gU_{c^y c^y} b_\theta \\ \frac{g_\theta}{c} &> \frac{gb_\theta}{c^2} \\ cg_\theta &> gb_\theta \end{aligned}$$

[10] See proof of proposition 2.3.

Since $g = (c - w^y)$ it only remains to prove that $g_\theta > b_\theta$.

$$\begin{aligned} g_\theta - b_\theta &= z(1-p)\left[\frac{2-s+A}{1+A} - \frac{A(1-s)}{1+A}\right] \\ &= \frac{z(1-p)}{1+A}(2-s+As) > 0 \end{aligned}$$

■

In the next proposition we show that even in the economy with borrowing there exists a range of parameters for which the policy is welfare increasing. This result is due to the externality arising from the public good nature of the consumption of old agents. Since agents do not take into account the externality they underprovide the public good relative to the social optimum. The policy therefore, by increasing consumption of old agents, may be welfare improving if the disutility from staying home is sufficiently low.

Proposition 4.10. *If A and z satisfy the condition: $A < \frac{z-1}{z+1}$ then there exists a steady state equilibrium with a positive protection policy that yields higher welfare than the steady state with no protection.*

Proof. I want to show that:

$$\left.\frac{\partial U}{\partial \theta}\right|_{\theta=0} > 0$$

where U is the steady state level of utility. This can be written as:

$$\frac{\partial U}{\partial \theta} = \frac{1}{c}\left[s\frac{\partial c^o}{\partial \theta} + \frac{\partial s}{\partial \theta}c_o + (1-s)\frac{\partial w^y}{\partial \theta} - \frac{\partial s}{\partial \theta}w^y + \frac{\partial b}{\partial \theta}\right] - \frac{\partial s}{\partial \theta}\frac{A}{1-s} + \frac{1}{c}\frac{\partial c^o}{\partial \theta}$$

where

$$\begin{aligned} \frac{\partial c^o}{\partial \theta} &= z(1-p)[(1-s) - \theta\frac{\partial s}{\partial \theta}] - \frac{\partial b}{\partial \theta} \\ \frac{\partial w^y}{\partial \theta} &= -z(1-p) \qquad (4.17) \\ \frac{\partial b}{\partial \theta} &= \frac{z(1-p)(1-s)}{1+A} \qquad (4.18) \end{aligned}$$

combining the expressions above

$$\frac{\partial U}{\partial \theta} = \frac{1}{c}\left(s\frac{\partial c^o}{\partial \theta} + (1-s)\frac{\partial w^y}{\partial \theta} + z(1-p)\left((1-s) - \theta\frac{\partial s}{\partial \theta}\right)\right)$$

$$
\begin{aligned}
&= \frac{1}{c}\left(sz(1-p)\left((1-s)-\theta\frac{\partial s}{\partial\theta}\right)-s\frac{\partial b}{\partial\theta}-z(1-p)\theta\frac{\partial s}{\partial\theta}\right)\\
&= \frac{1}{c}\left(sz(1-p)\left((1-s)-\theta\frac{\partial s}{\partial\theta}\right)-s\frac{z(1-p)(1-s)}{1+A}-z(1-p)\theta\frac{\partial s}{\partial\theta}\right)\\
&= \frac{1}{c}z(1-p)\left(\frac{A(1-s)s}{1+A}-\theta\frac{\partial s}{\partial\theta}(1+s)\right)
\end{aligned}
$$

the value of this derivative in $\theta = 0$ is given by

$$\left.\frac{\partial U}{\partial\theta}\right|_{\theta=0} = \frac{z(1-p)(1-s)}{c}\left[\frac{A}{1+A}s\right]$$

where $c = c^y = c^o$ from the F.O.C. The first term of this expression is always positive. The term in brakets is also positive if s is positive. From 4.14 we have:

$$
\begin{aligned}
s|_{\theta=0} &= 1-\frac{Az}{z-1-A}\\
s|_{\theta=0} &> 0 \Rightarrow A < \frac{z-1}{z+1}
\end{aligned}
$$

■

4.3. Comparing the two economies

The first important difference between the two economies is the employment level of young agents. Since in the non borrowing economy the only available way of smoothing consumption is to live at home, young agents optimally choose to work less than what they would work in the borrowing economy. This result is summarized in the following proposition

Proposition 4.11. *$\forall A$, more young people are employed in the economy with borrowing, that is:*

$$1-s_b > 1-s \qquad \forall\theta\in[0,1]$$

where $1-s_b$ is the fraction of young people that are employed in the unconstrained economy and $1-s$ is the same fraction in the constrained economy.

