Institutional Reforms in European Labor Markets

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Abstract

Most of the recent literature on labor market institutions draws on reforms rather than on cross-country variation in regulatory levels. This is a significant improvement with respect to the earlier literature which was based on somewhat arbitrary one-dimensional indicators of multi-dimensional institutions. But this literature lacks guidance from a theory of institutional reforms, acknowledging the fact that regulatory changes often create longlasting asymmetries, multi-tier regimes. This chapter provides new evidence on reforms in Europe, where most of the regulatory change in the labor market area have been taking place in the last 20 years. In light of this evidence, it extends a model widely used in analysing the interactions between institutions and labor market flows. Finally, it critically surveys the empirical literature drawing on institutional reforms in Europe.

JEL codes: J63, J64, J68.

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FIRST DRAFT. COMMENTS WELCOME

1 Introduction

There is a large body of academic papers and policy reports on the effects of European-type labor market *institutions* on economic performance. The early literature largely draws on cross-country (mainly Transatlantic) comparisons, and was reviewed in previous Handbook of Labor Economics (HLE) Chapters. In particular, Blau and Kahn, (1999), Bertola (1999) as well as Layard and Nickell (1999) in the third HLE volume addressed various dimensions of the relationship between institutions and labor market performance. Machin and Manning (1999) also offered in that volume an extensive review of the literature on the European unemployment problem, which inspired much of the early literature on institutions.More recent work has been identifying the effects of institutions by using difference-in-differences techniques which exploit time-series variation in these institutions as well as asymmetries in the enforcement of norms within each country. This most recent literature actually draws on institutional *reforms* rather than on cross-country variation in the levels of different institutions. Moreover, it widely exploits asymmetric reforms, that is, institutional changes affecting only a segment of the labor market and leaving the other segments unaffected.

The purpose of this chapter is to critically review this more recent empirical literature and motivate further research in this area. As I will argue in this chapter, futher empirical work needs stronger guidance from a theory of the institutional *reforms.* Europe offers a very interesting case study in this respect due to the large number and scope of the reforms that have been taking place in the Old Continent in the last 20 years. The models referred to by applied economists typically have empirical implications concerning the effects of radical reforms of these institutions, as they compare equilibrium outcomes with more or less of any given institution for everybody. However, the reforms that are actually taking place in Europe and those that are used in empirical research as "natural experiments" are mainly partial reforms, creating two-tier regimes, and longlasting asymmetries in the enforcement of these institutions.

While the pioneering work of Saint-Paul (2000) investigated the *determinants* of two-tier reforms from a political economic perspective and there is some literature (surveyed by Roland, 2001) on dual-track liberalisation in economies coming from central planning, much less is known about the *effects* on the labor market of reforms allowing for the coexistence of different regimes at the equilibrium. Two-tier regimes also have an important transitional dynamics which has yet to be thoroughly investigated from a theoretical perspective.

In applied work it is very important to aknowledge that asymmetric reforms may involve significant spillovers between reformed and unreformed sectors of the labor market. These spillovers need to be taken into account when defining proper identification strategies. Another important issue that could be better addressed drawing on stronger theoretical guidance is endogenous sorting in treatment and control groups in the literature drawing on natural experiments. Engineering two-tier reforms is generally a device for Governments to win political obstacles to sizeable regulatory changes. There seems to be a trade-off between size and scope of reforms where larger reforms are more likely to be two-tier. Thus, such reforms may generate non-negligible general equilibrium effects. Applied work on reforms would then greatly benefit also from a theory providing insights as to the effects of these reforms on the macro variables of the labor markets. Most applied work to date takes instead a partial equilibrium perspective.

The structure of this chapter is as follows.

Section 2 defines labor market institutions, reforms, either complete or two-tier, discrete or incremental, and provides evidence on the characteristics of institutional changes taking place in European labor markets in the last 30 years and compares them with developments in product market and financial market regulations. Section 3 extends a general equilibrium model of the labor market to allow for two-tier reforms in those institutions in which more activism has been documented. Section 4 reviews the literature in light of the above characterisation of reforms and theoretical predictions. Finally, Section 5 concludes.

2 Institutions and reforms

A large amount of empirical research on labor market institutions draws on cross-country comparisons of indicators of the intensity of different types of regulations. This literature was reviewed in previous handbook chapters (Bertola, 1999; Blau and Kahn, 1999; Nickell and Layard, 1999). In particular, the focus of the literature on the so-called "Eurosclerosis" (Bean (1994), Alogouskofis et al. (1995), Snower et al. (1996), Nickell (1997)) is on the role played by Transatlantic differences in the level employment protection, unemployment benefit systems, payroll taxes and subsidies on labor as well as wage setting institutions in explaining US-Europe differences in the levels and duration of unemployment. These comparisons inspired much of the subsequent theoretical work on the aggregate implications of labor market institutions.

This earlier literature could not analyse the evolution over time of institutions as no series or limited series were available at that time of the most relevant institutional features of labor markets. Later work, i.e., Blanchard and Wolfers (2000), Nickell, Nunziata and Ochel (2005) and Blanchard (2006) could combine in panel estimates of aggregate employment and unemployment equations cross-sectional observations and some low-frequency time-series on institutions offering new insights, notably on the interactions between shocks and institutions. But the evolution of the institutions per se is generally overlooked by this literature, which inspired mainly theoretical work on institutions rather than on institutional reforms.

Labor market institutions have been subject to frequent policy changes in the last 20 years. This activism can be preliminarly characterised by drawing on some widely used cardinal indicators of institutional intensity, devised by the OECD, whose shortcomings, are discussed in some detail in Boeri and vanOurs (2008). Figures 1 through 4 display the level of these indicators in the mid 1980s (horizontal axis) and at the most recent observation available (vertical axis). Countries located below the bisecting line through the origin have reduced over time the level of any given institution, whilst those located above the diagonal have increased it. Only countries located along the bisecting line have been keeping their institutions unchanged with respect to the initial year.

We consider the following four institutional indicators: the index of strictness of employment protection legislation (EPL); the summary generosity measure of unemployment benefits (UB); the active labor market policy (ALMP) expenditure to GDP ratio; and the total tax wedge on low wages. The first two measures are widely used by the literature: they draw on detailed information about national regulations and are increasing in the.strictness of EPL and generosity of UB Details on the OECD “Overall strictness of EPL” index are offered at http://stats.oecd.org/ Index.aspx?DataSetCode=EPL_OV. The summary generosity measure is defined as a simple average of the de jure gross replacement rates over the first two years of an unemployment spell, still drawing on OECD data. The ALMP budget includes a variety of so-called "activation programmes" (AP) providing job counselling, placement and subsidised hiring typically at low durations of unemployment or among youngsters and sanctioning with benefit reductions those who did not actively seek employment..Finally, the total tax wedge on low pay captures a wide arrays of employment conditional incentives (ECI) introduced to increase incentives to work at relatively low wages. It relies on detailed information on national tax and benefit systems collected in the publication "Taxing wages". Reference is made a single worker earning 2/3 of the average production worker pay.

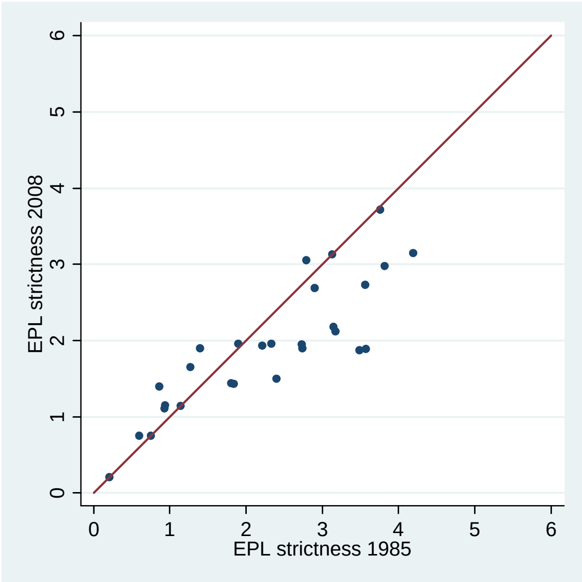

Figure 1: OECD Index of Strictness of Employment

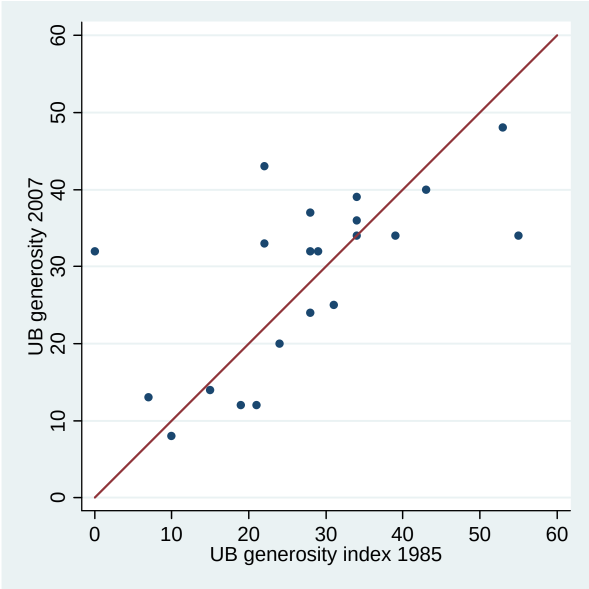

Figure 2: OECD Summary Generosity measure of UB

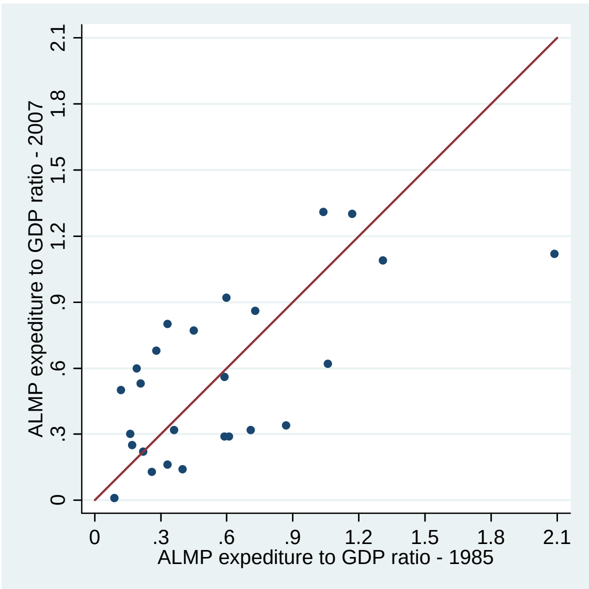

Figure 3: ALMP Expenditure to GDP Ratio

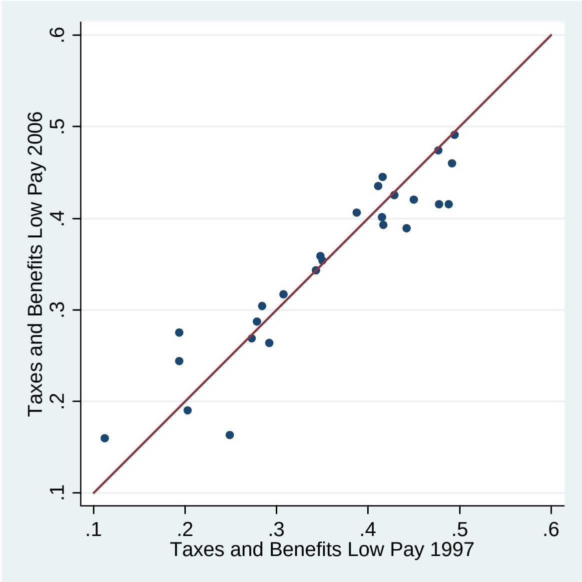

Figure 4: Taxes and Benefits on Low Wages

Table 1. Evolution of Labour Market Institutions in OECD Countries.

	EPL Index				UB Generosity measure			
	European		non-European		European		non-European	
	1985	2008	1985	2008	1985	2007	1985	2007
Mean	2.46	1.99	1.78	1.71	29.81	32.69	19.80	15.80
St. Dev	1.04	0.66	1.29	1.18	14.38	9.53	8.11	6.72
Average Variation	23.59%		17.39%		28.87%		19.91%	

	ALMP/GDP				Tax/Benefits low pay			
	European		non-European		European		non-European	
	1985	2007	1985	2007	1997	2006	1997	2006
Mean	0.64	0.68	0.42	0.27	40.02	38.55	26.92	28.28
St. Dev	0.53	0.36	0.23	0.23	7.77	8.12	10.91	8.58
Average Variation	79.36%		56.38%		6.79%		16.26%	

The message delivered by these figures is one of much activism. There are only 4 countries (out of 28) that did not change EPL over time, only one country (out of 21) that did not modify UB generosity, one country out of 26 that did not adjust the size of active labour market policy programmes, and one country out of 27 adjusted taxes and benefits for low wage earners (although the available series covers only a ten-year period in this case).

While there is not always a clear pattern in the institutional evolutions, they appear to have reduced the cross-sectional variation in the level of these institutions at least within Europe, as indicated by the beginning year and end year standard deviations of the indicators displayed in Table 1. European countries are also those that have implemented the largest institutional transformations (the exception is taxes on low pay), at least judging from the average rate of change of the value of the indicators over the period, reported in the last row of Table 1 for each institution. In light of this evidence, a more in depth analysis of institutional reforms in Europe is warranted.

2.1 Some key definitions

Before we proceed any further, it is better to provide a few key definitions which will be used henceforth.

A **labor market institution** is a system of laws, norms or conventions resulting from a *collective* choice, and providing constraints or incentives which alter *individual* choices over labor and pay. Single individuals and firms consider the institutions as given when making their own, *individual*, decisions. To give an example, an individual has limited choice over the number of hours of work to be supplied when working time is determined via a collective choice mechanism. Regulations on working hours are indeed an institution aimed, inter alia, at coordinating the allocation of time to work, leisure or home activities across and within households. Due to their foundations on collective choices, institutions are the byproduct of a political process. Often, but not always, institutions are written in laws. For instance, collective bargaining institutions are most frequently regulated by social norms and conventions rather than by laws.

By affecting individual incentives, these institutions affect the structure of labor markets. For instance, they move the intensive or extensive margins of participation, they expand or reduce the size of labor markets by inducing marketisation of home production or by crowding-out low productivity jobs.

It is always important to recognize that institutions fulfill a useful purpose from the point of view of at least some economic agents. Otherwise, it would hardly be possible to see why they were introduced in the first place and why reforms of these institutions are often politically difficult. The fact of the matter is that institutions create their own constituency. The political economy of labor market institutions is beyond the scope of this chapter. The results of this literature (e.g., summarized by Saint-Paul, 2000) are, however, very important in understanding the nature of the reforms that we define and characterise.

