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# Can Institutional Reform Reduce Job Destruction and Unemployment Duration? Yes It Can

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# Can Institutional Reform Reduce Job Destruction and Unemployment Duration? Yes It Can

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## Abstract

We read search theory's unemployment equilibrium condition as an Iso-Unemployment Curve (IUC). The IUC is the locus of job destruction rates and expected unemployment durations rendering the same unemployment level. A country's position along the curve reveals its preferences over the destruction-duration mix, while its distance from the origin indicates the unemployment level at which such preferences are satisfied. Using a panel of 20 OECD countries over 1985-2008, we find employment protection legislation to have opposing effects on destructions and durations, while the effects of the remaining key institutional factors on both variables tend to reinforce each other. Implementing the right reforms could reduce job destruction rates by about 0.05 to 0.25 percentage points and shorten unemployment spells by around 10 to 60 days. Consistent with this, unemployment rates would decline by between 0.75 and 5.5 percentage points, depending on a country's starting position.

JEL Classification Numbers: E240, J300, J60

Keywords: Search model, labor market institutions, unemployment inflows, unemployment duration.

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## 1 Introduction

This paper investigates how labor market policies affect the unemployment rate through its two defining factors, the duration of unemployment spells and job destruction rates. To this aim, we look at search theory's unemployment equilibrium condition as an Iso-Unemployment Curve (IUC). The IUC represents the locus of job destruction rates and expected unemployment durations rendering the same unemployment level. A country's position along the curve reveals its preferences over the destruction-duration mix, while its distance from the origin indicates the unemployment level at which such preferences are satisfied. We next provide micro-foundations for the link between destructions, durations and policy variables. This allows us to explore the relevance of institutional features using a sample of 20 OECD countries over the period 1985-2008.

The empirical literature investigating the influence of labor market institutions on overall unemployment rate is sizable (see, for instance, Blanchard and Wolfers, 1999, and Nickell and others, 2002). Equally numerous are the studies splitting unemployment into job creation and job destruction flows (see, for example, Blanchard, 1998, Shimer, 2007, and Elsby and others, 2008). This work connects these two strands of the literature by investigating how labor market policies shape both job separations and unemployment spells, which together determine the overall unemployment rate in the economy. The IUC schedule used in our analysis is novel and is motivated by the need to understand the nature of unemployment, as essentially coming from destructions, durations or a combination of both these factors. This can help clarify whether policy makers should focus primarily on speeding up workers' reallocation across job positions rather than protecting them in the workplace.

One fundamental question raised in this context is whether countries with dynamic labor markets significantly outperform countries with more stagnant markets. By dynamic (stagnant) we mean labor markets displaying high (low) levels of workers' turnover in and out of unemployment. Is it the case that countries featuring high job destruction rates but brief unemployment spells tend to display lower unemployment rates than labor markets characterized by limited job destruction but longer unemployment durations? And how do institutional features shape destructions and durations?

The remainder of the paper is organized as follows. The next section looks at the empirical evidence on unemployment inflows and durations. Section 3 introduces the concept of IUCs, which is the backbone of our theoretical construct. Section 4 lays out the empirical strategy, discusses the empirical results and uses the estimated model for simulation purposes. Section 5 concludes the paper.

## 2 Inflows and Durations: The Facts

Search theory allows for a decomposition of the steady-state unemployment rate into the product of the number of workers that leave employment as percent of the labor force and the expected duration of unemployment. As discussed in Section 3, it is possible to interpret this equilibrium relationship as an "Iso-Unemployment Curve" (or IUC), reflecting the different combinations of inflows and durations compatible with the same unemployment level. It is precisely the reasons underlying the position of countries in the space of IUCs that is investigated in this paper. Before we do this, it is interesting to see where countries actually stand in the IUC schedule.

To this aim, Figures 1 and 2 decompose annual unemployment rates into the yearly destruction rates and the expected duration of unemployment for 20 OECD countries over the four decades ranging from 1965 to 2009. The sample comprises eleven euro-area countries (Austria, France, Germany, Belgium, Italy, Spain, Greece, Portugal, Ireland, the Netherlands, and Finland) alongside nine other OECD countries (US, Canada, Australia, Japan, UK, Denmark, Norway, Sweden, and Switzerland). The empirical job destruction rates and unemployment durations have been extracted from available data on unemployment rates following the methodology developed by Shimer (2007). The detailed procedure is described in the Appendix.

Figures 1 and 2 reveal a huge variation in the unemployment inflow rates and durations across countries. With both low inflows and durations, Norway, Sweden, Japan, Switzerland, and to a lesser extent Austria, display the lowest unemployment levels. Reflecting a combination of brief unemployment spells and high inflow rates, North America is situated on IUCs with low-to-moderate unemployment levels. Belgium, Italy, Ireland and Greece have consistently featured low job destruction rates, coupled with relatively long durations and high unemployment rates. Australia, France, Germany, the Netherlands, Denmark and the UK, characterized by intermediate levels of both inflows and durations, tend to post higher unemployment rates than the first group, while their position relative to North America is ambiguous. Reflecting elevated inflows and durations, Spain tends to be located on IUCs with the highest unemployment levels (bar the seventies). Significant variation in the relative importance of the two variables of interest makes it difficult to characterize unemployment's behavior in Finland.

## 3 The Model

### 3.1 Equations

Theories of unemployment may be divided into two broad groups, depending on whether they are based on stocks or flows. The specification of the labor market adopted in this paper focuses on flows. It builds on the standard matching model developed by Pissarides (2000). Suppose that the size of the labor force is constant[1]. We let $u_t$ and $v_t$ at time $t$ denote the unemployment and vacancy rates, both expressed as percent of the labor force. The number of job matches taking place per unit of time is assumed to follow a Cobb-Douglas specification of the form

$$m_t = \mu v_t^{1-\rho} u_t^{\rho} \tag{1}$$

where $\mu$ denotes the degree of efficiency in the matching technology and $\rho \in (0,1)$ represents the unemployment elasticity of job matches. The job vacancies and unemployed workers that are matched at any time $t$ are randomly selected from the sets $u_t$ and $v_t$. Hence the hazard rate out of unemployment follows a Poisson process with rate