Proof.

$(1-s_b)\in[0,1]$ is the solution of the quadratic equation:

$$f_b(x) = z(1-p)\theta x^2+[zp+z\theta(1-p)-p(1+A)]x-Azp = 0$$

and $(1-s) \in [0,1]$ is the solution of the quadratic equation:

$$y = f(x) = [z(1-p)\theta(1+A)]x^2 + [zp(1+A) + z\theta(1-p) - p(1+A)]x - Azp = 0$$

We have:

$$\begin{aligned} f_b(0) &= f(0) = -Azp \\ f'(x) &> f_b'(x) \qquad \forall x \in [0,1] \end{aligned}$$

This implies that:

$$f_b^{-1}(0) > f^{-1}(0)$$

■

A consequence of the previous result is that in the non borrowing economy young agents live longer at home and thus welfare gains from introduction of the policy are larger. This is precisely stated in the next result

Proposition 4.12. *$\forall A$ such that $\frac{z-1}{z+1} < A < \frac{z-1}{z}$ the introduction of a positive degree of protection is welfare increasing in the economy with $\overline{b} = 0$ and is not welfare increasing in the unconstrained economy. In particular there exists a $\bar{\theta} > 0$ s.t. in the unconstrained economy welfare is constant for $\theta < \bar{\theta}$ and decreasing for $\theta > \bar{\theta}$*

Proof.

It follows from Proposition 2.4 and Proposition 3.3.

■

Figure 4.3 provides a graphical illustration of the previous result

When agents can borrow when young, they have two different ways to realize consumption smoothing: living at home with their parents and borrow on the credit market. This implies that agents choose to live less at home relative to the economy with no borrowing, and thereby they have less to gain from a policy that increases old agents' consumption. We have already shown that in the economy with borrowing young agents spend less time at home for any value of A. This implies that, for any specification of the preferences parameter, the degree of protection that maximizes welfare in the economy with borrowing is always lower than the one that maximizes welfare in the economy where agents have no access to credit markets.

Proposition 4.13. *The degree of protection that maximizes welfare is higher in the economy with $\overline{b} = 0$ than in the unconstrained economy.*