All the institutions affect directly or indirectly equilibrium take-home wages and labor costs of firms, by introducing a **wedge** between labor's marginal productivity and opportunity cost. As shown by Figure 5, the wedge can be introduced either in terms of taxes on labor or markups on reservation wages (price-based institutions) or by forcing effective labor supply below potential (quantity-based institutions).

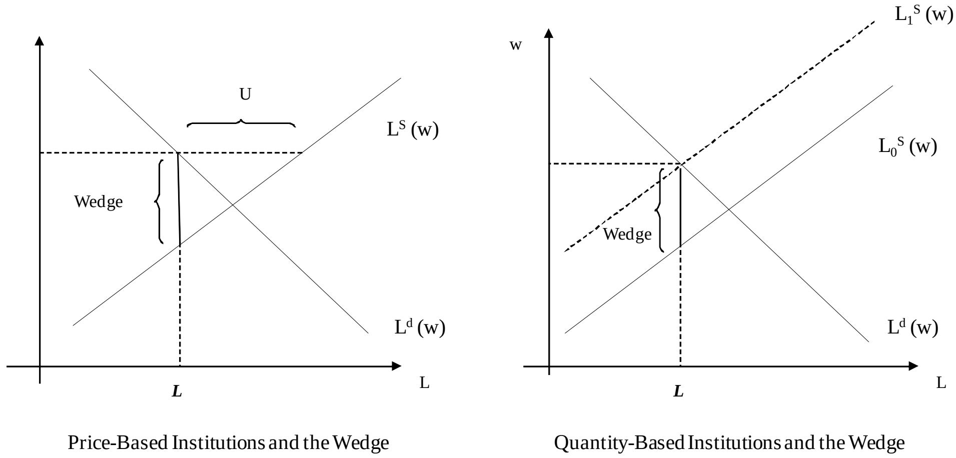

Figure 5: Reforms and the Wedge

Institutional reforms are changes in the design of these institutions, potentially affecting the structure of markets. As institutions are not always written in laws, some reforms may take place also via changes in administrative rules, informal agreements between collective organisations (e.g., unions and employers' associations) and social norms. From the standpoint of applied work it is very important to consider two characteristics of reforms.

The first is the orientation of reforms, that is, whether they *reduce* (e.g., by making employment protection less strict and/or unemployment benefits less generous, increasing labor supply by reducing taxes on relatively low-paid jobs or expand the scope of activation programmes) *or increase the wedge* introduced by labor market institutions between supply and demand. We will accordingly classify reform as either **decreasing or increasing the** (institutional) **wedge**.

The second characteristics relates to their phasing-in: it can be either a *complete* or a *partial* phasing-in. In the first case, the change in the regulations eventually involves everybody. In the second case, even at the steady state, the reform is confined to a subset of the population. The timing of the phasing-in is also important. Some reforms involving a complete phasing-in may involve a very long transitional period, so that the steady state institutional configuration is attained beyond the planning horizon of many agents potentially involved by the reform.

In the analysis below we will define an institutional change as a **two-tier reform** when it involves either a partial phasing-in or when its complete phasing-in requires more than 30 years, the average length of the working life in many countries. Two-tier reforms are typically related to the presence of strong political obstacles to reforms. Politically viable reforms must leave unaffected a significant fraction of the constituency of each institution. Clearly, the reforms themselves may alter the size of the different constituencies, creating the conditions for new reforms. For instance, reforms of employment protection legislation in the 1980s in Spain, which broadened the scope of temporary employment, created the conditions for the reforms of the 1990s which reduced the protection of permanent-regular employment (Dolado et al., 2002).

Notice that our definition of two-tier reform is independent of the size of reforms. Small, incremental adjustments of some institution can well be encompassing, that is, involving the entire potentially eligible population and, on those grounds, would not be considered two-tier reforms according to our definition. In the inventory of reforms that we are now going to explore, we also classify reforms depending on their size, as either **incremental** or *discrete*. In particular, incremental reforms involve a change in any given institution smaller than one-tenth of the cross-country deviation in the intensity of that regulation in the first year covered by our inventory. The regulatory intensity is measured by some indicator of the characteristics of the instituition in the various countries (e.g., the OECD index of strictness of employment protection, the OECD summary generosity measure of unemployment benefits, etc.). Discrete reforms involve changes in the indicator exceeding our arbitrary threshold.

The two latter definitions contribute to jointly identify **structural** reforms as those reforms that are either discrete and complete (not two-tier). The fourfold taxonomy is visually depicted in Table 2.

Table 2. A Taxonomy of Reforms.

Size	Discrete Two-tier	Structural
	Incremental Two-tier	Incremental Complete
	Scope	

2.2 Tracking reforms in Europe

Table 3 below provides information on the number and characteristics of reforms carried out in the European Union in the field of labor market and social policies in the period 1980-2007. It draws on the “Social Policy Reform Inventory”, assembled by the Fondazione Rodolfo Debenedetti (recently in co-operation with IZA), which takes stock of reforms carried out in Europe in the field of employment protection legislation (EPL), unemployment benefits (UB), activation programmes (AP) employment conditional incentives (ECI), and early retirement (ER) plans. Annex 1 provides information about the way in which the database was generated and is updated. The full detail on each reform is offered in the webpage of the Fondazione Rodolfo Debenedetti (www.frdb.org).

Table 3. Decreasing vs. Increasing the Wedge Reforms in Europe (1980-2007).

Reform area	**Decreasing the Wedge**	**Increasing the Wedge**	**Total per row**	**Of which decreasing**
EPL	68	44	112	61%
UB	78	61	139	56%
AP	97	7	104	93%
ECI	60	6	66	91%
ER	21	22	43	49%

Many reforms of labor market institutions are taking place. In the observation period almost 440 reforms were counted in just seven countries, that is, almost 2 reforms per year and country. The two policy areas more subject to reforms are UB and EPL. In these areas as well as in ER there are many reforms going in both directions, increasing and decreasing the wedge. This may be related to political opposition to reforms. There is much more consistency in AP and ECI reforms.

Most reforms, however, appear to reduce the wedge. This holds for each policy area except retirement rules where the reforms increasing the scope of early retirement slightly prevail over those moving in the opposite direction. Moreover, the share of reforms reducing the wedge is increasing over time (Figure 6). This trend can be explained as a reaction to competitive pressures arising from product market competition, which, by flattening the demand for labor, increase the employment bias of labor market institutions (Bertola and Boeri, 2002).At the same time, the fact that greater competition in product markets reduces the employment levels compatible with these institutions suggests that there will be strong political resistance to downscaling the institutions protecting against labor market risk. Social norms or cultural factors supporting redistributive, typically wage compressing, institutions may become more important at times of globalisation (Agell, 1999).This may contribute to explain why several reforms also go opposite to the direction implied by increased product market competition. Moreover, several empirical studies (e.g., Rodrick, 1998; Wacziarg and Welch, 2003) found a positive correlation between exposure to product market competition – measured in terms of trade openness – and the presence of redistributive institutions, pointing to stronger demand for protection in competitive environments.

Reforms sometimes involve a packaging of measures covering different policy areas, e.g., EPL and UB or UB and AP along with the so-called flexicurity approach. In this case they were "unbundled" in single measures and then repackaged by policy area (see Annex 2). Table 4 suggest that about 1 reform out of 5 involves some packaging. However, rarely this packaging involves more than two policy areas.

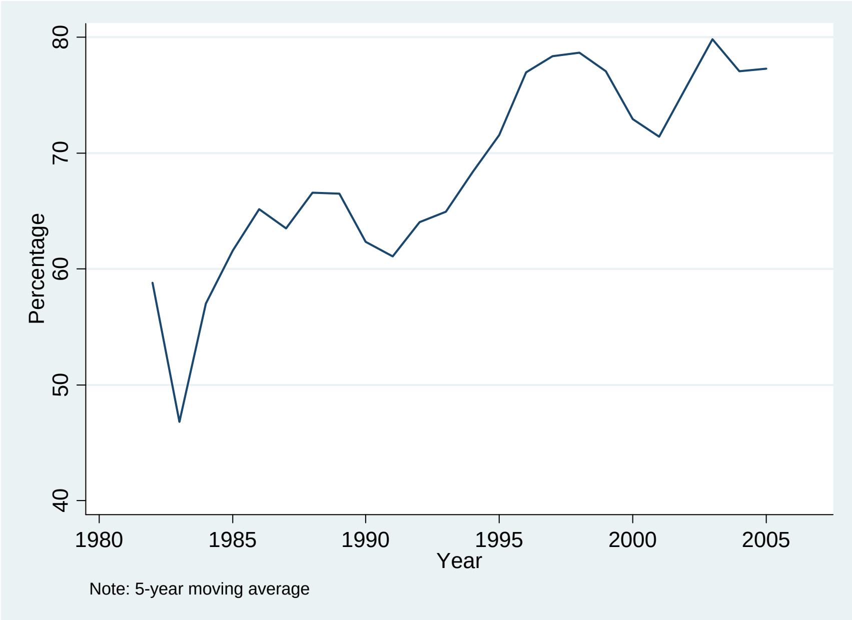

Figure 6: Share of Reforms Decreasing the Wedge

Table 4. Packaging of Reforms.
(Distribution of Reforms by Number of Policy Areas Involved)

Number of Reform Areas Involved by Reform	Number of Reforms	Percentage on Total
1 area	361	81.86%
2 areas	59	13.38%
3 areas	19	4.31%
4 areas	2	0.45%
Total	441	

2.3 Two-tier and incremental reforms

Reforms can also be categorized considering whether they are two-tier or complete. In particular, we looked at the "target share", that is, the share of the population potentially affected by the reform which was actually targeted by the reform. If the "treatment group" of the reform represents less than 50% of the potentially eligible population (i.e., it is only young people out of the entire working age population, temporary workers out of total dependent employment), then the reform was classified as a two-tier reform. As shown by Table 5, two-tier reforms are predominant in all institutional areas except unemployment benefits. Not all two-tier reforms necessarily increase the dualism of regulatory regimes. Some two-tier reforms reduce the asymmetries among the different regimes. However, four two-tier reforms out of five actually widen the asymmetries in regulatory regimes. The fact that EPL reforms are mostly two-tier and increase the dualism of labor markets is also confirmed by the resilience of the proportion of temporary contracts and the low transitions from fixed-term to permanent contracts (Guell and Petrongolo, 2007).

Table 5. Two-tier vs. Complete Reforms in Europe (1980-2007).

Reform area	**Two-tier**	**Complete**	**Total per row**	**Of which two-tier**
EPL	57	55	112	51%
UB	57	82	139	41%
AP	62	42	104	60%
ECI	35	31	66	53%
ER	35	8	43	81%

Limited to EPL and UB, we can also establish whether the reforms are incremental or discrete, according to the definitions proposed in Section 2.1. In particular, we measure the regulatory intensity of the two sets of reforms based on the recalled OECD "Overall strictness of EPL" index covering the time period 1985 to 2009 and, limited to the period 1980-85, the series of EPL strictness developed by William Nickell within a CEP-OECD project (http://cep.lse.ac.uk/_ new/publications/ abstract.asp?index=2424) which interpolates the OECD series with those used by Blanchard and Wolfers (2000). In the case of UB reforms, we relied on the summary generosity measure also tabulated by OECD. We classified as discrete those reforms involving a change in the value of the index larger than one-tenth of the cross country standard deviation in the index relative to the year 1995, that is, roughly in the middle of the observation period.

Table 6. Reforms of Employment Protection Legislation.

EPL	**Two-tier**	**Complete**	**Total**	**Of which two-tier**
Discrete	12	1	13	92%
Incremental	45	54	99	45%
Total	57	55	112	51%
Of which discrete	21%	2%	12%	

The result of this classification exercise are displayed in tables 6 and 7: they show that a very few complete reforms are sizeable. The "largest" reforms are generally two-tier reforms. In other words there seems to be a trade-off between size and scope of reforms. Therefore structural reforms are an exception: 6 out of 251, that is roughly the 2 per cent of reforms are structural according to our definitions.

Table 7. Reforms of Unemployment Benefits.

UB	**Two-tier**	**Complete**	**Total**	**Of which two-tier**
Discrete	6	5	11	55%
Incremental	51	77	128	40%
Total	57	82	139	41%
Of which Discrete	11%	6%	8%	

All this seems to indicate that the theoretical literature, which typically analyses the effects of complete reforms, and the empirical literature drawing on comparisons of countries having much different levels of these institutions is of limited practical relevance. Two-tier reforms may also question some identification assumptions made by the empirical literature exploiting "natural experiments" to learn about the effects of these institutions. Before we address these issues, it is instructive to compare labor market reforms with regulatory changes occurring in other domains, such as product market and financial market regulations.

2.4 Labor market vs. financial and product market reforms

Unfortunately, there is not an inventory of reforms in product market and financial market regulations to draw upon. We were forced in this case to define and measure reforms as the number of changes in the values of an index of the product market regulation devised by OECD and an index of financial regulations produced by IMF, which are tabulated at yearly frequencies. This clearly rules out the possibility of reforms moving in opposite directions within the same year, a rather frequent event in the case of labor market reforms. We can track reforms undoing other reforms only at lower frequencies.

In the case of product markets, we take an index measuring barriers to entry in seven network industries (airlines, telecoms, electricity, gas, postal services, railways and road freight). The details about this index are described in OECD (2006) and http://www.oecd.org/eco/pmr. In the case of financial markets we drew on the IMF "Financial Reform Dataset" (see Abiad, Detragiache, and Tressel, 2008). We focused on the EU15 and on the same time-period (1985-2007) considered when tracking labor market reforms.

The results of this exercise are displayed in the top panel of Table 8. Once more, we classify reforms by orientation (increasing or decreasing the wedge) and scope (discrete if they involve a step change of the indicator larger than one tenth of the standard deviation in the average period cross-country distribution of the indicator). The bottom panel of Table 8 displays the result of the same exercise in the case of two labor market institutions for which the same method to identify and classify reforms could be implemented, that is, EPL and UB reforms.

Three facts are relevant. First, there are more reforms in factor markets than in product markets. This may because, it is the second fact, there are more discrete reforms in product markets than in factor markets. Third, in financial markets and also in product markets there is more consistency in the orientation of the reforms, as there are a very few, if any, reforms increasing the wedge.

TABLE 8. REFORMS OF PRODUCT, FINANCIAL AND LABOR MARKETS.