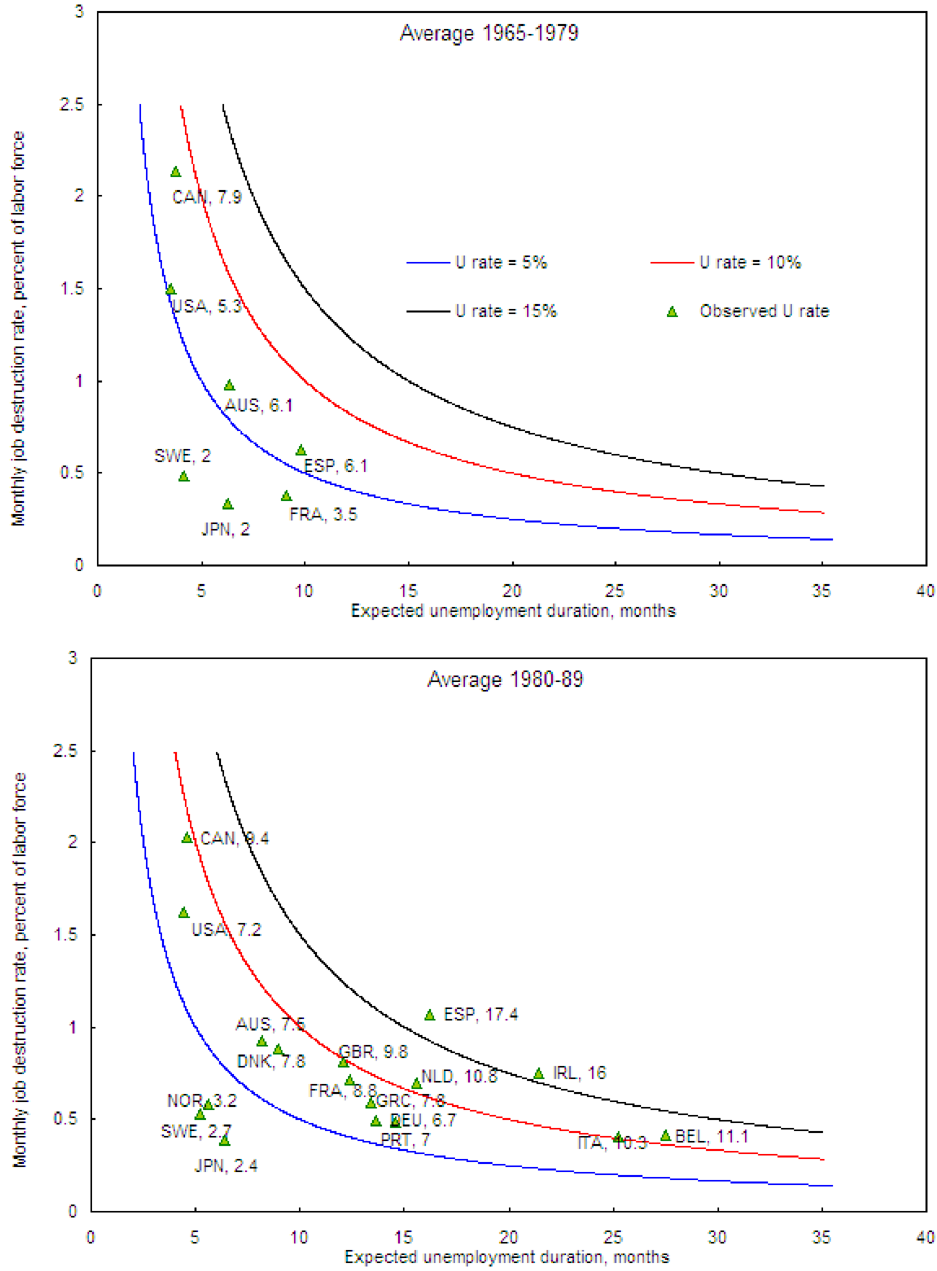
$$f_t = \frac{m_t}{u_t} = \mu \theta_t^{1-\rho} \tag{2}$$

where $\theta_t = v_t/u_t$ is the number of vacancies per unemployed workers or labor market tightness. This generates an exogenous hazard rate into employment equal to $f_t u_t$.

The flow into unemployment results from job-specific productivity shocks arriving to firms at Poisson rate $s_t$. When the shock arrives, the net product of the job changes to some new value drawn from a general probability distribution $G(x_t)$ ,where $0 \leq x_t \leq 1$ and $w(x_t)$ stand for the job's productivity and its corresponding wage. Let us denote by $J(x_t)$ the firm's expected profit from an occupied job. The firm chooses a reservation