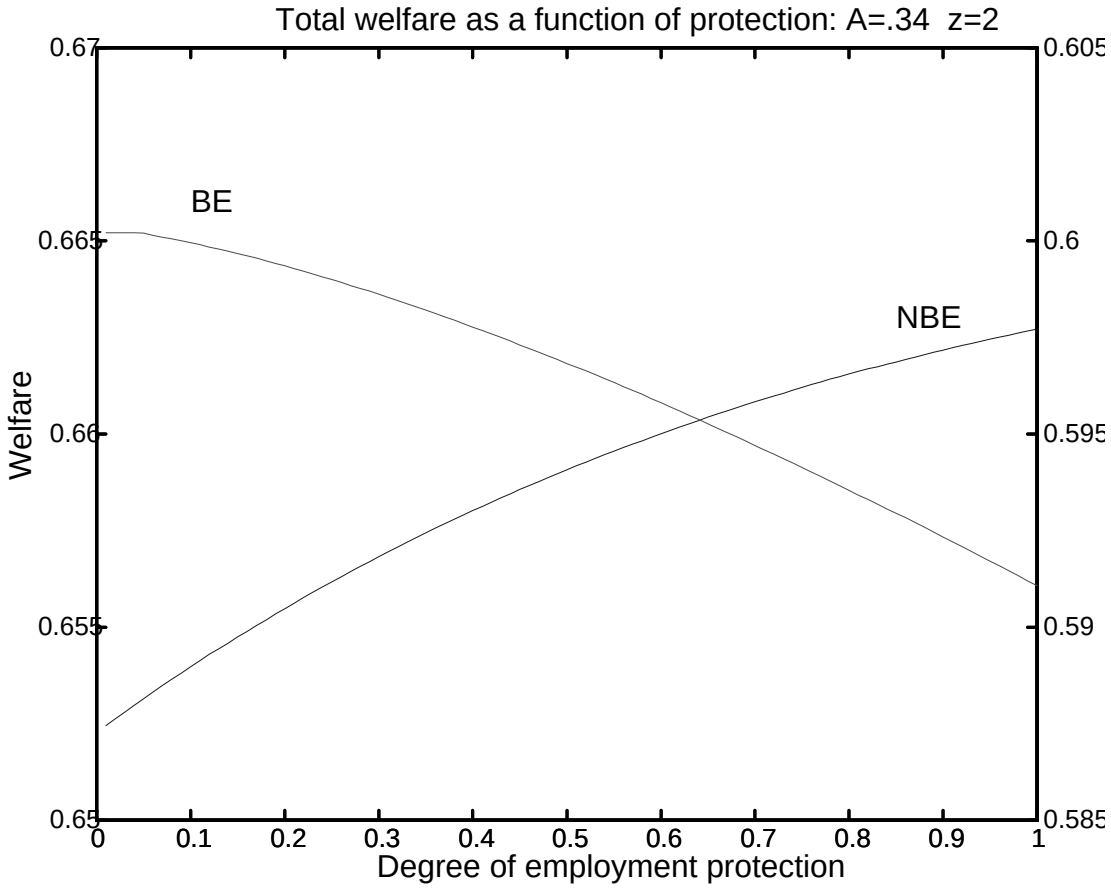

Total welfare as a function of protection: A=.34 z=2
BE
NBE
Welfare
Degree of employment protection
0.67
0.665
0.66
0.655
0.65
0.605
0.6
0.595
0.59
0.585
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Figure 4.3:

5. Political Equilibrium

In this section the employment protection policy is endogenized and emerges as the outcome of a political process. Every other period, young and old agents bargain over the degree of employment protection that is to be introduced. In particular, the political process is described by Nash bargaining among the two generations and if the agents do not reach an agreement, no policy is introduced.

This choice stems from the limitations that a voting mechanism has in the environment just described. A majority voting scheme would imply that, in a conflict between young and old, the most numerous class would have all the power in the government, leading to extreme outcomes. On the other hand bargaining is well suited to analyze the conflict between two large groups that fully realize the costs of concessions to the other party.

The bargaining takes place every other period in order for agents to internalize that the chosen policy will affect the hiring decision of the firm[11]. This implies that a new policy is introduced at time t, $t+2$, and so on. Without loss of generality we will assume that voting takes place in the even periods.

Let us denote with $\Theta(N_y, B)$ the function that assign a level of protection policy given the aggregate states N_y (aggregate employment of the young in the previous period), B (aggregate debt of old agents). We assume that agents and firms use the function Θ, together with the law of motion for the aggregate states, to formulate expectations on future policies. Let's first consider the problem of the young agents born in even periods when the chosen policy ($\hat{\theta}$) will be chosen as the result of a political process

$$V_e^y(N_y, n_y, B, b; \hat{\theta}) = \max_{s_t, b'} \log(c_t^y) + A\log(1-s_t) + \beta\log(c_t^o) \tag{5.1}$$

$$\begin{aligned}
s.t. \qquad c_t^y &= s_t c_{t-1}^o + (1-s_t) w^y(N_y, B; \hat{\theta}) + qb \\
c_t^o &= z\left[p + (1-p)\hat{\theta} N_y'\right] - b' \\
c_{t-1}^o &= z\left[p + (1-p)\hat{\theta} N_y\right] - b \\
N_y' &= N_y'(N_y, B) \\
w^y(N_y, B) &= p - (1-p) z\hat{\theta} \\
s &\geq 0 \qquad b \leq \overline{b}
\end{aligned}$$

[11] If bargaining took place in every period it is easy to show that the bargaining outcome would always be $\theta = 1$ every period.

while the utility of old agents alive in the even periods is given by

$$\begin{aligned} V_e^o(N_y, n_y, B, b, \hat{\theta}) &= \log(c_{t-1}^o) \\ c_{t-1}^o &= z\left[p + (1-p)\hat{\theta}N_y\right] - b \end{aligned}$$

We will assume that the optimal $\hat{\theta}$ will be the outcome of a negotiation between young and old agents and that the threat point of the negotiators is given by the no policy outcome. This implies that $\hat{\theta}$ will be the solution of

$$\max_{\hat{\theta}} \left(V_e^y(N_y, N_y B, B; \hat{\theta}) - V_e^y(N_y, N_y, B, B; 0)\right)\left(V_e^o(N_y, N_y, B, B, \hat{\theta}) - V_e^o(N_y, N_y, B, B, 0)\right)$$

