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Real and Perceived Losses from Unemployment: A Cross Country Study

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This paper compares the unemployment rate as a measure of inefficiency with several other potential measures across eighteen OECD countries. Results show that the unemployment rate is not a very good measure of relative inefficiency between countries, that it overestimates the number of individuals that would get jobs should the market clear, that the dead weight losses of unemployment are remarkably low even in high unemployment countries and that the aggregate perceived monetary losses by the unemployed as a proportion of GDP are also uniformly low, although inframarginal individuals in some countries may perceive their losses to be high.

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'..high unemployment represents a waste of resources so colossal that no one truly interested in efficiency can be complacent about it. It is both ironic and tragic that, in searching out ways to improve economic efficiency, we seem to have ignored the biggest inefficiency of them all.' **Blinder (1987, p. 33)**

I. Introduction

There has hardly been an issue in economics that has attracted so much controversy and research as unemployment. But decades of detailed research have failed to produce broad consensus on the causes and effects of unemployment. When reflecting on the motivation for this vast research, the intensity of focus has been heavily influenced by one argument (summarized by the quote above): unemployment is synonymous with inefficiency and labor market loss. This paper questions this assumption and shows that a given level of unemployment cannot be directly translated into a given level of labor market inefficiency.

The economic definition of unemployment is simple: the unemployed are jobless individuals actively seeking employment. The link to inefficiency is, on the face of it, a direct one: since these individuals are willing to work, their productivity is being 'wasted' if they cannot be employed. Because the definition is straightforward and there is the apparent link to inefficiency, the publication of the unemployment rate gives rise to an influence that can hardly be understated. Indeed, its historical impact on government and policy decisions is practically unrivaled.

However, arguments that unemployment is not a particularly good measure of labor market loss can be made. First, it merely records the amount of people out of work seeking employment, rather than the individuals who would gain employment if the market were to clear. Thus it may not offer an accurate measure of the 'true' underutilization of labor. Second, the amount of out-of-work people is not equivalent to the unexploited gains to trade arising from unemployment, the most common way to measure inefficiency in economics. These unexploited gains are dependent upon the relative labor supply

and demand elasticities, which previous papers (e.g. Layard *et al*., 1991; Hamermesh, 1993; Cahuc and Zylberberg, 2004; Bender *et al.*, 2006) finds differ substantially across countries. Third, it does not necessarily reflect the loss individuals 'perceive' they experience when unemployed.

Within these three points lies the main thrust of the paper. We, therefore, offer three alternative measures to deal with these points in turn. First, we introduce a new measure: the Under-Full Employment Rate (UFER), which measures the number of unemployed workers who would gain employment should the market clear. Second, rather than computing the size of the job queue, we calculate the dead weight loss (DWL) associated with labor market inefficiencies. Third, we estimate directly the perceived loss (PL) the unemployed face, which we define as the difference between the market wage and the reservation wage (as summarized by the labor supply curve) of the unemployed.

There are several specific contributions of this paper. First, it extends Bender *et al*. (2006), who look at labor market inefficiencies over time for two countries, to a broader set of countries. This is an important extension since there will likely be much more variation in labor demand and supply elasticities between countries given the particular institutional differences between labor markets. Second, as discussed above, we develop several new measures of labor market inefficiency. Thus, it goes beyond replicating Bender *et al*. (2006) since it sheds light on the reasons behind the low DWLs that arise in the abovementioned paper by estimating the true level of the underutilization of labor as measured by the UFER. Finally, while the DWL may be the correct measure of inefficiency, we also investigate the perceived loss (PL) in wages that unemployed individuals bear. For although the DWL may provide sensible policy conclusions from a welfare point of view, the PL may in equal measures be important from a public choice perspective. As the supply agents in the labor market constitute such a large proportion of voters, it is likely that policy makers may be concerned about the perceived losses an unemployed worker may face.[1]

[1] Note that the analysis is restricted to the operation of the labor market and so the losses that we discuss here are purely monetary. The subjective valuation of a job is beyond the scope of this paper. If unemployment causes some psychic loss (e.g. Clark and Oswald, 1994; Theodossiou, 1998) the measures in this paper will underestimate *all* the costs of unemployment. In addition, we do not investigate any external effects of unemployment that could

Comparing our measures to the unemployment rate, we show that the same level of unemployment can give rise to substantially different levels of UFERs, DWLs, and PLs, confirming the suspicion that unemployment rates are poor measures of 1) the underutilization of labor, 2) labor market inefficiency, and 3) the perceived loss the unemployed face. All of these considerations mean that our measures serve as better indicators than the unemployment rate of the successes or failures of economic policies in a labor market context. In short, our measures can supply important information to policy makers, which may help them to prescribe better policies.