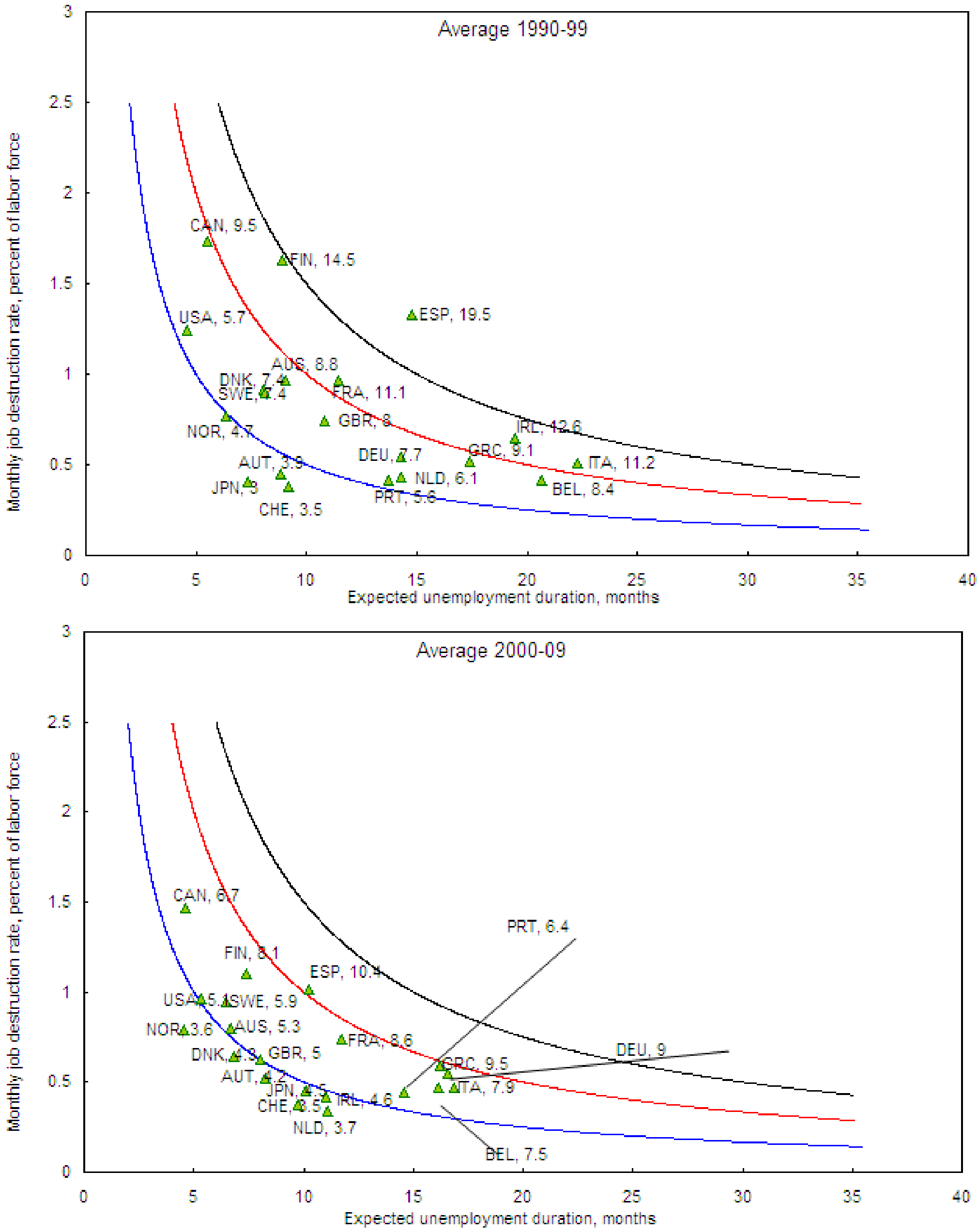
[1]This assumption is needed to apply the methodology developed by Shimer (2007) to measure job creation and job destruction flows. This is consistent with the view that, compared with workers' flows within the labor force, flows in and out of the labor force play a lesser role in explaining unemployment movements. Once this assumption is relaxed, one cannot use publicly available data to construct all possible flows between employment, unemployment and inactivity. Micro-data on individuals' employment status should be used instead. Data availability issues prevent us from taking this route.

Figure 1: Unemployment Duration and Job Destruction Rates in 20 OECD Countries, 1965-1989




Source: Authors' estimates of job destruction rates and expected unemployment duration based on OECD data and the methodology described in the Appendix.

Figure 2: Unemployment Duration and Job Destruction Rates in 20 OECD Countries, 1990-2009




Source: Authors' estimates of job destruction rates and expected unemployment duration based on OECD data and the methodology described in the Appendix.

productivity $R_t$ (with $J(R_t) = 0$) and destroys jobs whose productivity fall below it because of the shock. In words, job destruction operates when the reservation productivity is such that the expected profit from an occupied job is 0. This generates an endogenous hazard rate into unemployment equal to the product of the fraction of firms hit by a shock $s_t$, and the probability that a shock is below reservation $G(R_t\ )$, with associated job destruction of $s_tG(R_t\ )(1-u_t)$.The out-of-steady-state unemployment dynamics is therefore given by

$$u_{t+1} - u_t = s_tG(R_t\ )(1-u_t) - f_tu_t \tag{3}$$

At equilibrium the unemployment rate is constant, thus

$$sG(R)(1-u) = fu \tag{4}$$

with the interpretation that the mean number of workers who enter unemployment is equal to the mean number of workers who leave unemployment. Put another way,

$$\frac{1}{f}(1-u) = \frac{1}{sG(R\ )}u \tag{5}$$

which implies that, at equilibrium, the expected duration of unemployment is equal to the expected duration employment. Substituting (2) into (4) and solving for the $u$ yields

$$u = sG(R)(1-u)\frac{1}{\mu\theta^{1-\rho}} \tag{6}$$

which tells us that the equilibrium unemployment rate is the product of the hazard rate into unemployment $sG(R)$ times the expected duration of unemployment $(1-u)\frac{1}{\mu\theta^{1-\rho}}$.

Solving the model requires obtaining the equilibrium conditions for the two endogenous $R$ and $\theta$, to which we now turn. Suppose that job creation satisfies the zero-profit condition[2], that job destruction operates when $J(R) = 0$, and that the wage sharing rule is set in a Nash bargaining fashion. Let $\beta \in (0,1)$ be the labor's relative strength in wage bargaining, $z$ the unemployment income, $c$ the hiring and firing costs of firms, $\kappa$ an indicator of the regulatory stance in the market, $tw$ the tax wedge, and $r$ the rental cost of capital. One can then express labor market tightness and reservation productivity (characterizing job creation and job destruction respectively) as a function of the exogenous variables in the model, that is

$$\theta = \theta(\beta, c, \kappa, tw, s, r, \mu, R) \tag{7}$$

[2] As the model allows for regulatory costs, the zero-profit condition implies that firms' profits are dissipated by such costs.

$$R = R(\beta, c, z, \kappa, tw, s, r, \mu, \theta) \tag{8}$$

It is convenient to represent this system in the space $(R, \theta)$ while viewing the remaining parameters as constant (Figure 3). The model behaves according to the following logic:

- Expression (7) on job creation corresponds to the free-entry condition postulated by search models and reflects that firms post vacancies as long as the marginal recruiting cost per vacancy is equal to the expected value of holding it. At equilibrium, the expected gain from a new job to the firm must be equal to the expected hiring cost paid by the firm. It slopes down in the space $(R, \theta)$ because at higher reservation productivity , the expected life of (and gain from) a job is reduced. Firms create fewer jobs as a result, leading to a fall in market tightness $\theta$.
- Expression (8) on job destruction slopes up in the space $(R, \theta)$ because at higher $\theta$ the worker's outside opportunities are better and wages are higher. Higher wages translate into a lower net product of labor. Thus more marginal jobs are destroyed. A noteworthy property implicit in the equilibrium condition (8) is that the reservation productivity $R$ is less than the reservation wage $w(R)$. This implies some labor hoarding in equilibrium: because job productivity might change, the firm keeps some currently unprofitable jobs occupied.