Let's now consider the problem of the young agents born in odd periods when current policy (θ_t) is inherited from previous period:

$$V_o^y(N_y, n_y, B, b; \theta_t) = \max_{s_t, b'} \log(c_t^y) + A\log(1 - s_t) + \beta \log(c_t^o) \tag{5.2}$$

$$\begin{aligned} s.t. \qquad c_t^y &= s_t c_{t-1}^o + (1 - s_t) w^y(N_y, B; \theta_t) + qb \\ c_t^o &= z\left[p + (1-p)\Theta(N_y', B')N_y'\right] - b' \\ c_{t-1}^o &= z\left[p + (1-p)\theta_t N_y\right] - b \\ N_y' &= N_y'(N_y, B) \\ w^y(N_y, B) &= p - (1-p)z\Theta(N_y', B') \\ s &\geq 0 \qquad b \leq \overline{b} \end{aligned}$$

Definition 5.1. *A political equilibrium is a collection of value functions, decision rules, wage functions and law of motions for the aggregate states for even and odd periods together with a function $\Theta(N_y, B)$ and a sequence for $\{\theta\}_{t=0}^{\infty}$ that satisfy:*

- the agents' problem in 5.1 and 5.2
- the consistency of individual and aggregate decisions, that is, the conditions $b_y'(N_y, N_y, B, B; \hat{\theta}) = B_y'(N_y, B; \hat{\theta})$ and $1 - s(N_y, N_y, B, B; \hat{\theta}) = N_y'(N_y, B; \hat{\theta})$.
- $$\begin{aligned} & \Theta(N_y, B) \\ = \; & \arg\max_{\hat{\theta}} \left(V_e^y(N_y, N_y B, B; \hat{\theta}) - V_e^y(N_y, N_y, B, B; 0)\right) \\ & \left(V_e^o(N_y, N_y, B, B, \hat{\theta}) - V_e^o(N_y, N_y, B, B, 0)\right) \end{aligned}$$

- $\{\theta\}_{t=0}^{\infty}$ satisfies:

$$\theta_t = \begin{cases} \Theta(N_y, B) & t \quad even \\ \theta_{t-1} & t \quad odd \end{cases}$$

In figures 5.1 and 5.2 we report the time series for the equilibrium level of protection policy, living arrangements, youth old and total employment for the economy with and without borrowing constraints. Notice that qualitatively the model reproduces the main facts reported in the data section, namely that economies with tighter borrowing constarint display higher level of employment protection, lower level of youth employment, higher fraction of young people living at home and higher employment of prime age workers.