The outline of the paper is as follows: section 2 defines the various measures of labor market inefficiency. Section 3 details the data and empirical methodology. Section 4 presents the results and discusses the impact on the ranking of countries in terms of labor market inefficiency by using these alternative measures of loss rather than the unemployment rate. Section 5 offers some concluding comments.

II. Alternative Measures of Loss in the Labor Market.

We consider four different measures of losses which accrue due to underemployment in the labor market. All these can be illustrated by considering Figure 1.

The unemployment rate (UR)

The unemployment rate (UR) is simply the proportion of the labor force who are unemployed. At a given wage rate, w_0, let the labor force be defined by N_0^f and the employment level by N_0^e. With unemployment defined as $N_0^f - N_0^e$, the unemployment rate is given by:

$$UR = \frac{N_0^f - N_0^e}{N_0^f} \qquad [1]$$

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potentially cause inefficiencies outside the labor market. Nor do we investigate whether unemployment may reduce inflationary pressures. Further, we have no information across countries on discouraged or underemployed workers (which bias the unemployment rate downward) or illegal working or exaggerated search (which bias the unemployment rate upward). In as much as these bias the unemployment rate, they will also bias our measures of labor market inefficiency.

An ideal indicator of inefficiency should accurately measure the extent of sub-optimal resource allocation in the labor market. The unemployment rate has two major problems in this respect. First, it tends to over-estimate the number of individuals who are underutilized in the economy. Second, it does not measure the unexploited gains to trade directly. The first issue is examined as the UFER below whereas the second concern is dealt with as the DWL below. [2]

The under-full employment rate (UFER)

The number of unemployed workers at a given wage rate is not equal to the number of individuals who would get work if the market cleared. With the wage rate at w_0, the number of unemployed is represented as $N_0^f - N_0^e$. However, with the market wage exceeding the market clearing wage, w^c, full employment occurs at N^c rather than at N_0^f. Thus, not all the unemployed individuals will be employed if full employment occurs. Indeed it is more accurate to claim that $N^c - N_0^e$ is the true number of underutilized workers in the economy; that is the number of unemployed workers who would find themselves in employment if the economy reaches full employment. We, therefore, define the Under-Full Employment Rate (UFER) as the proportion of workers who are under-employed relative to the full employment level:

$$\text{UFER} = \frac{N^c - N_0^e}{N^c} \qquad [2]$$

Since $N^c < N_0^f$, the UFER is smaller than the UR. Thus, the UR overstates how many workers would gain employment if the economy moved to a full employment state. Indeed we could interpret the UFER as the 'true' unemployment rate. Note, however, though this measure more accurately identifies the proportion of individuals who could potentially be moved out of inactivity, it, like the UR, remains a poor measure of the actual unexploited gains to employment.

[2] Each of the following alternative measures of labor market inefficiency assumes the market clears, effectively ruling out the existence of frictional unemployment. We therefore overestimate the inefficiencies in our empirical analysis below, although given the small size of most of these inefficiencies, the bias of ignoring frictional unemployment appears to be small.

Dead weight loss (DWL)

In order to accurately assess the inefficiencies arising from unemployment we calculate the dead weight loss (DWL) in the labor market. This measure is the difference between the potential maximum employer-employee surplus possible and the actual surplus in the labor market. The DWL measures the unexploited gains to trade in the labor market and is dependent not only on the unemployment rate but also on the labor supply and demand elasticities. It is represented in Figure 1 by the area denoted DWL, between the supply and demand curves running from the market employment at N_0^e to the full employment N^c.

The calculation of DWL is straightforward, given the indirect labor supply and demand functions:

$$w^s = S(N) \qquad [3a]$$

and

$$w^d = D(N)\,. \qquad [3b]$$

If the market clearing employment is N^c but actual employment is N_0^e, the DWL can be given as:

$$DWL = \int_{N_0^e}^{N^c} D(N)dN - \int_{N_0^e}^{N^c} S(N)dN\,. \qquad [4]$$

This gives an absolute monetary measure of the efficiency loss for the general functions of D(N) and S(N). To put more structure on this, we specify particular functional forms with constant elasticities for the labor supply and demand functions:

$$w^s = A_s N^{\varepsilon_s} \qquad [5a]$$

and

$$w^d = A_d N^{\varepsilon_d} \qquad [5b]$$

where ε_s and ε_d are the inverse supply and demand elasticities and where A_s and A_d are shift parameters that influence labor supply and demand, respectively.