### 3.2 Model's predictions

Comparative statics implied by equations (7) and (8) is as follows (Figure 3):

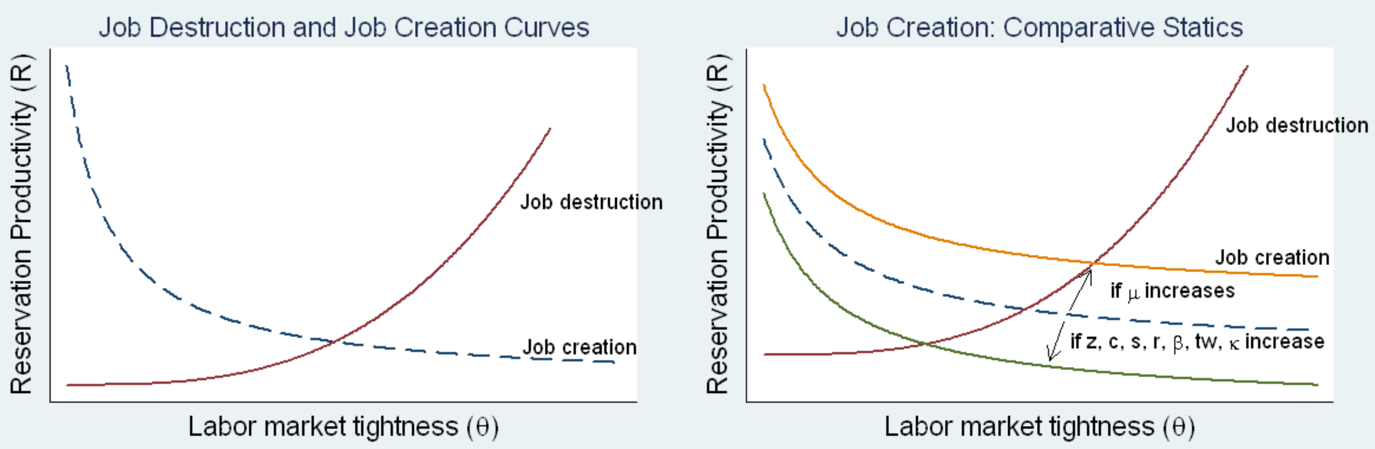
- At given $\theta$,

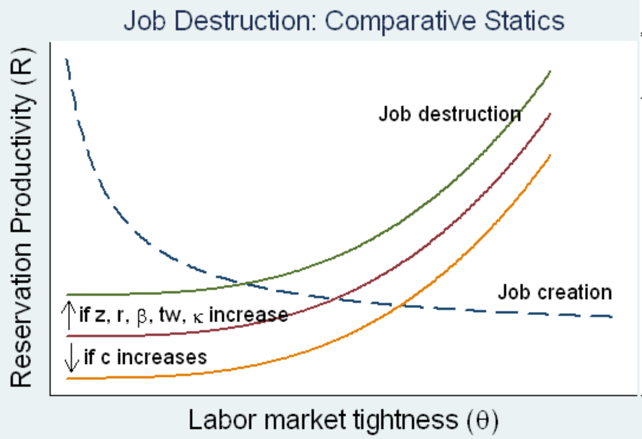
$$\frac{dR}{d\beta} > 0, \frac{dR}{dz} > 0, \frac{dR}{dtw} > 0, \frac{dR}{d\kappa} > 0, \frac{dR}{dc} < 0, \frac{dR}{ds} \lesseqgtr 0, \frac{dR}{dr} > 0 \tag{9}$$

- At given $R$,

$$\frac{d\theta}{d\beta} < 0, \frac{d\theta}{dz} < 0, \frac{d\theta}{dc} < 0, \frac{d\theta}{dtw} < 0, \frac{d\theta}{d\kappa} < 0, \frac{d\theta}{ds} < 0, \frac{d\theta}{dr} < 0, \frac{d\theta}{d\mu} < 0 \tag{10}$$

Figure 3: Model's predictions




**Unemployment Rate: Comparative Statics**

| | Job Destruction Rate | Unemployment Duration | Unemployment Rate |
|---|---|---|---|
| Increase in: | | | |
| Labor bargaining strength β | ↑ | ↑ | ↑ |
| Unemployment income z | ↑ | ↑ | ↑ |
| Firing and hiring costs c | ↓ | ↑ | ? |
| Matching efficiency μ | Unchanged | ↓ | ↓ |
| Product market regulation κ | ↑ | ↑ | ↑ |
| Tax wedge tw | ↑ | ↑ | ↑ |
| Interest rate r | ↑ | ↑ | ↑ |
| Frequency of productivity changes s | ? | ↓ | ? |

Source: The authors.

Consider now the influence of parameter changes on the job destruction and job creation equilibrium values, the latter being inversely related to our second variable of interest, the expected duration of unemployment. Bearing in mind that unemployment will change only if the new flows implied by the change in $R$ and $\theta$ are not equal, the model's predictions can be summarized as follows:

- Both a higher unemployment income $z$ and a higher labor share in bargaining $\beta$ raise reservation wages. This reduces the expected gain from a job, shrinking job creation (increasing duration) and increasing job destruction. As a result, the unemployment rate will be higher in the new equilibrium.
- An increase in the tax wedge $tw$ makes leisure more attractive relative to work, putting upward pressure on bargained wages. This renders marginal workers unprofitable and, all else being equal, more jobs are destroyed. At the same time, higher wages reduce the expected value from job matches to the firm, thereby inhibiting their recruiting activities. Higher job destruction and lower job creation therefore lead higher unemployment rates.
- Stricter regulation $\kappa$ tends to lower labor productivity in equilibrium, hence dampening job creation. A deterioration in competition-restraining regulations conveys higher mark-ups to producers, who will now seek to sell their goods at higher prices. As there is excess supply at the new prices, some unprofitable firms will exit the market and jobs will be destroyed until a new equilibrium is reached characterized by lower production and employment levels. Overall, the equilibrium unemployment rate is hypothesized to increase following a deterioration in the regulatory conditions.
- Job creation increases (duration falls) if productivity changes more frequently (higher $s$). Job destruction is subject to two opposing forces. On the one hand, job destruction increases because there are more shocks on average, but on the other hand, it decreases because firms are now more willing to hold on to labor if they expect a quick arrival of better conditions. Thus the effect of increased $s$ on unemployment is ambiguous.
- Higher interest rate $r$ reduces job creation (increases duration) as future profits on new jobs are discounted more heavily. At the same time, firms respond to higher interest rates by destroying more jobs. This is so because the option value of keeping unprofitable jobs is lower, given that the returns from a productivity

change only accrue in the future. Less job creation and more job destruction combine into higher unemployment rates.