Product Mkts Reforms	**Decreasing Wedge**	**Increasing Wedge**	**Total**	**Of which Decreasing**
Discrete	31	0	31	100%
Incremental	8	14	22	57%
Total	39	14	53	74%
Of which discrete	79%	0%	58%	
Financial Mkts Reforms	**Decreasing Wedge**	**Increasing Wedge**	**Total**	**Of which Decreasing**
Discrete	52	0	52	100%
Incremental	42	0	42	100%
Total	94	0	94	100%
Of which discrete	45%	0%	45%	
Labor Mkt Reforms	**Decreasing Wedge**	**Increasing Wedge**	**Total**	**Of which Decreasing**
Discrete	16	12	28	57%
Incremental	23	18	41	56%
Total	39	30	69	57%
Of which discrete	41%	43%	41%	

A possible explanation of these asymmetries between reforms of labor market, product market and financial market regulations is that reforms two-tier reforms cannot take place in product markets. A two-tier reform in a specific sector would indeed result in a market with different sets of rules applied to different firms. On the one hand, incumbent firms would operate under the traditional set of regulatory protections and associated rents (i.e. government subsidies). On the other hand, new entrants would be forced to operate without these rents. This cannot work as the incumbent firm (e.g., a former monopolist) would easily drive away from the market the new competitive fringe. In other words, two-tier reforms are a viable strategy to engineer reforms in order to make them politically viable in the labor market (Saint-Paul, 2000), but not in the product market.

Another fact highlighted by the table is that many reforms occur at higher than yearly frequencies or are not, in any event, captured by the overall indicators. Indeed, by looking at changes in the value of the indicators, we identify less than one half of the reforms that are in the frdb inventory.

2.5 How are reformed: a summary

Many reforms of labor market institutions occur every year notably in Europe. Comparing labor market outcomes before and after these policy changes and across countries starting at similar conditions offers to researchers a great opportunity to identify the effects of these institutions on the labor market. It is very important that these analyses take into account of the nature of these reforms. The qualitative analysis of reforms and comparisons of reforms between labor, product and financial markets suggest that two-tier reforms are very important in changing the institutions addressed in this chapter. The framework provided in the next section is helpful in characterising the macroeconomic effects of these reforms, either complete or two-tier reforms, and the interactions between reformed and unreformed segments of the labor market. This is helpful in guiding empirical work because it helps when defining the outcomes to be considered within ex-post policy evaluations, identifying proper treatment and control groups, and taking into account of potential general equilibrium effects.

3 A simple model of labor reallocation and reforms

The analysis of reforms can better develop on frameworks allowing for equilibrium unemployment, gross job and workers flows at the steady state and potential interactions between reformed and unreformed segments of the labor market. A widely used and flexibile framework having these properties is the equilibrium search model developed by Dale Mortensen and Christopher Pissarides, the MP model for short, which was presented in previous Handbook volumes (Mortensen and Pissarides, 1999). We will below briefly recall and then extend the MP model in order to allow for two-tier regimes in three of the four institutions whose evolutions were characterised in Section 2, notably, employment protection, unemployment benefits and active labor market policies. We will not address early retirement rules as this would require working on a different framework – ideally an overlapping generations model – and there has been less reform activity in that domain.

We will first characterise the effects of complete reforms of these institutions and subsequently consider two-tier regimes.

3.1 Gross job flows in the MP model

This section can be skipped by the readers who are familiar with the MP model.

Consider a market in which workers supply their services inelastically, being either unemployed (searching for a job) or employed. Symmetrically firms can either produce by employing one worker or search for one with an open vacancy. There are no restrictions in the entry of firms, but vacant firms-jobs must pay, while searching for workers, a periodic recruitment cost of c per unit period.

The matching of workers to vacancies occurs via an aggregate matching function (Blanchard and Diamond, 1989; Pissarides, 1979) embodying the trading and congestion externalities of any search process. Intuitively, when there are more unemployed around per a given number of vacancies it is more difficult for a jobseeker to find a job, while it is easier for a firm to fill a vacancy. Symmetrically, an increase in the number of vacancies per given unemployment pool makes the life easier for the unemployed while creating congestion delays in the process by which vacancies are filled. Consistently with much of the empirical literature estimating matching functions (Petrongolo and Pissarides, 2001) we are also going to assume that matching occurs at constant returns to scale. Also from a theoretical perspective, there is no reason to believe that the size of the labor market should affect the contact probability.

In this context the job finding (or the vacancy filling rate) will depend uniquely on the ratio of the number of vacancies, v, to the number of unemployed, u, that is, on the degree of labor market tightness, $\theta \equiv v/u$. Denoting the aggregate matching function as $m = m(u, v)$, the unconditional probability of a vacancy to match with an unemployed worker is then $q = \frac{m(u,v)}{v} = m(\theta, 1)$, with $q'(\theta) < 0, q''(\theta) > 0$, and $\lim_{\theta \longrightarrow 0} q(\theta) = \infty$, whilst the probability of an unemployed worker meeting a vacancy is $\frac{m(u,v)}{u} = \frac{\theta m(u,v)}{v} = \theta q(\theta)$.

For production to occur, a worker must be matched with a job. When matched, a firm and a worker generate periodic productivity x, where $x \in (0, 1]$. This match-specific productivity is subject to shocks, e.g., innovations or taste changes unknown at the time of match formation, occurring at a (Poisson) frequency λ. All newly-formed matches (i.e. filled jobs) begin at the highest possible value of x ($x = 1$). When a shock occurs, productivity is a random draw with a fixed, known cumulative distribution $F(x)$. These shocks are persistent: productivity remains at this level until a new shock occurs. And when productivity falls below a threshold level, R, endogenously determined in this model, it is no longer profitable to continue to produce in the existing match and the job is destroyed.

Due to the presence of search frictions, any realized job match yields a rent. Wages share this rent between workers and firms according to a Nash bargaining rule and are instantaneously renegotiated whenever a shock occurs. Insofar as R, the reservation productivity threshold, is strictly smaller than one, a non-degenerate distribution of wages is obtained at the equilibrium.

The labor market flows prevailing at the equilibrium are given by the matching of unemployed workers to vacancies (gross job creation) and by the dissolution of matches (gross job destruction) when their productivity falls below this threshold level. In this context, gross job creation coincides with unemployment outflows and gross job destruction with unemployment inflows. The evolution of unemployment is indeed governed by

$$\Delta u = \lambda F(R)(1 - u) - \theta q(\theta)u \tag{1}$$

where the constant labor force has been conveniently normalized to one, so that $(1 - u)$ denotes employment. As the above makes clear, gross flows in the labor market occurs also when unemployment is constant. Indeed, equating (1) to zero and solving for this steady state, constant unemployment level obtains

$$u = \frac{\lambda F(R)}{\lambda F(R) + \theta q(\theta)} \tag{2}$$

Moreover, the two key (endogenous) variables determining the evolution of gross flows in the labor market are market tightness (affecting the job creation margin) and the threshold productivity level (affecting the job destruction margin).

3.2 Introducing institutions

In this framework it is relatively straightforward to accommodate employment protection legislation, unemployment benefits and active labor market policies, drawing also on Pissarides (2000).

First, we consider an **exogenous firing tax** T which is levied on termination of job-worker matches. The purpose of the firing tax is to reduce the probability of job loss for those having a job. It is designed as a pure deadweight loss paid to a third party or simply dissipated resources associated with government regulation. It should be distinguished from severance compensation (a lump-sum transfer from employer to employee upon severance), which can be offset by a compensating wage adjustment (Lazear 1990) in this setup as workers are risk-neutral and Nash bargaining allows for wage flexibility above the value of non-employment.

Second, we introduce an **unemployment benefit** $b = \rho\bar{w}$ which is offered as a replacement of earnings during an unemployment spells. To keep things simple we consider a flat income replacement schemes providing to jobless people the fraction $0 < \rho < 1$ of average labor income, $\bar{w}$, independently of the past earning history (of the past match-specific realizations of x) of the worker.The policy parameter ρ, in particular, measures the generosity of unemployment benefits. Benefits are assumed to be open-ended and.provided conditional on unemployment status. Thus the average duration of benefits coincides with the average duration of unemployment $\frac{1}{\lambda F(R)}$.

Third, **active labor market policies** are framed in the MP model as two alternative policy instruments. On the one hand, we introduce an employment conditional incentive, e which is provided to job-holders on a flow basis as a measure to increase rewards from participation, "making work pay". This policy instrument is isomorphic to a wage subsidy provided to employers due to the equilibrium structure of the model. The incidence of taxes (subsidies) is independent of who pays (receives) them. The second policy instrument acts on recruitment costs, c. It reduces frictions in the vacancy filling process by activating jobseekers, providing job counselling, placement services, etc..This policy instrument is isomorphic to any measure increasing the job finding rate $\theta q(\theta)$ as this would also reduce the expected costs of posting a vacancy $\frac{c}{\theta q(\theta)}$. The two policy instruments, employment conditional incentives and hiring subsidy correspond to the distinction between financial incentives and activation schemes in the design of active labor market policies (Boeri, 2005).

3.3 Partial equilibrium effects of complete reforms

These institutions have both, partial equilibrium and general equilibrium effects. The partial equilibrium effects are those related to the operation of the wedge, that is, the effects on wages holding constant the macro variables The general equilibrium effects incorporate the effects on wedges of changes in the aggregate job creation and job destruction rates. Comparisons of the two sets of results highlight what could be missed by considering only the partial equilibrium effects of reforms.

Wages are in this setup determined according to a bilateral bargaining process between each worker and each employer. It is shown in the Annex 2 that the institution-free and match-specific wage obeys the Nash bargaining rule

$$w(x) = \beta(x + c\theta) \tag{3}$$

where $0 \leq \beta < 1$ measures the relative bargaining strenght of workers vis-a-vis employers. Equation 3 shows that wages are increasing in match specific productivity, match frictions and market tightness at a rate which is increasing in the bargaining power of workers. The more powerful are workers, the more they appropriate of the match surplus. It is bargaining power and frictions that allow workers to obtain a markup over their reservation wage.

Introducing now the three sets of institutions described above and solving again the Nash bargaining problem we obtain (see Annex 2) a wage equation providing a weighted average of the institution-augmented reservation wage and productivity of labor

$$w(x) = (1-\beta)(\rho\bar{w} - e) + \beta\left[x + (c-h)\theta + rT\right] \tag{4}$$

This shows that when β approaches 0, that is workers have no bargaining power, wages collapse to the unemployment benefit net of the employment conditional incentive, which is indeed a measure aimed at reducing disincentives to accept low-paid jobs associated with the provision of unemployment benefits. When instead β approaches 1, wages in (4) appropriate the entire match productivity and are augmented by recruitment cost net of the hiring subsidy and the discounted value of the firing tax (which is a lump-sum payment). Under such conditions, however, it would be unprofitable to open up a vacancy (the recruitment costs, net of the hiring subsidy, could not be covered by any ensuing flow of net revenues at match formation). Hence, the need to impose that β is strictly lower than 1.

By subtracting (4) from (3), it becomes apparent that institutions, at unchanged macro variables and allocation of bargaining power, affect both the size of the wedge associated with match formation, and the way in which these rents are split between workers and firms.

$$\Delta w = (1-\beta)(\rho\bar{w} - e) + \beta\left[rT - h\theta\right] \tag{5}$$

In words wages are increasing in unemployment benefits mostly when employers have more bargaining power, and in firing taxes when it is the worker side to be more powerful. Wages (and the overall wedge) are instead decreasing in employment conditional incentives (employers succeed in getting part of the state subsidy from their workers) and in active policies improving the matching process.

Labor market institutions are, however, bound to affect wages also via changes in market tightness and the average wage (mainly via changes in the reservation productivity level below which jobs are destroyed). We will now analyse how these predictions are affected by allowing for changes in the macro variables.

3.4 General equilibrium effects of complete reforms

A complete reform, even when just incremental, is bound to have effects on the labour market aggregates. We remind that our definition of a complete reform is of a institutional change in any of the above policy parameters, T,

ρ, e, h affecting all potentially eligible groups, that is either all firms (in the case of T), all the unemployed (ρ), all the employees (e) or all employers having posted a vacancy (h). To investigate the comparative statics effects of incremental changes in these policy parameters, one needs to totally differentiate the two equilibrium gross job creation and gross job destruction conditions, implicitly providing the equilibrium values of market tightness and of the reservation productivity threshold, θ^* and R^*. The two equations are derived in Annex 2. By then applying the Cramer's rule to this system of two equations, it is straightforward to obtain the following qualitative effects of reforms:

Table 9. Comparative Statics Results of Complete Reforms.

Effect of an increase in$\Longrightarrow$ *on* $\Downarrow$	ρ	T	e	h
R^*	$+$	$-$	$-$	$+$
θ^*	$-$	$-$	$+$	$+$
u^*	$+$	?	$-$	?
Probability of job loss	$+$	$-$	$-$	$+$
Job finding rate	$-$	$-$	$+$	$+$
Average wage	$+$	?	?	?

Hence,once allowance is made for changes in the macro variables, three reforms out of four (the exception being the increase in the generosity of UB) no longer have unambiguous effects on wages.

The economics behind these results is as follows.

Consider first an **increase in the replacement income** offered by unemployment benefits. The impact effect of this reform is to increase the reservation productivity at which matches are dissolved as the outside option of workers has improved. This means that the new equilibrium features a higher job destruction *rate* $\lambda F(R^*)$.Further effects come from wage setting. As shown above, in partial equilibrium, a rise in ρ increases wages in continuing jobs proportionally to the bargaining power of employers. In general equilibrium (of the labor market) this effect can be partly offset by the reduction in market tightness which is associated with the lower duration of jobs and the higher wages. This effect of market tightness on wages is larger in presence of significant recruitment costs and low, if any, hiring subsidy. Thus, the effects of unemployment benefits on wages interact with the size of active labor market policies. The average wage increase both because of the above effects and the higher productivity threshold that increases the average productivity in continuining jobs. As unemployment benefits are indexed to the average wage, there will be also a second-round, positive effect on the level of unemployment benefits. As gross job destruction increases, unemployment unambiguosly increases, bringing down the equilibrium level of market tightness, θ^*. Overall, the new equilibrium features a higher probability of job loss, a lower job finding rate $\theta^* q(\theta^*)$, a higher unemployment rate and a larger average wage.

An **increase in firing taxes** has the opposite effect of maintaining alive jobs with a lower match productivity. This reduces the gross job destruction rate. Firing taxes also positively affect wages, as in partial equilibrium. The effect on wages is partly offset by the reduction in market tightness induced by the larger firing tax and by the wage hike, which reduces the number of vacancies issued at the equilibrium. Once more, this effect of market tightness on wages is mediated by active labor market policies, notably by the relevance of activation policies reducing recruitment costs. As both job finding and job loss rates decline, the effect on equilibrium unemployment is ambiguous. Conditional on any given realisation of x, wages go up..However, the effect on average wages is also ambiguous as the new equilibrium features more low-productivity, hence low-wage, jobs. Insofar as the average wage is affected by the reform, there will be interactions with the generosity of the unemployment benefit system, which is indeed indexed to the average wage. Overall, the new equilibrium features lower job loss and job finding probabilities, while there is ambiguity as to the effects on unemployment and the average wage.