Equating the expressions (5a) and (5b) gives the full employment level of employment, N^c:

$$N^c = \left(\frac{A_s}{A_d}\right)^{\frac{1}{\varepsilon_d - \varepsilon_s}}. \qquad [6]$$

After some manipulation, the DWL can be written as:

$$DWL = \int_{N_0^e}^{N^c} A_d N^{\varepsilon_d} dN - \int_{N_0^e}^{N^c} A_s N^{\varepsilon_s} dN$$

$$= \left[\frac{1}{\varepsilon_d + 1} A_d N^{\varepsilon_d + 1}\right]_{N_0^e}^{N^c} - \left[\frac{1}{\varepsilon_s + 1} A_s N^{\varepsilon_s + 1}\right]_{N_0^e}^{N^c} \qquad [7]$$

$$= \left(\frac{1}{\varepsilon_d + 1} - \frac{1}{\varepsilon_s + 1}\right) w^c N^c - \left(\frac{1}{\varepsilon_d + 1} A_d \left[N_0^e\right]^{\varepsilon_d + 1} - \frac{1}{\varepsilon_s + 1} A_s \left[N_0^e\right]^{\varepsilon_s + 1}\right).$$

Finally, in order to obtain comparable efficiency losses across countries and time, we divide the DWL by GDP, to generate an Unemployment Loss Index (ULI), defined as:

$$ULI = \frac{DWL}{GDP}. \qquad [8]$$

By considering Fig. 1 it becomes evident that identical unemployment rates (or indeed identical UFERs) may lead to very different DWLs if either the supply or demand elasticities change. For instance, a higher DWL can be generated by rotating the labor supply curve from w^s around the (w_0, N_0^f) point (point 2) to a steeper and more inelastic labor supply curve. A more inelastic labor supply implies, in short, a greater DWL, given a constant UR. Intuitively, for a given UR, the maximum amount an individual unemployed worker will be willing to receive in a pay cut increases as the labor supply becomes more inelastic. Thus, the gains to trade of increasing the employment beyond N_0^e are greater as the labor supply becomes more inelastic. This is reflected by $w_0 - w_0^r$, the difference between the maximum amount that firms are willing to pay for the marginal worker and the minimum amount the marginal worker is willing to accept in order to supply the marginal unit of labor, which is larger when

the labor supply elasticity is low. A similar analysis can be conducted by altering the elasticity of labor demand.[3]

The perceived loss (PL)

An important issue regarding the DWL is that it is based on only a subset of the unemployed – namely those who would be employed if the market cleared. Whether this argument is regarded as relevant by the unemployed is a different matter. Indeed any given unemployed individual who observes the higher than market clearing wage will perceive a loss from unemployment, regardless whether the reservation wage the worker possesses is above the market clearing wage or not. So what is important to the unemployed is that he/she is being rationed at the market wage. Summing up all perceived losses of the unemployed generates an aggregate perceived loss (PL) measure for *all of the unemployed.* This measure is thus defined as the area between the market wage w_0 and the supply curve running from the employment rate of N_0^e to the labor force N_0^f in Fig. 1.

Conceptually, since an unemployed person's perceived loss is the difference between the market wage w_0 and value of their labor supply, the total PL is the joint area of DWL and area K in Fig. 1. Thus, its size is crucially dependent on the labor supply elasticity (but not on the demand elasticity) for a given level of employment. For example, when the labor supply becomes more inelastic evaluated at point (w_0, N_0^f), the supply curve pivots and the PL increases. From the equations described above and Figure 1, PL can be written as:

$$PL = w_0\left(N_0^f - N_0^e\right) - \int_{N_0^e}^{N_0^f} A_s N^{\varepsilon_s} dN$$

[3] Note that the analysis is evaluated at the actual wage and labor force point. Thus the labor supply curve pivots through point 2 in Fig. 1. The same procedure is employed to investigate the effects of differing demand elasticity by evaluating the changes at the actual employment point, rather than the equilibrium employment point.

$$= w_0\left(N_0^f - N_0^e\right) - \int_{N_0^e}^{N_0^f}\left[\frac{1}{\varepsilon_s + 1} A_s N^{\varepsilon_s + 1}\right] \qquad [9]$$

$$= w_0\left(N_0^f - N_0^e\right) - \left(\frac{1}{\varepsilon_s + 1} A_s \left[N_0^f\right]^{\varepsilon_s + 1}\right) - \left(\frac{1}{\varepsilon_s + 1} A_s \left[N_0^e\right]^{\varepsilon_s + 1}\right)$$

From this, we define the perceived loss index (PLI), which measures the PL as a proportion of GDP:

$$PLI = \frac{PL}{GDP}. \qquad [10]$$

Note that since this loss is felt by all of the unemployed, it implies two things. First, the PLI may be significantly larger than the ULI on its own (as reflected in Fig. 1). Second, since the PLI will be bigger than the ULI and since the unemployed hold some voting power, one might expect that the public policy aspects of unemployment might be much larger than that predicted by the strict inefficiency in the labor market. Thus the PLI measure might be important from a public choice framework to measure the relative importance of unemployment as a policy issue.[4]

III. Data and Econometric Specification

We now turn to estimating the various measures of unemployment losses using macroeconomic data for 18 OECD countries over the period 1970-2004. The data used here come from OECD National Accounts data for 1970 to 2004 for Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the UK, and the US. All monetary figures are deflated by the GDP deflator for a particular country.[5] There are two main reasons why macro-data may be preferred to micro-data in a cross-country comparison. First,

[4] A related literature includes papers by Hibbs (1977), Alesina (1987), and more recently Di Tella *et al*. (2001) and Di Tella and MacCulloch (2005) who examine political models where voters have preference over unemployment and inflation.