- By reducing the expected duration of vacancies, higher matching efficiency $\mu$ reduces hiring costs for firms, increasing job creation (reducing duration) and bringing down the unemployment rate.

- Higher hiring and firing costs $c$ lower the expected gain from a job and reduce job creation. Likewise, larger firing costs make firms more conservative in their firing decisions and limit job destruction. This makes for a more stagnant labor market, but the effect on lower inflows and higher durations on equilibrium is itself ambiguous.

## 4 Estimating the Model

### 4.1 Data and Empirical Strategy

In order to assess the impact of labor policies on job destruction rates and the duration of unemployment spells, we estimate empirical versions of (7) and (8) of the form:

$$Job\ destruction\ rate_{it} = fe_i + d_t + \sum_j b_j x_{ijt} + OG_{it} + \varepsilon_{it} \tag{11}$$

$$Expected\ duration\ of\ unemployment_{it} = fe_i + d_t + \sum_j b_j x_{ijt} + OG_{it} + \varepsilon_{it} \tag{12}$$

Equations (11) and (12) control for out-of-steady-state dynamics by entering the output gap as an indicator of cyclical position in the regressions. In our notation $t$ , $i$ and $j$ are indexes for time, countries and institutions, and $x$ represents a vector of institutions. The specification allows for country fixed and common time effects. The two dependent variables are extracted from available data on unemployment rates following the methodology described in the Appendix.

All institutional variables in the model are normalized to have zero mean and unit standard deviation. They are mapped into empirical concepts in the way we turn to describe. Reservation wages $z$ are proxied by benefit replacement rates during the first year of unemployment, as averaged over various family types and earning levels (Nickell and others, 2001; and OECD, labor market policies database). Firms' firing costs $c$ are approximated by the OECD indicators of Employment Protection Legislation for regular workers (EPL) and the incidence of temporary employment.

The matching efficiency is supposed to be influenced by three categories of Active Labor Market Policies (ALMPs). Given that heterogeneity in the synthetic indicator of ALMPs is one reason for non-significance of these policies in previous studies (Bassanini and Duval, 2006), we proceed with a disaggregated analysis whereby ALMP spending is decomposed into three main categories: job seeker support by Public Employment Services (PES), training policies and financial support to labor-demand. Data on ALMPs programs is also taken from the OECD labor market policies database. As suggested by Estevao (2003), we express ALMP expenditures per unemployed person as a percentage of GDP per capita to ensure cross-country comparability.

We use union centralization and coordination measures (Visser, 2007) to calibrate workers' strength ($\beta$) in wage bargaining. Tax wedges comprise social security contributions, personal income and indirect tax rates (Nickell and others, 2001; and OECD, labor market policies database).

Estimating the model further requires identifying measures for productivity shocks and overall financial conditions, which we take to be the standard deviation of labor productivity[3] and the real interest rate. As a measure of the regulatory stance in product markets, we use the OECD indicator of regulation in Energy, Transport and Communications (ETRC). This is narrower in terms of sectoral coverage than the OECD aggregate indicator for product market regulation but has the advantage of being available in long-time series. Moreover, as the EU Single Market Program has been more effective in liberalizing traditionally monopolistic sectors than in opening up services in general, the potential for reform presented in the following section can be interpreted as a lower bound to overall reform gains.

### 4.2 Results

We estimate the two-equation system on job destruction and unemployment durations given by (11) and (12) using data from the 20 OECD countries listed in Section 2 over

[3] Conceptually one may distinguish between *aggregate* shocks, interpreted as a general increase or decrease in job productivity, and *reallocation* shocks, interpreted as shocks that increase or decrease the variance of productivity. Consistent with the theoretical approach adopted in this paper, our empirical analysis focuses on reallocation shocks.

the period 1985-2008. The Simultaneous Equations Model (SEM) estimator we use assumes that the two unemployment components are determined simultaneously by the model postulated in section 3. SEM further allows for cross-correlation in the error terms of the two variables of interest. Results are summarized in Table 1.

As expected, unemployment inflows and durations are strongly affected by cyclical conditions. At times where the economy operates above potential output and labor markets are tighter, both job losses and the length of unemployment spells are reduced. The opposite holds during downturns, characterized by negative output gaps, slack labor markets, and higher unemployment inflows and durations.

For a right interpretation of the link between the set of institutional factors and the two endogenous variables, note that, by construction, the coefficients presented in Table 1 capture the estimated effect of each policy on unemployment inflows and durations when the economy is producing at full capacity (i.e. zero output gap).

Our estimates for job destruction suggest strong correlations with the tax wedge, EPL (alone and interacted with the incidence of temporary employment) and product market regulation, which we turn to rationalize.

By increasing the price of leisure relative to working activities, a higher tax wedge pushes up workers' reservation wage. Workers at the margin are rendered unprofitable to firms and more jobs are destroyed. There is some evidence that this impact depends on the economic cycle, as indicated by the significance of the coefficient of the interaction term between the tax wedge and the output gap. A positive sign implies that the effect of the tax wedge on job destruction is augmented in periods when labor markets are tight (when the output gap is positive) and less marked in periods with considerable labor market slack (when the output gap is negative). This is consistent with workers attaching greater value to their leisure time during upturns as compared to downturns.

In keeping with previous findings in the literature, we find that stricter job protection rules tend to reduce job losses. However, as indicated by the positive sign of the interaction term between EPL and temporary employment, the dampening effect of EPL on job destruction is reduced in economies characterized by a high share of temporary jobs–where labor legislation tends to differ across permanent and temporary workers.

Hurdles to competition in the services sectors result into higher equilibrium levels of job destruction. This is because regulations that inhibit competition grant more market power to producers, each one charging now higher prices for the goods they sell. But, as aggregate demand is less than supply at the new prices, a number of unprofitable firms will exit the market. And more jobs will be destroyed. Thus stricter regulations lead to market configurations characterized by higher job destruction and lower employment levels.

Consistent with our theoretical priors, ALMP programs (our proxy to matching efficiency) do not appear to have a significant impact on job destruction. Neither could we find evidence of a significant relationship between bargaining coordination and the inflow rate. Using bargaining centralization to measure the capacity of the social dialogue to internalize the impact of wage demands on employment destruction preserved this result. And the coefficients of non-linear specifications testing the Calmfors-Driffill hypothesis turned out to be also non-significant.