An **increase in employment conditional incentives** makes the labor market tighter. The reduction in entry wages, hence the increase in θ^*, is stronger the larger the bargaining share of employers and the larger the other active labor market policy tool, that is, recruitment subsidies. As continuing jobs are subsidised, also the productivity threshold, R^* declines, increasing the duration of jobs. The new equilibrium involves higher a job finding rate and a lower job loss probability, as well as a lower level of unemployment and average wage. The latter declines because of both, wages are lower at any productivity realization and there are more low productivity jobs alive. Finally, an **increase in the activation scheme** reducing recruitment costs has similar effects on the job creation margin than the other active labor market policy tool. As the costs of filling a vacancy are lower, the vacancy to unemployment ratio increases. However, lower turnover costs allow for jobs to be destroyed at a higher productivity threshold. The new equilibrium features higher job finding and job loss rates, whilst the effects on unemployment and average wages are ambiguous.

The above occurs under the assumption that increased unemployment benefets and active policies can be funded by windfall Government revenues or, in any event, do not require increasing payroll taxes. Were we to internalize the Government budget constraint in such cases (which is rarely done in applied work as most reforms are marginal and have a negligible effect on net public expenditures), job destruction would be larger and job creation lower, involving a lower employment rate at the equilibrium. With payroll taxes funding active policies it would also be important to consider whether or not unemployment benefits are taxed (Pissarides, 1998). If they are tax-exempt, and the replacement rate is defined in terms of gross wages, then the negative effect on employment would be larger.

3.5 Two-tier reforms in the MP model

Consider now a set of two-tier reforms of the above institutions. According to our working definition, two-tier reforms affect at the equilibrium only a subset of firms, employees or unemployed workers. Alternatively, these reforms involve a very long transitional dynamics from one steady state to another.

We begin by applying the first definition as it allows for a characterisation of the effects of dual track reforms by simple comparisons of steady state equilibria.

Two-tier reforms of employment protection typically expand the scope of fixed-term contracts. An example is the battery of reforms carried out in Italy in the 1997-2003 period. These reforms first (with the so-called Pacchetto Treu) expanded the scope of fixed term contracts; next they introduced Temporary Work Agency; subsequently they increased the potential duration of fixed-term contracts and finally they introduced new types of atypical contracts (e.g., job on call or staff leasing). No change was made to regulations on the dismissals of workers with open-ended contracts. Drawing on these practical examples, we can model a partial reform of employment protection in this setting as one that removes firing taxes for entry jobs, while leaving employment protection unaltered for continuing jobs and the (incumbent) workers attached to them. New jobs last until they are hit by a productivity shock, occurring, as for all types of jobs, at Poisson frequency λ. If the new productivity realization falls below a reservation productivity which is specific to entry jobs, say R_0 , the match is dissolved and ends with a flow from temporary jobs into unemployment. If instead the new productivity realization is above R_0, jobs are converted into permanent contracts, covered by the standard firing taxes, T . It follows that the expected duration of a fixed-term job is $\frac{1}{\lambda}$ whilst the rate at which temporary jobs are converted into permanent jobs is $\frac{1}{\lambda F(R_o)}$ where R_0 is endogenously determined at the equilibrium. Due to the presence of firing taxes on continuining jobs, the reservation productivity of entry jobs is higher than the reservation productivity of continuing jobs, that is, $R_0 > R$.

This modeling device does not allow employers (and workers) to choose the type of contract in both new and continuing matches. This restriction is less serious than it could appear at a first sight. Indeed regulation on fixed-term contracts constrain the number of renewals (generally no more than two) of temporary contracts (Guell and Petrongolo, 2007). This means that entry jobs must be either transformed into permanent contracts at their expiration or smply not renewed originating a flow to unemployment. As far as entry jobs are concerned, regulatory asymmetries are often so large that they encourage employers to offer all new hiring on fixed-term contracts (the share of new hiring on temporary contracts can be as high as 90 per cent in countries with strict EPL on permanent contracts).

Tracking reforms of unemployment benefits, we adlso found many regulatory changes reducing the generosity of transfers only for unemployment spells originated from short-tenured jobs, and leaving unaffected entitlements of workers with a relatively long seniority. An example is the 1989 reform of the British unemployment benefit system that reduced replacement rates for the short-term unemployment benefit claimants, by increasing the length of the minimum waiting period required for eligibility to benefits for this category of workers. In order to frame two-tier reforms of unemployment benefits in the MP model, we need first to allow for a tenure-related unemployment benefit system, as those existing in most OECD countries. In particular, let us introduce a lower replacement rate, $\rho_0 < \rho$ for workers flowing into unemployment from short-tenure jobs, defined here for simplicity as those dissolved after the first shock to match productivity. In other words, these flows originate from match dissolution of temporary jobs. A two-tier reform of unemployment benefits can be then framed as one reducing ρ_0 while leaving ρ unaffected or increasing ρ while leaving ρ_0 unaffected.

Similarly, we allow for a two-tier structure of employment subsidies, having e_0 paid only to entry jobs. A typical example is the French 1981 reform that introduced a one-year 50% social security contribution rebate for new hires of people aged less than 26, single women, and long-term unemployed aged more than 45. Similarly the aforementioned Pacchetto Treu reduced social security contributions for temporary contracts. Activation policies by definition involve only the job finding (or vacancy filling) process. Hence, they are by definition two-tier under the posited extensions of the MP model. Only employers issuing new vacancies benefit from h. The transformation of temporary into open-ended contracts is not affected by recruitment subsidies.

3.6 Insider and outsider wages

This characterisation of two-tier reforms involves a major extension of the MP model. In particular, we now have two job destruction conditions implicitly defining the two thresholds (R and R_0), and two wage equations. The first wage equation determines workers pay in entry jobs or the wage of *outsiders*, denoted by the subscript 0.

$$w_0 = (1-\beta)\ (\rho_0 \bar{w} - e_0) + \beta(1 + (c-h)\theta - \lambda T) \tag{6}$$

The second wage equation applies to continuing jobs and provides *insider* wages at all productivity levels above the reservation productivity level, R

$$w(x) = (1-\beta)\ \rho\bar{w} + \beta(x + (c-h)\theta + rT) \tag{7}$$

Notice that firing taxes enter negatively the outsider wage equation and positively the insider wage equation. The economics behind this result (see Garibaldi and Violante (2005) for a proof) is that incumbent workers can renegotiate wages after firing taxes have been phased-in, allowing them to obtain a larger share of the match surplus while the firm is locked in by the firing tax. Such a two-tier wage structure deals with the so-called holdup problem (Williamson, 1975) arising from the improved bargaining position of the party that does not invest in the continuation of the match. In this case it is the employers who have to pay firing taxes at match dissolution and this weakens their position at the bargaining table.

The difference between insider and outsider wages at the entry productivity level is given by

$$w(1) - w_0 = (1 - \beta)\bar{w}(\rho - \rho_0 + e_0) + \beta(rT) \tag{8}$$

In words, insiders enjoy a surplus over outsiders at the same match productivity levels which is increasing in the difference in replacement rate offered to unemployed coming from long-tenured with respect to short-tenured jobs, in the employment conditional incentive and in firing taxes. The latter matter more when workers have more bargaining power. Two-tier reforms widening the institutional asymmetries are bound to increase these rents of outsiders vis-a-vis the insiders, potentially affecting also the rate of conversion of temporary into permanent jobs. To better evaluate these effects we need to consider the effects of two-tier reforms on the aggregate variables.

3.7 Job flows and two-tier reforms

Labor market equilibrium under these extensions of the MP model now features two job destruction conditions, implicitly defining the reservation productivity values R and R_0, and a job creation condition implicitly defining market tightness (see Annex 2). These equilibrium values of the aggregate variables provide also the two job loss rates (from entry and continuing jobs respectively), the premium placed on tenure by the two-tier wage structure and the rate of conversion of new (or temporary) jobs into permanent jobs.

Table 10. Comparative Statics Results of Two-Tier Reforms.

Effect of an increase in $\Longrightarrow$	ρ	T	e_0
on $\Downarrow$			
R_o^*	0	+	+
R^*	+	−	0
θ^*	0	+	+
u^*	+	−?	−?
Job loss rate (from entry jobs)	0	+	+
Job loss rate (from continuing jobs)	+	−	0
Job finding rate	0	+	+
Tenure (wage premium)	+	+	+
Conversion temporary-permanent	0	−	−
Entry jobs as % of total employment	+	+	+

Table 10 summarizes the comparative statics properties of two-tier reforms in the different policy areas. We analyse reforms widening the asymmetry between entry jobs and continuing jobs, by increasing ρ (at unchanged ρ_0), T or e_0. Once more we are going to neglect the effects of these reforms on payroll taxes.

A reform **increasing replacement rates to unemployed coming from continuing jobs** involves, just like in the case of complete reforms, an increase in job destruction on contininuing jobs. However, due to the presence of a different regime for entry jobs, job creation is unaffected in this case. Unemployment increases and the wage tenure profile becomes steeper, by allowing workers in continuing jobs to extract a larger match surplus than entrants per any given productivity level. The share of entry jobs in total employment increases because of the reduction on the average duration of continuing jobs.

A reform **increasing employment protection for incumbents** also increases the wage tenure profile and the share of employment in entry (flexible) jobs. This happens because the rate of conversion of temporary into open-ended contracts is reduced, while the average duration of continuining jobs actually increases this time. As hirings increase in hiring and job losses from permanent contracts decline, unemployment is likely to decline in spite of the higher job loss rate from entry jobs.

Finally, a **reform increasing employment subsidies for entry jobs** does not affect the job destruction margin for permanent contracts, while it increases the job finding rate and job destruction among short-term contracts. At the new equilibrium unemployment is likely to be lower as the effect on job creation tends to dominate the effect on job destruction from fixed-term contracts. The rate of conversion of temporary into permanent contracts is also reduced as asymmetries between the two types of contractual conditions are magnified by the reform. Finally, just like the other two-tier reforms, there is an increase in the wage-tenure profile and in the share of entry jobs in total employment.

There are important differences with respect to complete reforms, which can be appreciate by comparing tables 9 and 10. A reform increasing the generosity of unemployment benefits from continuing jobs, unlike a complete reform of UB, does not affect job creation. If accompanied by a reduction on replacement rates from entry jobs, it may actually even reduce unemployment. A two-tier reform of EPL increases job finding on entry jobs while a complete reform of employment protection unambiguously reduces the unemployment outflow rates. A reform increasing firing taxes only on continuing jobs may increase job turnover insofar as it induces more hirings and more separations on entry jobs, while a complete reform unambiguously reduces gross job flows .Finally a reform increasing employment conditional incentives on entry jobs may actually increase job destruction, while a complete reform would do just the opposite. These differences between complete and two-tier reforms arise because in the latter case we have two destruction margins, rather than one, which may move in different directions and entry jobs insulate hiring decisions from taxes (including firing taxes) on continuing jobs.

3.8 Transitional dynamics

The above two-tier reforms permanently increase the dualism of the labor market. According to the definition offered in Section 2.1, two-tier reforms can also allow for a steady state equilibrium in which only one regime survives, but involve a very long transitional dynamics. Analysing the transitional dynamics of various types of reforms of labor market institutions goes much beyond the scope of this work. We will confine ourselves herein to point out that this long transitional dynamics may depart significantly from the long-term, steady state, outcomes of complete reforms. This is likely to be the case especially when two-

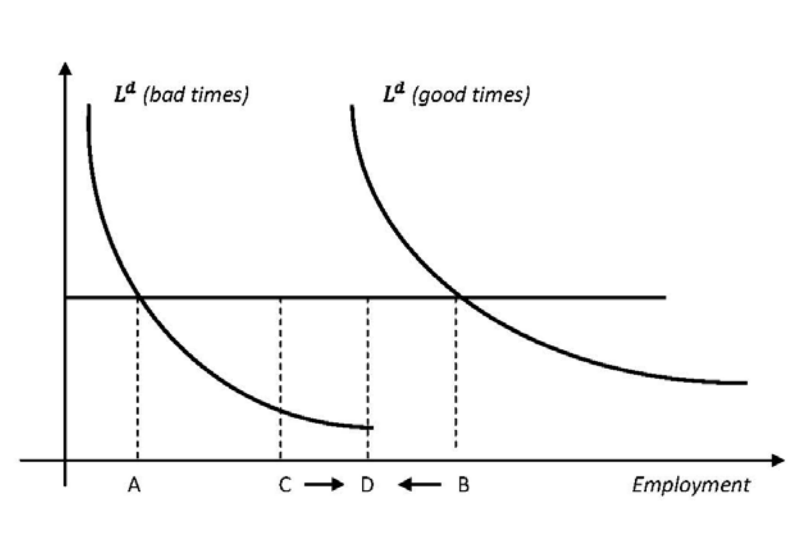

Figure 7: The Honeymoon Effect

tier reforms are a device to engineer a discrete reform. The larger is the change in the level of the institution from one steady state to the other, the larger the deviation of the transitional dynamics from the long-run equilibrium.

The example of two-tier reforms of employment protection can be particularly instructive in this respect and can be illustrated by drawing on a simple intuition of Boeri and Garibaldi (2007). The model considered by the two authors focuses only on labor demand. In particular, it solves a dynamic and stochastic labor demand problem with attrition. They assume prohibitive firing costs in permanent contracts. In this setting, firms keep employment constant, independently of aggregate productivity (or demand) realisation, by simply replacing the workers involved in natural turnover. When temporary contracts are suddenly introduced, the firm exploits any hiring flexibility in good business conditions, but *can not* exploit downward flexibility in bad times, since it is constrained by the stock of insider workers. The profit maximizing employment dynamics is described in this dual regime by instantaneous hiring in favorable business conditions followed by optimal inertia through natural turnover in adverse business conditions. As a result, the lower the attrition, the larger is employment growth during the transition. The model therefore predicts the emergence of a *honeymoon* effect in employment. Eventually, the employment gains are dissipated by the decline of insider workers. At the end of the transitional dynamics, all permanent workers are replaced by workers with temporary contracts end employment returns to its level before the reform.