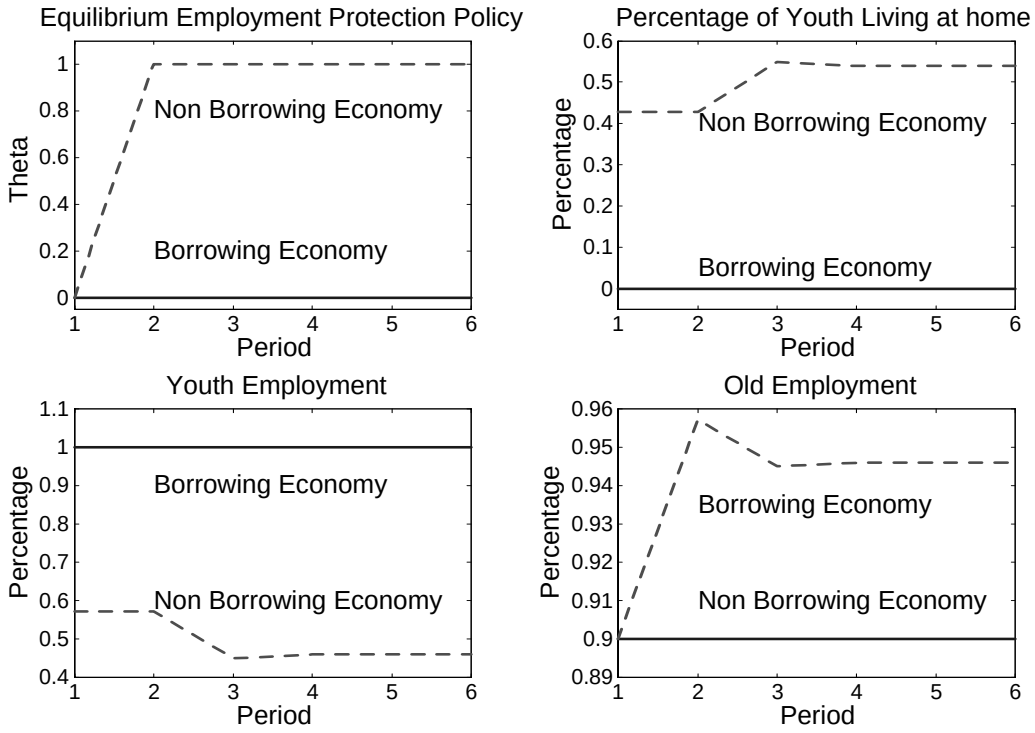

Equilibrium Employment Protection Policy
Theta
Period
Non Borrowing Economy
Borrowing Economy
Percentage of Youth Living at home
Percentage
Period
Non Borrowing Economy
Borrowing Economy
Youth Employment
Percentage
Period
Borrowing Economy
Non Borrowing Economy
Old Employment
Percentage
Period
Borrowing Economy
Non Borrowing Economy

Figure 5.1:

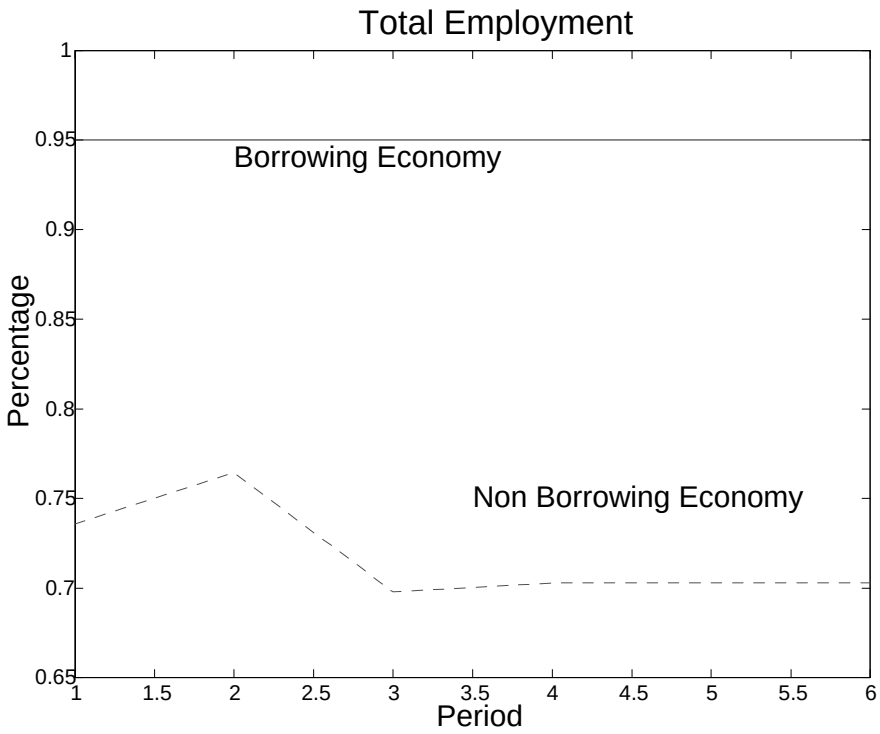

Total Employment
Borrowing Economy
Non Borrowing Economy
Percentage
Period
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6

Figure 5.2:

6. Conclusions

This paper sheds light on why some countries have chosen high degree of employment protection policy even though such policies can dramatically reduce employment. Traditional explanations based on insider-outsider model may explain the emergence of protection policies but find hard to explain why these emerge in some countries and not in others. In this work we have documented that countries characterized by high level of protection also display severe credit market imperfections and a high fraction of young people living at home. The framework takes credit market imperfections as primitive and predicts that, in an economy with credit constraints, young agents, being unable to borrow, prefer to live at home and share consumption with their parents, thus benefiting from the employment protection. A specific model in which the employment protection policy endogenously emerge as the outcome of a dynamic bargaining between young and old generations, predicts patterns for protection policies, living arrangements and employment of young and old agents that are qualitatively consistent with the cross country evidence.

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