Unlike direct indicators of wage bargaining, more generous replacement rates do seem to push up reservation wages and aggravate job destruction. Our estimates could not shed light on the theoretical ambiguity surrounding the influence of productivity changes on job destruction.

Turning to the duration of unemployment, high tax wedges appear to discourage job creation and prolong unemployment spells. By increasing equilibrium wages, higher tax wedges tend to depress labor demand and increase the flow of workers into unemployment. Likewise, the unemployment benefit replacement rate is found to have a positive impact on unemployment duration. This is likely to capture the negative impact of the replacement rate on search incentives, as stressed in earlier works (Bassanini and Duval, 2006, Blanchard and Wolfers, 1999). EPL also has a positive, albeit weakly significant, influence on unemployment duration.

Labor-demand support does not appear to influence unemployment durations while job-seeker support is only borderline significant. The former result is consistent with previous studies pointing to large dead-weight losses and substitution effects associated with employment subsidies. These studies have often been disappointing in terms of bringing the unemployed back into unsubsidized work (see, for instance, Martin and Grubb 2001).

In contrast with both theoretical priors and economic intuition, more spending on formation policies tends to result in longer unemployment spells. This could partly reflect

Table 1: Regression Results

SEM Regression: Job Destruction Rate and Unemployment Duration

| | Job Destruction Rate (% of Labor Force) | Unemployment Duration (Months) |
|---|---|---|
| Output Gap | -0.0522*** | -0.0201*** |
| | [-6.036] | [-2.829] |
| EPL | -0.1363** | 0.0589* |
| | [-2.449] | [1.712] |
| EPL*Temporary Employment | 0.0630** | 0.0132 |
| | [2.493] | [0.640] |
| ALMP | | |
| -Job Seeker Support | -0.0241 | -0.1052* |
| | [-0.335] | [-1.789] |
| -Training | -0.0421 | 0.2043*** |
| | [-0.436] | [2.581] |
| -Labor Demand Support | 0.0791 | -0.0573 |
| | [1.064] | [-0.940] |
| Tax Wedge | 0.1338*** | 0.1028*** |
| | [3.664] | [3.437] |
| Output Gap*Tax Wedge | 0.0055* | 0.0017 |
| | [1.796] | [0.294] |
| Product Market Regulation | 0.1191** | 0.0358 |
| | [2.403] | [-0.881] |
| Replacement Rate | 0.0624* | 0.0705* |
| | [1.716] | [1.813] |
| Bargaining Coordination | -0.0085 | -0.0396 |
| | [-0.244] | [-1.379] |
| Real Interest Rate | 0.0082 | 0.0897*** |
| | [0.295] | [3.924] |
| Productivity Volatility | 0.0042 | -0.0274* |
| | [0.234] | [-1.862] |
| Total Observations | 324 | 324 |
| Adjusted R-squared | 0.851 | 0.9 |

Note: The sample includes data for 20 OECD countries listed in Section 2. The estimation includes cross-country fixed effects (not displayed) and year dummies as common time effects. Dependent variables are in logs. The t-statistics are reported in parenthesis. Superscripts *, ** and *** indicate that the estimated coefficient is significantly different from zero at 10, 5 and 1 percent levels, respectively.

reverse causality, as those programs can be adjusted more rapidly in response to an economic downturn and longer unemployment spells than, say, EPL or tax wedges. Moreover, training programs may reduce search efforts if not properly designed, and in the case where participation in such programs represents a more attractive alternative to workers than open unemployment, they could even augment wage demands. In any event, any beneficial effects of ALMPs need to be weighed against the costs of taxes required to finance them, which may in turn increase unemployment.

Our estimates confirm the theoretical prediction that job creation increases (duration falls) in response to more frequent changes in productivity while the time spent in looking for a job appears to be inversely related with real interest rates.

One interesting finding from our analysis is that, with the notable exception of EPL and ALMPs, all remaining labor market institutions seem to impact the job destruction rate and the unemployment duration in the same direction. Countries with both high inflows into unemployment and long durations may therefore find efficient to use the policies that affect both dimensions at the same time.

### 4.3 Policy Implications from Some Illustrative Simulations

To get an idea of the model's projection capacity of both inflows and durations, we apply the coefficients estimated in Table 1 to output gap forecasts over the period 2010-12[4]. These estimates are based on the most updated (i.e. 2008) institutional configurations in each country. The projection exercise is meant to illustrate the link between the model's institutional variables and the two unemployment components, rather than to provide accurate forecasts over the referred period. The projections presented in this section should therefore be taken with caution.

Figure 4 ranks countries according to their expected behavior in terms of inflows and durations. Projections reflect a wide variation in countries' experiences. The duration of unemployment spells ranges from around 26 months in Greece to 5.6 in Norway. Belgium, Ireland, Italy and Portugal also feature comparatively long durations. The shortest unemployment spells are projected for the Nordic and Anglo-Saxon countries. Job destruction rates are envisaged to be the highest in countries as heterogeneous as Canada, Finland, Spain, and the US; and the lowest in Portugal, Netherlands, Belgium,

[4]The cut-off date for the forecasts is July 2011.