The basic meachanism behind the honeymoon effect is described in Fig 7 where two regimes are compared, one in which employment is at will and the second on in which firing is unboundly expensive. When labour is perfectly flexible, the firm optimally hires labor in point A in the figure when conditions are bad and in point B when conditions are good. On average, the flexible firm hires an amount of labor around point C in the Figure. If firing is unboundly expensive, the firm sets an average employment at point C in the figure. In the simplest form there is simply zero mobility in the case of the rigid regime. In terms of average long run employment, the two regimes yields the same average employment level. Now consider a two tier reform from a rigid regime. In particular, starting from the equilibrium in which the firm hires at point C whatever the conditions, let the firm enjoy "marginal flexibility". We assume that unexpectedly the firm can hire and fire workers on a temporary basis, but, at the same time, it cannot break the existing stock of permanent contracts. Formally, the constraint on the stock of permanent workers corresponds to an employment position at point C in the figure. A firm that has suddenly the option to hire temporary workers should exploit this possibility. In good times the firm should hire temporary workers up to the optimal employment level in the frictionless regime, and dismiss such workers in bad times. In other words, the firm in the two-tier regime will have average employment in point D in the figure. This implies that a two tier regime leads to an increase in average employment.

This example suggests that a long transitional dynamics to the new steady state equilibrium may involve large effects on employment and unemployment stocks even when these aggregates are unchanged across the two steady equilibria. Importantly this occurs independently of the expectational effects which are typically considered by the literature when explaining surprising effects of reforms (e.g., an increasing in early retirement inducing a decline in the effective retirement age or a minimum wage hike resulting in higher employment). It is a byproduct of the dual track design of reforms. An implication of this model is that the stricter is EPL before the reform, the larger will be the honeymoon effect. This is in line with evidence on two-tier reformers collected in Table 11. The countries having the strictest regulations before the two-tier reform experienced the largest contribution of temporary employment to job growth.

Table 11. Pre-Reform EPL Strictness and Post-Reform Temporary Employment.

Country	Time Period	EPL Strictness (Overall)	EPL Strictness (Temporary)	Temporary Emp. Growth ΔETt (000)	Contribution Temp. Jobs $\Delta ETt/E_0$
Belgium	1987-1996	3.15	4.63	22.7	0.66
	1997-2005			135.3	3.54
	Δ			112.6	2.89
Italy	1987-1997	3.54	5.31	402.9	0.02
	1998-2005			823.2	4.11
	Δ			420.3	4.09
Netherlands	1987-1995	2.73	2.38	340.1	5.79
	1996-2005			288.8	3.80
	Δ			-51.3	-2
Portugal	1987-1996	3.95	3.34	-168.9	-4.10
	1997-2005			431.8	10.09
	Δ			600.6	14.19
Spain	1981-1984	3.9	3.75	0	0
	1985-1995			3377.1	28.5
	Δ			3377.1	28.5
Sweden	1987-1996	3.08	3.28	-138.9	-3.22
	1997-2005			189.2	4.82
	Δ			328.1	8.04

3.9 What matters in the reforms: a summary

The effects of reforms are rather intuitive when analysed in a partial equilibrium framework. They are much harder to predict when macro variables are allowed to vary together with the institutional change. In this case one should consider interactions with other institutions. For instance, we have shown above that the effects of reforms of EPL and UBs are very much affected by the design and size of activation schemes reducing the costs of recruitment for firms.

Not only the direction, but also the nature of reforms is very important in affecting potential outcomes. Two-tier reforms, as those documented in Section 2, involve several margins of labor market adjustment which often move in opposite directions. This does not necessarily mean that their effects on labor market aggregates are ambiguous. Actually, our discussion above suggests that two-tier reforms of EPL and employment-conditional incentives can be signed in their effects on unemployment, unlike complete reforms of the same institution.

A long phasing in of reforms, involving a long transition in which two regulatory regime coexist, can also have different effects than those that could be predicted by comparing steady state equilibria before the reform and when the new regime is fully enacted. In particular, reforms of EPL allowing for a long transition dynamics,.may involve a temporary honeymoon effect on employment and unemployment. These effects are bound to eventually disappear together with the dualism of the labor market, but can be sizeable in the aftermath of reforms.

Thus, the predictions of the models allowing for two-tier reforms are consistent with the observation of strong employment growth even at times of slow output growth in several European countries having introduced fixed-term contracts from initially very strict employment protection legislations.(Boeri and Garibaldi, 2009).

More broadly, given the large number of institutional changes having opposite effects on different segments of the labor markets, empirical work should allow for differential effects of these reforms within the same market for labor. Moreover, it is important to concentrate on flows as the effects of reforms can be better identified by focusing on labor market flows, notably on the transitions of workers and jobs across different regimes. In the next section we will anayse to which extent the most recent empirical literature on labor market institutions has taken all this into account and which indications come from this literature as to further refinements of the theory of labor market institutions.

4 Are we learning enough from the reforms?

In this section we survey applied work on the effects on the labor market of institutions, which has been largely drawing on reforms, along with the "natural experiments" methodology. This literature is rich of interesting findings. Yet, we could have learned more in some cases, if the specific nature of reforms had been properly taken into account.

Before proceeding to the literature survey, it is useful to provide a checklist of issues to be addressed by applied work drawing on institutional reforms in light of the analysis of reforms in Section 1 and of the framework developed in Section 2.

- What are the relevant institutional interactions involved by the reform? Are the control and the treatment group initially homogenous also in terms of these other institutions?
- Is the reform packaged with other reforms? If so, how can these additional measures affect the outcomes of the reform being evaluated?
- How large is the reform with respect to the initial level of the institution?
- How large is the segment not involved by the reform? How tigthly is the regulation enforced to start with?
- Does the reform have relevant spillovers on the unreformed segment(s)?
- How many different regimes does the reform involve? How long do these asymmetries last?
- Is the reform bound to have macro significance?

We will now pass on to analyse to which extent the applied literature on institutional reforms addresses these issues. After providing more details on each institutions, we will review the literature focusing in particular on the studies drawing on reforms.

4.1 The literature on employment protection

Employment Protection Legislation (EPL) refers to the set of norms and procedures to be followed in case of dismissals of redundant workers. EPL imposes legal restrictions against dismissals and compensations to the workers to be paid by their former employers in case of early termination of a permanent employment contract. A number of procedures are also envisaged under EPL, which have to be followed in case of both individual and collective layoffs. The final decision on the legitimacy of a layoff generally depends on a court ruling. From the point of view of economic analysis, it is very important to note that the firing decision is not only up to the worker and/or the employer, but can involve the participation of a court, of a third party, which can be requested to assess the legal validity of the layoff. From the standpoint of economic theory, there are indeed two key components of EPL: a tax and a transfer. The *transfer component* is a monetary transfer from the employer to the worker, similar in nature to the wage. The *tax component*, instead, is more similar to a tax, because it corresponds to a payment to a third party, external to the worker-employer relationship. It is this second component which was framed in the model in Section 2. Conceptually, the transfer component of EPL corresponds to *severance payments* and the mandatory *advance notice period*, while the tax component to *trial costs* (the parcels for the lawyers, etc) and all the other *procedural costs*. *Severance payments* refer to a monetary transfer from the firm to the worker to be paid in case of firm initiated separation. *Advance notice* refers to a specific period of time to be given to the worker before a firing can be actually implemented. Both the severance payment and advance notice that are part of EPL refer to the *legal minima*, that is, statutory payments and mandatory rules that apply to *all* employment relationships, regardless of what is established by specific labor contracts. Beyond mandatory payments, collective agreements may well specify larger severance payments for firm-initiated separations. Another important dimension of EPL consists of the *administrative procedures* that have to be followed before the layoff can actually take place. In most countries, the employer is often required to discuss the layoff decisions with the workers' representatives. Further, the legislative provisions often differ depending on business characteristics such as firm (or plant) size and industry of activity.

A large body of empirical literature on employment protection is based on inferences drawing on cross-country variation in the OECD EPL strictness indicator (the time-series variation in the index is available only since 2001). Table 12 summarizes the main findings of this literature. Consistently with the theoretical predictions in Section 3, a few studies found significant effects of employment protection on employment and unemployment *stocks* while they all found that EPL negatively affects unemployment inflows and outflows: countries with most strict EPL have more stagnant unemployment pools.

Table 12. The Effects of Employment Protection on Labor Market: Empirical Results.

	STOCKS		FLOWS	
Author(s)	E	U	E	U
Emerson (1988)	?	?	–	–
Lazear (1990)	–	+		
Bertola (1990)	?	?	?	–
Grubb & Wells (1993)	–			
Garibaldi, Koening & Pissarides (1994)	?	?	?	–
Addison & Grosso (1996)	?	?		
Jackman, Layard & Nickell (1996)	?	?	–	–
Gregg & Manning (1997)	?	?		–
Boeri (1999)	?	?	+	–
Di Tella & McCulloch (1998)	–	+		
OECD (1998)	?	?	+	–
Kugler & StPaul (2000)			+	–
Belot & Van Ours (2001)		–		
Nickell, Nunziata & Ochel (2005)	?	?		
Garibaldi and Violante (2005)	+	–		

No unambiguous result is instead obtained concerning the impact of EPL on employment flows and job turnover. Many countries with strict EPL display relatively large job flows. This is at odds with the theory of complete reforms implying that the strictness of employment protection reduces job flows. Part of the discrepancy between theory and data can be related to measurement problems: there is limited cross-country comparability of gross job creation and destruction measures. However, also using the harmonised gross job flows data recently assembled at OECD (Bassanini and Marianna, 2009), the discrepancy persist: pairwise correlations of EPL and measures of workers reallocation are not statistically significant (Fig .8).

A possible explanation of the large job flows observed in countries with strict EPL is related to interactions with other institutions. Bertola and Rogerson (1997) argue that countries with strict dismissal regulations also have institutions compressing wage structures, preventing the work of price-driven adjustment mechanisms: if employers cannot adjust wages in response to shocks, they are forced to adjust employment. Other explanations relate to the two-tier nature of reforms (Boeri, 1999) inducing many job-to-job shifts at the expiration of fixed-term contracts that do not involve intervening unemployment spells. Only the most recent cross-country regressions – e.g., those in Garibaldi and Violante (2005) – allow for interactions of EPL with other (mainly wage setting) institutions. A panel structure is indeed required to meaningfully investigate these interactions and earlier studies could only draw on cross-sections. Needless to

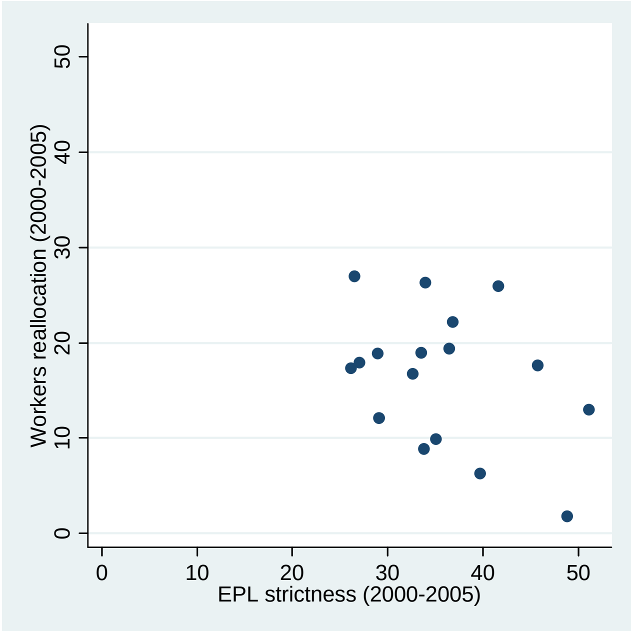

Figure 8: Workers Reallocation and EPL strictness (2000-2005).

say, interactions of highly imperfect measures of regulatory intensity pose very serious measurement problems.

These potential interactions with other institutional features and the role of two-tier reforms inspired more recently a wave of studies exploiting time-series and within country variation in employment protection to identify the effects of EPL via double differences (before and after the reform and between the segments affected and unaffected by the reform), in the spirit of the "natural experiments" literature. Two-tier reforms are ideal in this respect as they induce both time-series variation in institutions as well as substantial within-country variation in the actual enforcement of regulations.

Several studies documented that the introduction of fixed-term contracts increased the volatility of employment, by acting on both, hiring and firing margins. The earliest literature is focused on the Spanish, pioneering, case and reports quartely job flows for temporary contracts ten times larger than for permanent contracts (Garcia-Serrano, 1998). Most transitions are across jobs, though: Jimeno (1999) estimated that an increase by one per cent of the proportion of temporary contracts in total employment raises job-to-job shifts by 0.34 per cent. This effect of temporary employment on transitions across jobs is consistent with estimates provided by Boeri (1999) on job-to-job shifts in the EU15. The effects of the introduction of temporary employment on unemployment to employment transitions are less clearcut. This may also be because job-to-job shifts of temporary employees crowd-out displaced workers, coming from permanent employment (Booth and Francesconi, 2002). Other studies found that marginal reforms of EPL negatively affect labor productivity (Guell and Petrongolo, 2000; Blanchard and Landier, 2002; Boeri and Garibaldi, 2007). This is consistent with the "honeymoon" effects related to long-lasting dual track reform strategies. It can also be rationalized as due to less investment in human capital of temporary workers (Arumpalam and Booth, 1998) or by the reported sorting of low-skilled and marginal groups of the labor force into temporary positions (Kahn, 2007).

These studies exploit the within country asymmetry between fixed-term and permanent contracts. The second difference is obtained either by comparing pre and post reform labor market outcomes, net of any expectational effect, or by taking at least another asymmetry in the enforcement of EPL. For instance, the exemption of small units from the strictest EPL provisions can be used in conjunction with dual track reform strategies to carry out differences-in-differences policy evaluation studies (Autor et al., 2006; Boeri and Jimeno, 2006; Miles, 2000). These studies find a negative effect of EPL on dismissal rates. Garibaldi et al. (2003) also found that the presence of firm-size thresholds (e.g, 15 employees, as in Italy) below which EPL does not hold, increase firms' persistence, that is, the probability that a firm does not change the number of employees from one year to the next, just below the threshold. These effects are generally small, but qualitatively consistent with the predictions of economic theory.

Employment and unemployment are not the only outcome variable being considered by the literature on fixed-term contracts. Some authors have considered the effects of temporary employment on effort and productivity (Ichino and Ripahn, 2005; Engellandt and Riphahn, 2005). Others on job satisfaction (and self-reported job security) (Clark and Postel Vinay, 2005), on-the-job training (Arumpalam and Booth, 1998) or work accidents (Guadalupe, 2003).