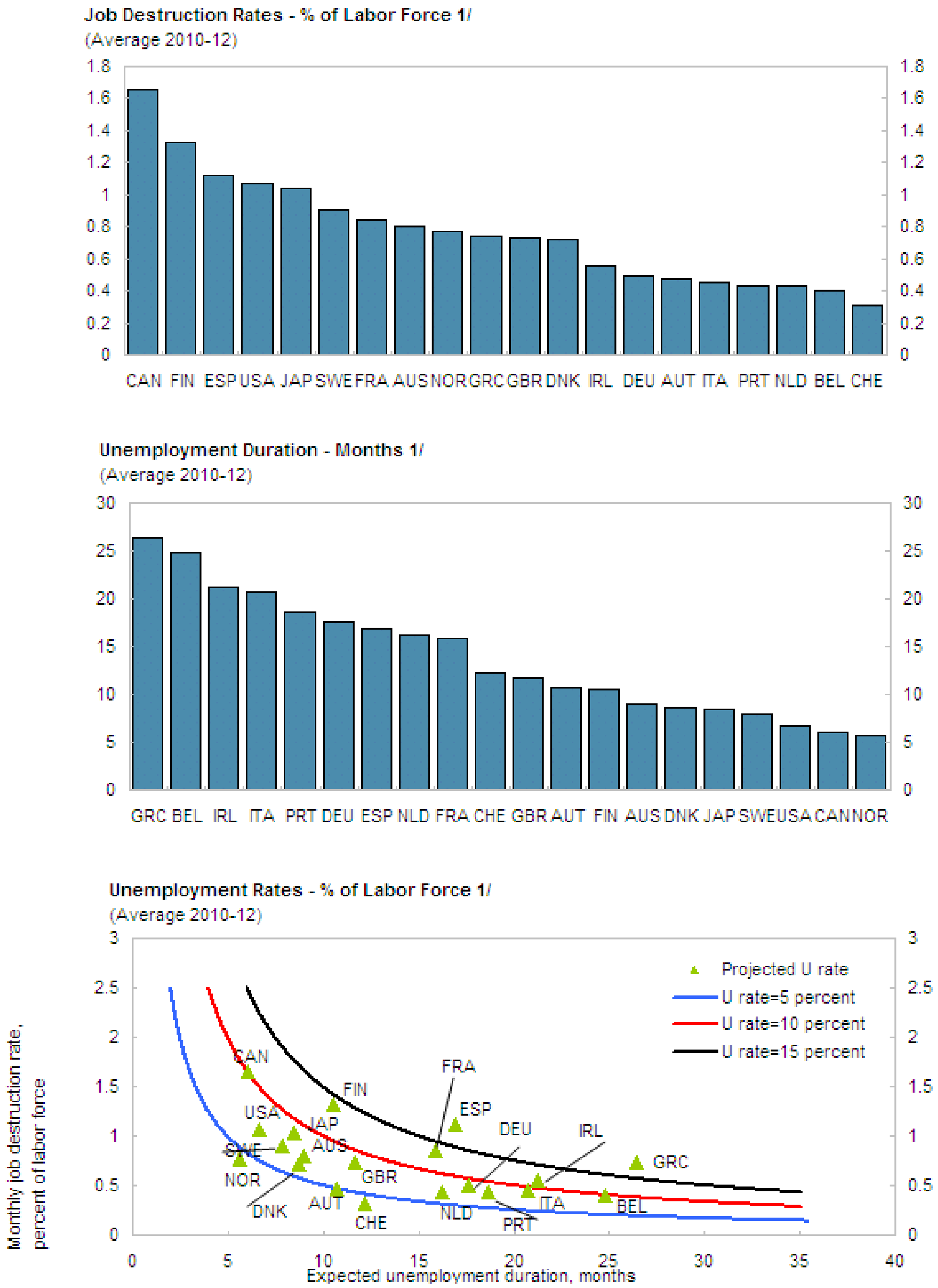
Belgium and Switzerland.

We now turn to calibrate the impact of changes in institutional variables on unemployment inflows and durations. To this aim, we quantify the (percentage point) difference from baseline projections induced by i) a move to best sample practices in services regulation; ii) a 5-percentage-point reduction in tax wedges; iii) a 5-percentage-point reduction in replacement rates; iv) a simulation combining all the above changes. Rather than as a literal description of what every country ought to do, the simulations presented here are meant to illustrate the scope for less employment destruction and lower unemployment duration, as well as to generate a benchmark against which to make cross-country comparisons. Clearly, countries need not to adopt such reform package in full, but may target specific policy areas depending on the nature of the unemployment problem and decide on the pace of reform that best suits their needs.

The results are indicative of substantial gains from reform (Figure 5). Our simulations imply that removing the hurdles to entering key services and alleviating the tax burden on labor can each reduce job destruction rates permanently by 0.05 percentage points on average for the whole sample. And by stimulating job search, lower replacement rates and tax wedges can limit the duration of unemployment spells up to 20 and 50 days, respectively. The combined impact of those changes would yield sizable unemployment reductions in all countries, with Greece, Spain, France, Finland, Ireland, Belgium, and Italy benefiting the most from the implementation of the combined package (Figure 6). Of course, actual unemployment impact will vary with the ambition of the reform agenda, the speed of its implementation, and the time needed for these reforms to take hold.

These reforms could go hand in hand with reducing inequalities. In countries where labor market duality remains unacceptably high, measures to harmonize employment protection benefits between types of job contracts should reduce the disproportionate burden on temporary workers—those last hired and first fired. Our simulations suggest that a reduction in job protection rules for regular workers to cover only $\frac{1}{4}$ of the distance with the least regulated economies would have a neutral impact on unemployment, provided it is accompanied by a reduction in temporary unemployment to match best practices.

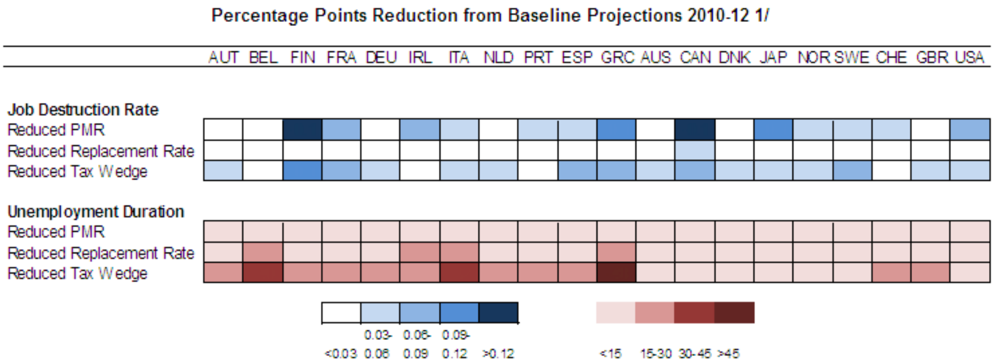
Figure 4: Job Destruction Rates and Unemployment Duration: Baseline Projections




Source: Authors' Calculations.

1/ Projections are based on the estimated coefficients reflected in Table 1, 2010-2012 output gap data and 2008 institutional configurations in each country.

Figure 5: Reform Impact on Job Destruction Rates and Unemployment Duration

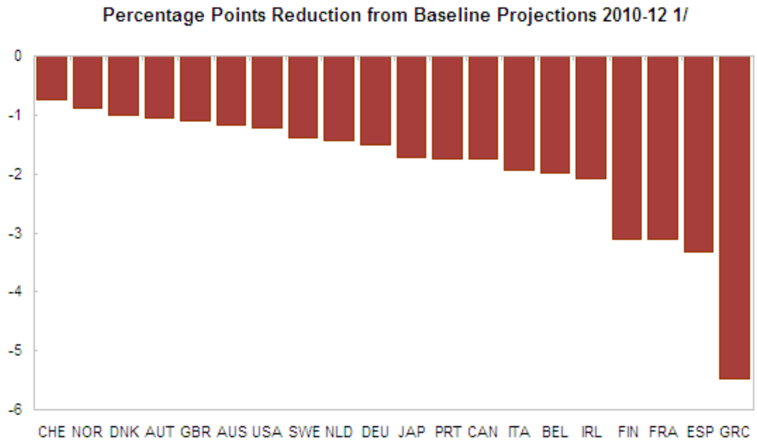



Source: Authors' Calculations.

1/ The heatmap illustrates changes in job destruction rates and unemployment durations assuming that (i) every country adjusts PMR to best sample practices; (ii) replacement rates are cut down by 5 percentage points across-the-board.

2/ Percentage point reduction for job destruction rates and reduction in days for unemployment duration.

Figure 6: Combined Reform Impact on Unemployment Rates




Source: Authors' Calculations.

1/ The simulation illustrates the scope for reform by assuming that tax wedges and benefit replacement rates are each reduced by 5 percentage points in every country; and PMR is adjusted to match best sample practices.

## 5 Conclusions

This paper reads the basic unemployment equilibrium condition postulated by search theory as an Iso-Unemployment Curve (IUC). The IUC is the locus of job destruction rates and expected unemployment durations that render the same unemployment level. We use this schedule to classify countries according to their preferences over the job destruction-unemployment duration trade-off. The upshot of this analysis is that labor markets characterized by high levels of job destruction but brief unemployment spells do not necessarily outperform countries characterized by the opposite behavior. But, the IUC construct makes it clear that high unemployment rates result from extreme values in either durations or destructions, or intermediate-to-high levels in both.

Looking at unemployment through the lenses of the IUC schedule focuses the attention on each economy's revealed social preferences over the destruction-duration mix. Policy packages fighting unemployment should take into consideration such preferences. Some countries seem to tolerate relatively high destruction rates as long as unemployment duration is short. Others are biased towards job security and do not mind financing longer job search spells. A few unfortunate countries are trapped in a high inflow-high duration combination, seemingly condemned for long periods of high unemployment.

An optimistic message arising from this study, especially for countries located on higher IUCs, is that an ambitious structural reform program tackling high labor tax wedges, activating unemployment benefits and removing barriers to competition in key services can effectively contain job losses, limit the duration of unemployment spells and yield substantial reduction in unemployment.

## 6 Appendix: Measuring Job Destruction and Unemployment Durations

This appendix presents the methodology used to estimate annual time series of flow hazard rates into and out of unemployment. It also discusses how to infer the average duration of unemployment spells consistent with such flows. The procedure builds on Shimer (2007). However, this approach cannot be directly applied to European countries as unemployment duration is not available at monthly frequencies in the European Labor Force Survey. To overcome this limitation, we follow the methodology proposed by Elsby and others (2008). This methodology exploits annual and quarterly data to measure annual averages of monthly unemployment flows.

Let us denote by $F_t^{<12}$ the probability that an unemployed worker exits unemployment within one year. The annual change in the unemployment stock can be expressed as

$$u_{t+12} - u_t = u_{t+12}^{<12} - F_t^{<12} u_t \tag{13}$$

Here $u_{t+1}^{<12}$ represents the stock of unemployed workers with duration less than one year (i.e. the yearly flow into unemployment), and $F_t^{<12} u_t$ represents the flows out of unemployment. Solving for the annual outflow probability $F_t^{<12}$, one obtains

$$1 - F_t^{<12} = \frac{u_{t+12} - u_{t+12}^{<12}}{u_t} = \underbrace{\frac{u_{t+12} - u_{t+12}^{<12}}{u_{t+12}}}_{A} \underbrace{\frac{u_{t+12}}{u_t}}_{B} \tag{14}$$

where the factor $A$ represents the fraction of unemployment with duration longer than one year and the ratio $B$ is the annual gross growth rate of unemployment. Assuming that the monthly outflow hazard rate for workers unemployed less than one year $f_{out,t}^{<12}$ is constant within years, the annual outflow probability $F_t^{<12}$ is related to $f_{out,t}^{<12}$ through

$$e^{-12 f_{out,t}^{<12}} = 1 - F_t^{<12} \tag{15}$$

so that $F_t^{<12}$ can be mapped into $f_{out,t}^{<12}$ in the following manner

$$f_{out,t}^{<12} = -\ln\left(1 - F_t^{<12}\right)/12 \tag{16}$$

where $f_{out,t}^{<12}$ is the hazard rate for unemployed workers of duration lower than one year, which is related to the probability that an unemployed worker at time $t$ completes her spell within the subsequent twelve months.

In order to obtain estimates of the corresponding inflow hazard rates $f_{in,t}^{<12}$, let us reformulate the evolution of the monthly unemployment rate over time as

$$\frac{du_t}{dt} = f_{in,t}^{<12}(1 - u_t) - f_{out,t}^{<12} u_t \tag{17}$$

Assuming that the flow hazards are constant within years and solving equation (17) forward one year, we can relate the variation in the unemployment stock $u_t$ over the course of the year to the variation in the underlying hazard rates $f_{in,t}^{<12}$ and $f_{out,t}^{<12}$:

$$u_t = \lambda_t u_t^* + (1 - \lambda_t) u_{t-12} \tag{18}$$

where the steady-state unemployment rate $u_t^*$ is given by:

$$u_t^* = \frac{f_{in,t}^{<12}}{f_{in,t}^{<12} + f_{out,t}^{<12}} \tag{19}$$

and the annual rate of convergence to the steady state $\lambda_t$ is found to be:

$$\lambda_t = 1 - e^{-12(f_{in,t}^{<12} + f_{out,t}^{<12})} \tag{20}$$

To operationalize the methodology described above, we use OECD annual data on unemployment rates and unemployment rates by duration to compute equation (14). Given $F_t^{<12}$,we use equation (16) to estimate $f_{in,t}^{<12}$, which together with $u_t$ allows us to obtain $f_{out,t}^{<12}$ through equations (18), (19) and (20).

The inflow rates estimated above are combined with annual data for the unemployment rates to estimate through equation (16) the average duration of unemployment spells for the four decades ranging from the 1970s throughout the 2000s.

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