A problem with these studies is that they generally neglect important spillovers between covered and uncovered segments. These spillovers can be rather substantial. Bentolila and Dolado (1994) for instance provide evidence that flexible contracts offer a buffer stock to firms, insulating permanent workers from employment adjustment in response to exogenous shocks. This is consistent with the theoretical predictions of the framework developed in Section 2 as to the effects of two-tier reforms on the wage tenure profile. Other spillovers come from changes in the rate of conversion of fixed term into permanent contracts when asymmetries between the two types of contracts are increased. Dolado, Garcia-Serrano and Jimeno (2002) found that the probability of being employed with a temporary contract was significantly affected by changes in the regulations for permanent employment introducred after the 1997 reform in Spain, which reduced employment protection for so-called regular contracts. Also this effect is consistent with the predictions of the model proposed in Section 2.

Investigating the effects of EPL under dual regimes without taking into account of these spillovers may induce to overestimate the effects of EPL on the labor market. Suppose to consider a typical two-tier reform, reducing EPL limited to fixed term contracts while leaving unchanged the rules for permanent contracts. Identification of causal effects in a differences-in-differences framework requires that the two segments of the labor force taken as the "treatment" ($s = 1$) and the "control" ($s = 0$) groups respectively would have had the same trends in the outcome variable, had the reform not occurred. Assuming for simplicity that the EPL reform simply adds a constant δ to the conditional mean of some outcome variable (e.g., employment, N) in the treated segment, i.e., that:

$$N_{it} = \beta_t + \gamma_i + \delta s_i + \varepsilon_{it}$$

where i denotes the labor market segment (fixed-term vs open-ended contracts), t is time, β is a common time trend, γ is a segment-specific fixed effect, and R is a dummy variable taking value one after the reform limited to the treatment group. In this case differences in differences identify δ as follows:

$$\begin{aligned} &\{E\left[N_{it} \mid s_i = 1,\, t = 1\right] - E\left[N_{it} \mid s_i = 1,\, t = 0\right]\} + \\ &- \{E\left[N_{it} \mid s_i = 0,\, t = 1\right] - E\left[N_{it} \mid s_i = 0,\, t = 0\right]\} = \delta \end{aligned} \tag{9}$$

as the first difference identifies $\delta + \beta + \gamma$ while the second difference identifies $\beta + \gamma$. Suppose, however, that the reform of EPL also affects the "control" group, by adding δ_2 to its conditional mean. In this case, the first difference in (9) identifies $\delta_1 + \beta + \gamma$ while the second difference $\delta_2 + \beta + \gamma$. It follows that this strategy can only identify the differential effect, $\delta_1 - \delta_2$. Thus, when reforms increase employment among fixed-term contracts and reduce employment among open-ended contracts, an identification strategy based on comparing pre-post reform employment variations across the two segments of the labor force overestimates the effects of reforms on employment.

An additional problem relates to the sorting of workers into the treatment and the control groups. This is the reason why the empirical literature looks for other differences, beyond the fixed-term/open-ended contracts divide, involving an exogenous allocations to the treatment or the control group, e.g., firm size when it is the worker the unit of analysis.

Finally, policy endogeneity is another important issue largely neglected by this literature. Some studies found EPL to become more protective during cyclical downturns or in high-unemployment regions (Bertola et al., 2000). The issues related to policy endogeneity are, however, more important with reference to the design of unemployment benefits and are therefore addressed in greater detail below.

4.2 The literature on unemployment benefits

Unemployment benefits are treated by the OECD indicators analysed in Section 1 as a one-dimensional institution. However, there are at least three key dimensions which identify an unemployment benefit system: i. the *eligibility* conditions (the norms determining access to the benefit), ii. the *entitlement* conditions (the rules concerning the duration of the payment), and iii. the *replacement rate*. Typically, at the beginning of the unemployment spell, the income replacement system mimics an insurance scheme: benefits are proportional to past contributions, which are themselves proprtional to wages. However, the presence of benefit floors and ceilings compresses considerably the distribution of unemployment benefits with respect to the distribution of wages. Transfers to jobseekers at longer unemployment durations are generally independent of past contributions, and are offered in combination with other cash transfers to individuals who are not working, notably social assistance of the last resort. Eligibility to this second, *unemployment assistance*, component of UBs can be independent of payments (if any) made during the previous work experience. When the individual exhaust the maximum duration of benefits, she can have access to social assistance, in which case the transfer is offered for unlimited duration, but subject to means-testing, that is, provided only to the unemployed individuals who have incomes and family assets lower than a given (poverty) threshold.

There is a huge literature on the effects of reforms of unemployment benefits on unemployment stocks, both at the macro and at the micro level.

The macro literature draws on cross-country comparisons based on aggregate indexes of UB generosity as those introduced in Section 2. Just like in the macro-EPL literature the effects of reforms were initially identified via cross-country differences in the levels of the indicators. For instance, using cross-sectional data on 20 OECD countries, Layard et al. (1991) estimated that a 10% rise in the replacement rate involves roughly a 1.7% increase in the unemployment rate. Later studies for the same group of industrialized countries offered comparable results: Scarpetta (1996) estimated an elasticity of unemployment to UBs of the order of 1.3%, while Nickell (1997) of 1.1% and Bassanini and Duval (2006) of 1.2. Blanchard and Wolfers (2000) found that UB replacement rates and duration are the most relevant institutions affecting unemployment, when interacted with shocks (the latter measured as deviations from country averages in TFP growth, real interest rates or a labor demand shifter). Unemployment benefits were also found to affect the composition of employment (Bertola et al., 2002) by "pricing out" women, youth and older workers.

In general it is the maximum duration of benefits, as opposed to the level of the replacement rate, which is found to have the strongest effects on unemployment rates in this macro literature. In other words, an increase of benefit levels has less effects on unemployment duration than an increase by the same percentage of the maximum duration of benefits.

The micro literature typically evaluates the effects of benefit levels and the residual entitlement to benefits on the duration of unemployment, based on longitudinal data, mostly drawn from live registers. This literature is consistent in finding positive effects of UB generosity on unemployment duration, but the effects are quantitatively small, notably when UB generosity is measured in terms of replacement rates rather than in terms of the maximum duration of benefits. Atkinson and Micklewright (1991), Devine and Kiefer (1991) and

Krueger and Meyer (2002) offer excellent surveys of this earlier literature. To give a few examples, Narendranathan et al. (1985) obtained a lower bound estimate of only 0.08 for the effects on unemployment duration among British men of a one per cent increase in the level of benefits. Van den Berg (1990) estimated that a 10 per cent increase in the level of benefits in The Netherlands increases the duration of unemployment by one week, a result which is in line with evidence from the US (Meyer 1989 and Katz and Meyer, 1990). The effect is, however, stronger (up to 5 weeks) when the increase in the benefit level occurs later on in the unemployment spell. Stronger effects are found when considering changes in the maximum duration of benefits (Meyer, 1990).

Spikes in the conditional probability of leaving unemployment (hazard rate) are typically found in correspondence to the maximum duration of benefits. Athough part of the spikes is attributable to measurement error (Card et al., 2007), notably exits from the unemployment register not corresponding to genuine outflows to jobs, spikes are also observed by studies tracking actual job finding rates rather than all outflows from the live register.

The stronger effects of changes in the duration of benefits vis-a-vis changes in the generosity of benefits (potentially having a larger effect on the net present vale of UB entitlements) can also be explained in terms of policy endogeneity or reverse causality thereby higher unemployment among some group induces Governments to increase the duration of benefits (Holmlund, 1998). Several studies documented that underlying labor market conditions have important effects on UB duration. For instance, regional diversification in the maximum duration of UBs was found to be positively correlated with the duration of unemployment in US states (Card and Levine, 2000). Lalive, and Zweimueller (2004) showed that estimates not correcting for policy endogeneity may significantly overstate the negative effects of the duration of UBs on the duration of unemployment in Austria. In particular, they estimated that the effects of the increase in benefit duration from 30 to 209 weeks on unemployment duration would have been 40 per cent larger without correcting for policy endogeneity.

The potential bias induced by policy endogeneity can be characterised by making reference to the identification strategy embedded in (9). Suppose that reforms react to stronger growth of unemployment in some group of the population (e.g., workers coming from long-tenured jobs) and that the outcome of interest is unemployment. Denote as β_{it} the group-specific time effect. As the reform is dictated by trend growth of unemployment being different in the two groups (i.e., $\beta_{00} > \beta_{10}$), a double differences approach would only identify $(\beta_{01} - \beta_{00}) - (\beta_{11} - \beta_{10}) + \delta$ potentially attributing to the reform effects which are instead related to the differential dynamics of unemployment in the absence of the reform.

As in the case of EPL, there can be relevant interactions with other institutions. An increasing body of literature is exploring interactions between UB and EPL, but mainly taking a political economic perspective (Algan and Cahuc, 2009; Boeri, Conde-Ruiz and Galasso, 2009) along the so-called pathways to flexicurity. Other relevant interactions are those between unemployment benefits and unemployment assistance programs (Pellizzari, 2005). These inter-

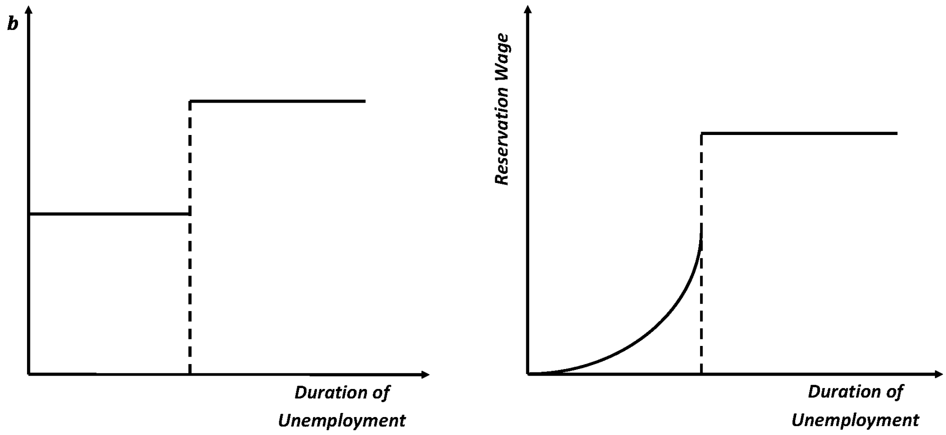

Figure 9: Interactions between UB and social assistance

actions may reduce the elasticity of unemployment duration to changes in UB duration simply because individuals flowing from unemployment benefits to social assistance may actually experience an increase in the income transfer. This increases the reservation wage over the spell of unemployment even when the UB is provided at a flat (or mildly declining) rate (Figure 9).

Two-tier reforms of UBs provide a second difference that can be used to control for these interactions. A number of recent studies compared hazards from unemployment across cohorts of UB recipients entitled to different durations of benefits. For instance, van Ours and Vodopivec (2006), provided a differences-in-differences analysis of reforms of the UB system in Slovenia. They considered, on the one hand, workers with 15 to 20 years of experience whose maximum duration of benefits was reduced from 18 months to 9 months of benefits and compared their experience with that of workers with more than 20 years of experience whose entitlement period was not affected by the reform. They found that spikes in the hazard rates followed very closely the change in entitlements. Lalive, van Ours and Zweimuller (2004) also used differences-in-differences techniques to disentangle the effects on unemployment duration of increased replacement rates and the extension of the maximum duration of benefits exploiting the fact that the increase in the generosity of UBs concerned only individuals aged more than 40 or with a relatively long work experience.

The presence of spillovers across treatment and control groups may be a less serious issue in this context than in the case of two-tier reforms of EPL. However, the extensions of the MP model in Section 3 suggest that also reforms of UB increasing generosity only at long tenure jobs involve a steeper-wage tenure (and wage-age) profile and a larger share of short duration jobs in total employment. Labor demand reacts to these reforms operating substitutions of workers whose reservation wage increased as a result of the reform with workers whose reservation did not increase. Comparisons of unemployment outflows rates between cohorts whose benefits have been increased and cohorts whose benefits have not been increased (or have been reduced) may therefore induce to overstate the responsiveness of unemployment duration to UB generosity along the lines of the argument developed when discussing the literature on EPL.

Also endogeneous sorting into the different regimes is less of a problem than in other institutional reforms since typically two-tier reforms of UBs allocate individuals to treatment and control groups based on variables which are not under the control of individuals (e.g., age or past work history).

A more fundamental problem with this literature is that it is largely focused on job finding rates, while the impact of UB reform is likely to be perceived mainly on the job destruction margin, notably in presence of two-tier reforms.

4.3 The literature on employment conditional incentives

Empirical research on employment conditional incentives has mainly evaluated the effects on labor supply and family incomes of reforms targeting specific vulnerable groups. A narrow target is defined because reforms aim not only at encouraging participation in the labor market by conditioning state support to employment, but also at reducing poverty. For instance employment subsidies can be provided only to low-income families with children. A relatively narrow targeting of benefits also addresses the "windfall problem" thereby individuals, who are already working, opt-in the employment conditional incentive benefit ("windfall beneficiaries"): by restricting access to some classes of individuals (like the long-term welfare recipients or the unemployed) these deadweight costs are minimized. The transfers (or tax reductions) are phased in as earnings rise up to a threshold (phase-in region), are constant within an income bracket, and are gradually reduced over a set of income levels (phase-out region). Another important issue related to the design of employment subsidies relates to the conditions imposed on intensive margins. Indeed, these schemes tend to have asymmetric effects on intensive vs. extensive margins. Individuals who, at the existing earnings, do not qualify for the benefits, may reduce working hours, substituting leisure for work in order to gain access to the subsidies ("opt-in beneficiaries"). In order to minimize these effects, some reforms impose a strict full-time work requirement. Adjustments of these hours of work requirements have been used to evaluate labor market adjustment to employment-conditional incentives (Blundell, Brewer and Francesconi, 2008).

Other institutional details which are very important in the evaluation of reforms relate to whether the benefit is provided as a tax credit or as a benefit. In the former case, reforms do not involve an increase in public expenditure, but may be less effective in encouraging participation if refunding is slow, which is frequently the case. Moreover, tax credits cannot reach those individuals who do not fill a tax form, e.g., because their incomes fall in the no-tax area. The empirical literature evaluating these reforms is mainly focused on the US, Canada and the UK Britain. Only limited to the US and Canada, it could draw on randomized experiments (as in the case of the *Earning Supplement Project* and the *Self-sufficiency Project* in Canada, the Minnesota *Family Investment*, the Milwaukee *New Hope*, the Vermont *Welfare Restructuring*, the Florida *Family Transition* and the Connecticut *Job First* programmes in the US). Blank (2002) offers an excellent survey of the findings of this literature.

Although there has been a lot of experimentation with ECIs in Europe, regrettably there is no tradition of randomized experiments. The extensive literature on the microeconomic effects of the substitution in Britain of the *Family Credit* (FC) with the *Working Families' Tax Credit* (WFTC) had therefore to rely on quasi-experiments or structural models. This literature was reviewed by Blundell and Hoynes (2004) and Gregg and Harkness (2003) as well as in previous Handbook Chapters (Blundell and McCurdy, 1999).

We offer below a summary account of those findings, mainly coming from the European experience with ECI reforms, which are more important from a macroeconomic, labor force participation, perspective.

Duncan, Pearson and Schotz (2003) discuss the adaptation of in-work benefits in Denmark, France, UK and US. They observe that the evaluation of the employment effects points to an uneven impact across demographic groups, depending on the labor force attachment of the group and on the incentives structure of the in-work benefit program. A key issue in this respect is whether eligibility to in-work benefits is established on the basis of family income rather than individual income. In the case where eligibility is based of family income, the ECI can be better targeted to those actually in need of income support, but may have adverse effects on participation decisions of secondary earners in couples. Evidence from both the Earned Income Tax Credit (EITC) in the US (Eissa and Hoynes 1998) and WFTC in the UK (Blundell and Hoynes 2004; Francesconi and van der Klaauw, 2006; Brewer, Duncan, Shephard and Suarez, 2006) indicates that the programs indeed lowered the employment rate of married women with working spouses. In case where ECI are instead conditioned on individual incomes, they may end-up rewarding high-income families. Microsimulation studies (Bargain and Orsini, 2006) confirm that individual benefits have much better properties in incentivating labor supply, notably of women, especially in countries where the labor supply elasticity is larger. Pearson and Scarpetta (2000) underline that there is no single measure which of itself will have a major impact on employment. In-work benefits need to be part of a comprehensive policy and need to take into account administrative difficulties which vary from country to country. The main problems concern the take-up rate (in-work benefits need to be publicized), and the tax system used to deliver the benefit which need to be quick in order to make the benefit clearly linked to the current working condition. Another key factor in determining the effectiveness (and the costs) of ECIs is the dispersion of wages at the low-end of the earning distribution.

Other financial incentives aim at supporting job creation at relatively low productivity levels. Wage subsidies for low-wage employees sometimes operate also in conjunction with ECIs. They can be provided either as employment subsidies to employees or as reductions of employers' social security contributions. Wage subsidies can take several forms (e.g., subsidies or credits proportional to part or all of the annual wage, lump-sum amounts or re-employment bonuses to be redeemed by employers, etc.). As the wage level is the only qualifying condition, the reduction typically applies to both new entrants and to long-standing members of the workforce. The reduction in contributions remains in effect as long as the monthly wage is below a pre-determined ceiling. When the reduction is based only on the monthly wage and not on the number of hours worked, this measure may lead to more part-time work at what may be relatively high hourly wages. Therefore for part-time workers the cut in contributions is commensurate to the hours worked.

Perhaps the most noteworthy (at least in terms of take-up rates) scheme experimented in Europe is the Dutch SPAK (see Doudeijns, Einerhand, and Van de Meerendonk, 2000). The SPAK was introduced in 1996 and phased out in 2003 for cost-saving reasons. It consists of a reduction of employers' contributions on low wages. The reduction in contributions declines as the wage rises and ceases at 115% of the statutory minimum wage. This may create a disincentive for firms to increase wages over this threshold. In 1997 the transitional SPAK was introduced to cushion the loss of wage subsidies and the increase in taxes for employers who raised the pay of SPAK workers over the threshold. According to the traditional SPAK, employers may apply for half of the SPAK for two years for workers who were previously on the SPAK programme but lost the benefit because they got an increase up to 130% of the minimum wage.

Evaluation based on general equilibrium models of the Dutch economy (Bovenberg et al. 1998 and European Commission 1999) predicted a total increase in employment of 1% and 5% for the low-skilled workers. Evaluations of similar programmes in France and Belgium also report significant effect on employment. On the basis of firm-level data, Crépon and Déplatz (2001) estimate the number of jobs created at a number ranging between 255,000 and 670,000 jobs (between 1% and 3% of total employment in the business sector). Sneessens and Shatman (2000) for Belgium estimate that a cut of 21% in employers' contributions on unskilled jobs may increase total employment of the unskilled by 6.7%. These estimates have to be judged with caution given the considerable uncertainty as to the labor demand elasticity and, to a lesser degree, the labour supply elasticity of low-wage workers. The employment effects of wage subsidies are larger the more elastic are labour demand and supply. When the labour supply elasticity is larger than the demand elasticity, the earning effect of a wage subsidy is larger than the employment effect and vice versa.

Wage subsidies, like subsidies to the employees, can generate deadweight losses in the form of windfall beneficiaries. The main criticism to this kind of policies is indeed that they subsidize existing jobs and job creation that may have occurred anyway. The deadweight costs generated by windfall beneficiaries could be eliminated by using true marginal employment subsidies, i.e. subsidies only to job openings beyond those that would have occurred in the absence of the subsidy. But clearly the informational requirements for such subsidies are unattainable. Many countries have proxied marginal subsidies with incremental subsidies, i.e. subsidies to employment beyond a certain increment over the previous year's employment and restrained access to firms that did not layoff workers in the previous year. But these subsidies can generate perverse incentives for firms to implement large layoffs followed by large hirings, and may end up subsidising high turnover sectors and firms. Furthermore these subsidies typically cover fast-expanding firms as well as those in decline.

Broad measures to reduce employers' contributions for low-paid jobs imply a big funding effort. They can also exert fiscal crowding out effects insofar as the subsidy needs to be financed by increasing tax rates (Drèze, 2002). The costs of wage subsidies are non-negligible: available estimates suggest that they may reach from 0.5 to 1% of GDP in France, Belgium, Italy and the Netherlands.

Due to these high fiscal costs many ongoing experiments with ECIs provide benefits or tax credits with a limited duration. Besides the budgetary constraint, the justification for such time limits is that state support should only encourage the transition from welfare to work making a permanent break from dependency on state support. The analysis of the effects of these policies necessarily require a dynamic analysis and observations on treatment and control groups several years after the initial treatment. Card and Hyslop (2005) analysed one of such schemes, the Canadian Self Sufficiency Project (SSP) providing a subsidy only to individuals accepting full-time jobs, and for at most 3 years. They found that SSP had large effect in the short run: 69 months after all subsidy payments ended the welfare participation rates of the treatment and control groups were equal. Once the financial incentives for some individuals to find a full-time job were gone these individuals did no longer behave differently from individuals that did not get the ECI. Card and Hyslop conclude that the SSP experiment offers little support for the idea that temporary wage subsidies can have a permanent effect on the labor market position of welfare benefit recipients. The framework above suggests that such two-tier reforms, providing support only limited to entry jobs may also have important effects on the wage tenure profile and on the conversion of short-term into permanent contracts. This hints at potential labor demand factors that could prevent employment conditional incentives to become a pathway to self-sufficiency. To our knowledge these demand effects have not yet been investigated by the literature. Nor there is work on job reallocation associated with ECI, except the aforementioned study by Francesconi and van der Klaauw (2006).

4.4 The literature on activation programmes

Activation programmes aim at easing the job matching process. Their goal is to promote job search more effectively compared to reduction of UB replacement rates which only motivate job search rather than improving also its effectiveness. Activation programs thus rely on the services offered by the public employment services (PES) in terms of placement, counseling and vocational guidance and job-search courses. Unlike in the case of generic public employment services, participation is compulsory for the relevant target groups. Key examples are the requirement imposed on unemployed individuals to attend intensive interviews with employment counselors, apply for job vacancies as directed by employment counselors, independently search for job vacancies and apply for jobs, accept offers of suitable work, participate in the formulation of an individuals action plan, participate in training or job-creation programs. Because of the disutility involved in complying with activation requirements, some potential claimants do not initiate a benefit claim. Hence, activation programs self-select the most needy; If unemployed workers are unwilling to participate in the activation programs they may loose their benefit entitlements permanently or temporarily (in case of benefit sanctions).

Kluve (2006) presents an analysis of about 100 evaluation studies of active labor market policy programs in Europe, most of them operating after 1990. He finds that the effectiveness of programs is quite independent of contextual factors such as labor market institutions and macroeconomic environment. Whereas traditional training programs appear to have at most a modest effect on transitions from unemployment to work private sectors incentive programs, services and sanctions perform significantly better. Direct employment programs in the public sector are rarely effective and frequently detrimental for the employment prospects of participants. Providing job search assistance and counseling and monitoring accompanied by appropriate sanctions for noncompliance are especially effective and they are often quite cost-effective because their rather inexpensive nature.

There are a few empirical studies in which an experimental set-up is used to address the effectiveness of active labor market policies and activation programs. Gorter and Kalb (1996) found that intensive counseling and monitoring increase job finding rates of unemployed workers in the Netherlands. Dolton and O'Neill (1996) found effects of the so-called Restart experiments in the UK, where unemployment benefit claimants were obliged to attend meetings with a counsellor to receive advice on for example search behavior and training courses. These interviews, which lasted about 20 minutes, were conducted after six months of unemployment. Dolton and O'Neill (2002) report that the interviews reduced the male unemployment rate five years later by 6 percentage points, as compared to a control group for whom participation in the first six-monthly interview took place six months later. Black et al. (2003), who studied mandatory employment and training programs for unemployed workers, found that some unemployed workers that are informed about the mandatory character left unemployment before they have to enter a program. Apparently these unemployed considered the programs as sanctions to be possibly avoided rather than as opportunities.

Van den Berg and van der Klaauw (2006) investigated the effect of counseling and monitoring on Dutch UB recipients in 1998. They used data from a field experiment. All unemployment benefit recipients had to send in weekly reports concerning job search activities. Once every four weeks, the PES determined whether the individual was still eligible for benefits. The experiment consisted of randomly assigning counseling and monitoring to part of the workers. The results of the analysis show that low-intensity job search assistance programs have at best small effects. High-intensity job search assistance programs may have a more positive effect on the exit rate to work. Furthermore, monitoring of relatively well-qualified individuals in favorable macroeconomic conditions leads to inefficient substitution of search methods or channels. This also generates small net effects on the exit rate to work. Individuals with worse prospects may have less scope for substitution, and monitoring of their search activity may lead to an increase in the exit rate to work. Van den Berg and Van der Klaauw (2006) argue that it may make more sense to focus monitoring on individuals with worse opportunities.

Non-experimental studies are based on cross-country comparisons or micro-oriented evaluation studies. Recent evaluation studies however are not very optimistic about the benefits of many of these programs. Heckman et al. (1999) give a detailed overview of microeconometric evaluation studies. They conclude that labor market programs have at best a modest impact on participants' labor market prospects. Furthermore, there is considerable heterogeneity in the impact of these programs, so for some groups of workers the programs are more effective than for other groups of workers. Finally, when programs are implemented on a large scale displacement and general equilibrium effects may be sizeable. This means that without incorporating them in a macro framework micro treatment effect evaluations will provide poor guides to public policy. Calmfors, Forslund and Hemström (2001) conclude that the evidence on the effectiveness of Swedish ALMP is rather disappointing. Labor market retraining for example has no or negative employment effects. Martin and Grubb (2001) draw similar conclusions in their overview on what works and what does not work among ALMP in OECD countries. They conclude for example that subsidies to employment and direct job creation have been of little success in helping unemployed get permanent jobs.

Martin and Grubb (2001) conclude from an overview of previous research that public training programs are expensive but sometimes helpful. Job search assistance is helpful when combined with monitoring and sanctions while job subsidies are often subject to large dead weight loss and substitution effects and direct job creation is not very successful. Kluve and Schmidt (2002) conclude from an overview of 53 evaluation studies that programs with a large training content are most likely to improve employment probability, while direct job creation and employment subsidies in the public sector almost always fail.

If one would draw a general conclusion from the empirical studies based on micro data it would be that the effects of activation schemes on the job finding rates are rather small. An important drawback of some of these schemes is that they stimulate workers to reduce their search efforts instead of increasing them. This is due to the so-called locking-in effect (see for example Van Ours, 2004). Other effects are important too. What is effective for an individual unemployed worker may not be effective in terms of the aggregate level of unemployment.

One reason for this may be crowding out. If a program brings an unemployed worker back to work more quickly at the expense of another unemployed worker finding a job more slowly the training program is not very efficient. Another reason for the differences between individual and aggregate effects is that a training program may make workers more attractive for firms, which stimulates job creation, but also job destruction of old jobs, as indicated by the framework developed in Section 3. Benefit sanctions seem to be more effective than other ALMP. From recent micro studies on the effect of benefit sanctions in the Dutch labor market we know that a reduction of unemployment benefits may have a substantial effect on the outflow from unemployment to a job. Abbring, Van den Berg and Van Ours (2005) study the effect of financial incentives by comparing the unemployment duration of individuals that have faced a benefit reduction with similar individuals that have not been penalized. They found that benefit sanctions have a positive effect on individual transition rates from unemployment to a job. Van den Berg, Van der Klaauw and Van Ours (2004) performed a similar study for welfare recipients in the city of Rotterdam. Although this group of unemployed has a labor market position that is often considered to be very weak, they too found that benefit sanctions stimulate the transition from welfare to work. For the Swiss labor market similar effects of benefit sanctions were found. From an analysis of Swiss data on benefit sanctions Lalive et al. (2005) conclude that by imposing a benefit sanction the unemployment duration decreases by roughly three weeks. They also found evidence of the existence of an ex ante effect.

A key problem with the non-experimental literature on activation programs is that these schemes rely on the self-selection of the most needy and it is often difficult to find remedies for this endogenous sorting in ex-post evaluation studies. Another problem is that they often neglect the effect of these programmes on the job destruction side, which can be sizeable according to the theoretical perspectives offered in Section 3.

5 Final remarks

This chapter surveyed the vast applied literature drawing on reforms of labor market institutions in Europe. Reforms have been concentrated in four domains: employment protection legislation, unemployment benefits, employment-conditional incentives and activation programs. Our broad conclusion from this survey is that this literature is very informative, but not sufficiently supported by a theory accounting for the particular nature of reforms that are taking place in the labor market. They are, for the most, reforms creating longlasting asymmetries while theory typically considers complete reforms, affecting all the potentially eligible population. More theoretical work on two-tier reforms could provide better guidance to applied work suggesting refinements in the identification of the causal effects of institutions. At the same time, a more careful description of the reforms in applied, along the checklist suggested in this Chapter, could help the development of a more realistic theory of reforms in the labor market.

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Annex 1

A1.1 The iza-frdb social policy reforms database

In recent years, there has been considerable progress in the development of international comparative databases on labor market reforms and on quantitative indicators providing institutional information for many countries. However, researchers are increasingly interested not only on quantitative indicators, but also on qualitative information on labor market reforms allowing for a deeper understanding of country specific reform processes.

For this reason, IZA (Institute for the Study of Labor) and fRDB (Fondazione Rodolfo Debenedetti) are currently cooperating in constructing a comprehensive inventory of policy reforms in core areas of the EU labor market. In future, the database will cover reforms in the EU27 countries starting from 1980. The already existing "fRDB Social Reforms Database" (firstly published in 2003) is the starting point of this work.

A first version of the database has been recently released, covering seven European countries (Denmark, France, Germany, Italy, Netherlands, Spain and United Kingdom). It currently covers five main policy areas:

- employment protection legislation (EPL)
- unemployment benefits (UB)
- employment conditional incentives (ECI)
- activation programs (AP)
- early retirement (ER)

The unit of analysis in the database is the reform, i.e. a collection of policy measures referring to a unique formally approved law. Thus, collected information mainly consists of enacted national legislations. In addition, other public acts or collective agreements are recorded if they are likely to be relevant at the national level and potentially affect large sectors of the economy or a large percentage of workers. Planned reforms, proposals on future changes or bills that are not formally approved are not included. A reform is recoded only when the legislative process is formally concluded.

Reforms addressing more than one topic - or more than one policy area - are recoded several times under different categories (once per each topic addressed). This means that each measure embedded in observed reforms is individually evaluated in order to take into account of all possible characteristics of the reform process. Despite the multiple coding of measures, reforms that introduce changes in more than one policy area (or addressing more than one topic) can be easily identified through a reform-specific identification number. In other words, a reform id allows for a clear identification of all measures corresponding to a specific text law or collective agreement.

Collected information on reforms is presented in a synthetic and ready-to-use fashion, including details on the main institutional changes over time and target groups. Institutional details have been collected by IZA and fRDB researchers drawing on a variety of sources and then checked by a network of national experts. Categorical variables as well as other characteristics of reforms are also available in Stata format, ready to be used for statistical analysis (Monti and

Eichhorst, 2009).

Annex 2

A2.1 Institutions and wage setting in the MP model

Let us first evaluate the steady-state, equilibrium valuations of states. Given our assumptions, the continuation valuation by workers of unemployment (U), and employment ($W(x)$), and by firms of an open vacancy (V) versus a job ($J(x)$) must solve the following four functional equations:

$$rU = \theta q(\theta)[W(1) - U] \tag{10}$$

$$rV = -c + q(\theta)[J(1) - V] \tag{11}$$

$$rW(x) = w(x) + \lambda \int_R^1 (W(z) - W(x))dF(z) + \lambda F(R)(U - W(x)) \tag{12}$$

$$rJ(x) = x - w(x) + \lambda \int_R^1 ((J(z) - J(x))dF(z) + \lambda F(R)(V - J(x)). \tag{13}$$

Equations (10) through (13 n) equate normal returns on capitalized valuations of labour market states to their expected periodic payouts. In equation (10), the flow yield from the valuation of the state of unemployment U at interest rate r is equated to an expected "capital gain" stemming from finding new employment at $x = 1$. Equation (11) governs the valuation of an unfilled vacancy. All filled vacancies begin at a common productivity, so all vacancies must be identical *ex-ante*. The function $W(x)$ in (12) returns the value of employment in a job-worker match with current productivity x. The implicit rate of return on the asset of working in a job at productivity x is equal to the current wage $w(x)$ plus the expected capital gain on the employment relationship. The lower bound of the definite integral, R, is the cutoff or threshold value of match productivity, determined endogenously in the model. If idiosyncratic productivity x falls below R, the match is no longer profitable and the job/worker pair is destroyed. A similar arbitrage argument determines the valuation to a firm of a filled job in (13), given the current realization of x.

Wage equation under the Nash bargaining rule should solve:

$$w(x) = \arg\max (W(x) - U)^{\beta} (J(x) - V)^{1-\beta}$$

yielding the FOC

$$W(x) - U = \beta(J(x) + W(x) - V - U) \tag{14}$$

Use now $V = 0$ and rewrite the two asset value conditions (for jobs and employment, respectively):

$$\begin{aligned}
rJ(x) &= x - w(x) + \lambda \int_R^1 [J(z) - J(x)]\, dF(z) + \lambda F(R)\, [V - J(x)] \\
rJ(x) &= x - w(x) + \lambda \int_R^1 J(z) dF(z) - \lambda J(x) \\
J(x) &= \frac{x - w(x) + \lambda \int_R^1 J(z) dF(z)}{(r + \lambda)}
\end{aligned}$$

$$\begin{aligned}
rW(x) &= w(x) + \ \lambda \int_R^1 [W(z) - W(x)]\, dF(z) + \lambda F(R)\, [U - W(x)] \\
rW(x) &= w(x) + \lambda \int_R^1 W(z) dF(z) + \lambda F(R) U - \lambda\, [(W(x))\, (1 - F(R)) + F(R) W(x)] \\
W(x) &= \frac{w(x) + \lambda \int_R^1 W(z) dF(z) + \lambda F(R) U}{(r + \lambda)}
\end{aligned}$$

$$\begin{aligned}
\beta(J(x)) &= (1 - \beta)\, (W(x) - U) && (15) \\
\beta\, [x - w(x)] &= (1 - \beta)\, [w(x) - rU] \\
(1 - \beta)\ rU + \beta x &= w(x) \\
w(x) &= (1 - \beta)\, rU + \beta x && (16)
\end{aligned}$$

Now obtain a closed form expression for rU as follows:

$$\begin{aligned}
W(1) - U &= \beta(J(1) + W(1) - U) && (17) \\
(1 - \beta)\, [W(1) - U] &= \beta J(1)
\end{aligned}$$

Combining this with the free entry condition:

$$\begin{aligned}
rU &= \theta q(\theta)\, [W(1) - U] \\
W(1) - U &= \frac{rU}{\theta q(\theta)}
\end{aligned}$$

we get:

$$(1 - \beta) \left[\frac{rU}{\theta q(\theta)} \right] = \beta \frac{c}{q(\theta)} \qquad (18)$$

or

$$(1 - \beta)\, [rU - \rho w] = \beta c \theta \qquad (19)$$

or

$$rU = \frac{\beta c\theta}{1-\beta}$$

Finally inserting this into the (15), we get

$$w(x) = \beta\left[x + c\theta\right]$$

Consider now the set of institutions introduced in Section 3, that is, an unemployment benefit $b = \rho w$, a firing tax T, an employment conditional incentive e and a hiring subsidy $h < c$. Let us first rewrite the steady-state, equilibrium valuations of states under these new conditions.

$$rU = b + \theta q\left(\theta\right)\left[W(1) - U\right] \tag{20}$$

$$rV = -c + h + q\left(\theta\right)\left[J(1) - V\right] \tag{21}$$

$$rW(x) = w(x) + e + \lambda\int_R^1 (W(z) - W(x))dF(z) + \lambda F(R)(U - W(x)) \tag{22}$$

$$rJ(x) = x - w(x) + \lambda\int_R^1 ((J(z) - J(x))dF(z) + \lambda F(R)(V - T - J(x)). \tag{23}$$

Wages under the Nash bargaining rule will now solve:

$$w(x) = \arg\max\left(W(x) - U\right)^{\beta}\left(J(x) - V + T\right)^{1-\beta}$$

yielding the FOC

$$W(x) - U = \beta(J(x) + W(x) + T - V - U) \tag{24}$$

Use now $V = 0$ and rewrite the two asset value conditions with the institutions following the same steps than in the institution-free model:

$$J(x) = \frac{x - w(x) + \lambda\int_R^1 J(z)dF(z) - \lambda T}{(r+\lambda)}$$

$$W(x) = \frac{w(x) + e + \lambda\int_R^1 W(z)dF(z) + \lambda F(R)U}{(r+\lambda)}$$

$$\begin{aligned}
\beta(J(x) + T) &= (1-\beta)\left(W(x) - U\right) && (25)\\
\beta\left[x - w(x) + rT\right] &= (1-\beta)\left[w(x) + e - rU\right] &&\\
w(x) &= (1-\beta)\left(rU - e\right) + \beta(x + rT) && (26)
\end{aligned}$$

Now obtain the closed form expression for rU with institutions by using the free entry condition :

$$J(1) = \frac{c-h}{q(\theta)}$$

to obtain:

$$rU = \rho w + \frac{\beta(c-h)\theta}{1-\beta} \tag{27}$$

Finally inserting this into the (25), we get

$$w(x) = (1-\beta)(\rho w - e) + \beta\left[x + (c-h)\theta + rT\right]$$

A2.2 Institutions, job creation and destruction in the MP model

To obtain the job creation condition, use (27) and evaluate the asset value of a job (23) for an employer, $J(x)$, at R, where $J(R) = -T$:

$$\begin{aligned} rJ(R) &= R - (1-\beta)(\rho w - e) - \beta\left[(c-h)\theta + R\right] + \lambda \int_R^1 J(z)dF(z) - \lambda J(R) \\ -T &= (1-\beta)(R - \rho w + e) - \beta(c-h)\theta + \lambda \int_R^1 J(z)dF(z) \end{aligned} \tag{28}$$

Solving for the last term and simplifying

$$\lambda \int_R^1 J(z)dF(z) = \beta(c-h)\theta - (1-\beta)\left[R - \rho w + e\right] - T \tag{29}$$

Moreover, by the asset value condition of a job and the wage equation we have

$$rJ(x) - x + w(x) = \lambda \int_R^1 J(z)dF(z) - \lambda J(x)$$

$$(r+\lambda)\,J(x) - x + (1-\beta)(\rho w - e) + \beta\left[x + (c-h)\theta + rT\right] = \lambda \int_R^1 J(z)dF(z) \tag{30}$$

Hence plugging (29) into the above and simplifying:

$$(r+\lambda)\,J(x) = (1-\beta)\left[x - R\right] - T$$

Being interested in the job creation margin, we evaluate this at the initial productivity level, and use the free entry condition:

$$\begin{aligned} (r+\lambda)\,J(1) &= (1-\beta)\left[1-R\right] \\ (r+\lambda)\,\frac{c-h}{q(\theta)} &= (1-\beta)\left[1-R\right] \end{aligned} \tag{31}$$

or

$$\frac{(1-\beta)\left[1-R\right]}{(r+\lambda)} - T = \frac{c-h}{q(\theta)} \tag{32}$$

This condition (*JC-curve*) is strictly downward sloping in the (R, θ) space, since $q'(\theta) < 0$. The economics behind this trade-off is that a higher R involves a shorter duration of matches, and so lower expected profits from a new job. Thus fewer vacancies are created, reducing market tightness.

Jobs are destroyed when productivity falls below its corresponding reservation or threshold level. R is implicitly defined by the condition

$$J(R) = -T. \tag{33}$$

At the same time, Nash bargaining also implies that R satisfies the zero match-surplus condition:

$$J(R) + T - V + W(R) - U = 0 \tag{34}$$

and, given the free entry condition $V = 0$, it follows that

$$W(R) = U$$

that is, separations are privately, but not necessarily socially, jointly efficient.

To obtain the *job destruction* condition implicitly providing the reservation productivity level, R, consider first that by (23)

$$\begin{aligned} rJ(x) &= x - w(x) + \lambda \int_R^1 [J(z) - J(x)]\, dF(z) + \lambda F(R)\, [V - T - J(x)] \qquad (35) \\ rJ(x) &= x - w(x) + \lambda \int_R^1 J(z) dF(z) - \lambda J(x) - \lambda T \\ (r+\lambda)J(x) &= x - [(1-\beta)(rU - e) + \beta\, [x + (c-h)\theta + rT]] + \lambda \int_R^1 J(z)dF(z) - \lambda T \end{aligned}$$

Evaluating the above equation at $x = R$ and noting that $J(R) = -T$ by the definition of the reservation productivity

$$\begin{aligned} (r+\lambda)\, J(R) &= R - [(1-\beta)(rU - e) + \beta[R + (c-h)\theta + rT]] + \qquad (36) \\ &+ \lambda \textstyle\int_R^1 J(z)dF(z) - \lambda T \\ -(r+\lambda)\, T &= R - [(1-\beta)(rU - e) + \beta[R + (c-h)\theta + rT]] + \\ &+ \lambda \textstyle\int_R^1 J(z)dF(z) - \lambda T \end{aligned}$$

Finally use (27) to obtain

$$R + \frac{\lambda}{r+\lambda} \int_R^1 (z - R)dF(z) + rT = \rho w - e + \frac{\beta(c-h)\theta}{1-\beta} \tag{37}$$

The left-hand side is the flow benefit of a continuing match with productivity R; this is the current flow product plus the option value deriving from possible future improvements over the following time interval. The right-hand side represents the (opportunity) costs of maintaining the match at the threshold value of idiosyncratic productivity. This *job destruction* (JD) *condition* defines an upward-sloping curve in the (θ, R) space.

The intersection of (37) with the job creation condition (32) defines the aggregate labor market equilibrium. There exists a unique equilibrium reservation productivity and labor tightness pair (R^*, θ^*) given by the Poisson arrival rate λ, worker bargaining power β, the hiring subsidy h, employment conditional incentives e, firing tax T and unemployment benefits ρw:

$$\begin{aligned} R^* &= R^*(\lambda, \beta, h, e, \rho, T) \\ \theta^* &= \theta^*(\lambda, \beta, h, e, \rho, T). \end{aligned}$$

Given the equilibrium R^* and θ^*, the unemployment rate follows from the flow condition for constant unemployment:

$$u^* \equiv u^*(\lambda, \beta, h, e, \rho, T) = \frac{\lambda F(R^*)}{\lambda F(R^*) + \theta^* q(\theta^*)}. \tag{38}$$

A2.3 Job creation and job destruction in two-tier regimes

The job creation and job destruction condition for the two-tier regimes can be derived by imposing that $V = 0$, $J(R_0) = 0$ and $J(R) = -T$ and using the Nash bargaining rule. This obtains the job creation condition

$$\frac{(1-\beta)(e_0 - R_0)}{r+\lambda} - \frac{\beta}{r+\lambda}(1 - \lambda T) = \frac{c-h}{q(\theta)} \tag{39}$$

The job destruction condition for temporary jobs

$$R_0 + \frac{\lambda}{r+\lambda}\int_{R_0}^{1}(z - R_0)dF(z) + e_0 - \lambda T = \rho_0 w + \frac{\beta(c-h)\theta}{1-\beta} \tag{40}$$

and the job destruction for permanent contracts

$$R + \frac{\lambda}{r+\lambda}\int_{R}^{1}(z - R)dF(z) + rT = \rho w + \frac{\beta(c-h)\theta}{1-\beta} \tag{41}$$