[5] For the countries in the Eurozone (Belgium, Finland, France, Germany, Italy, the Netherlands, and Spain) the OECD has converted pre-Euro currencies to Euros using the 'appropriate irrevocable conversion rates'. Therefore monetary values for these countries are converted to Euros back to 1970.

macro-data can include variables that are relatively similarly defined across countries, making cross-country comparisons possible. Second, in micro studies there are additional tractability and data requirement issues, such as the need to control for both labor supply and demand factors. While most developed countries conduct household surveys that could give information on the labor supply factors, few have employer surveys that could adequately control for labor demand conditions.

The dependent variable in both the labor supply and demand equations is the average real wage, which is calculated by total compensation in the economy divided by the number of individuals employed. Unfortunately, the literature is not very consistent with regards to the covariates found in the aggregate labor demand and supply equations. Many different variables in a variety of forms (current levels, lagged levels, or differences) have been used. Given this and the desire to replicate Bender *et al.* (2006), which is also consistent with Layard *et al.*'s (1991) choice of covariates in the labor supply and demand equations, we choose a specification that mirrors theirs as closely as possible. On the demand side, the independent variables include (logs of): employment, the sum of indirect and Social Security taxes (the 'wedge' term of Layard *et al.*, 1991), real exports, and real GDP.[6] On the supply side, the independent variables include (the logs of): labor force, the sum of Social Security and household income taxes, the unemployment rate, and a dummy variable for the 1973 to 1979 'stagflation' time period. There are many other covariates that determine labor demand and supply one could consider, but a conscious decision was made to make the variable specification as parsimonious as possible.[7] First, given the relatively short time series, having a large number of variables significantly decreases the degrees of freedom and, therefore, the power of the regressions. Second, on a more theoretical level, we want the supply and demand elasticities to be allowed to vary through the influence of country specific institutions,

[6] A 2001 to 2004 dummy variable for the US is added to pick up the labor demand effects in the aftermath of the 9/11 terrorist attacks; this dummy variable was not significant for other countries, and so it appears only in the US labor demand regression.

[7] A related literature examines determinants of unemployment over the long run (e.g., Blanchard and Wolfers, 2000; Nickell *et al.*, 2005), where the real interest rate (as a measure of the cost of capital) is often included as a covariate. This variable may play a particularly important role in the intertemporal labor supply, particularly on the intensive margin (i.e., on hours worked). In a dynamic setting, the real interest rate may certainly impact the labor/leisure tradeoff (see, for example, MaCurdy, 1981; Altonji, 1986; Ball, 1990; Keane and Rogerson, 2012).

since it is these that would generate inefficiencies in the labor market due to unemployment. By including only the main covariates, these excluded factors will allow for the possibility of generating different (inverse) elasticities if these factors vary across countries.

Hurd and Kapteyn (2003) provide a similar argument regarding country specific institutions using micro data. While it may be preferable to include measures of the institutional characteristics that cause the supply and demand elasticities to vary (e.g. unionization, unemployment benefits, search frictions, regulation, etc.) across countries, we only have 34 observations for each country. Thus, there are not enough degrees of freedom to attempt this since the elasticities could vary by *each* of these labor market characteristics. Our approach of examining the net effect of all these factors on the elasticities, therefore, moderates the potential arbitrariness of how to measure the institutions or disagreement on which institutions are important (see Blanchard and Wolfers, 2000). Consequently, we choose to allow for a parsimonious variable specification to force the net effect of these institutions on the elasticities.

Furthermore, the effect of labor market institutions on unemployment is highly contentious. Indeed, whether institutions do more than reduce income inequality is according to Freeman (2008) still an unresolved question. Though we do not necessarily concur with Bassanini and Duval (2009, p. 40) who state, "there is no or limited consensus on the quantitative impact of institutions on unemployment," there is still considerable debate both to the method of transmission and the magnitude of the effect institutions have on unemployment. This can been seen in a general sense, where Blanchard and Wolfers (2000) argue that using institutions as an explanation of high unemployment when these institutions were also present when unemployment was low is problematic, whereas Nickell *et al*. (2005) argue that changes in OECD unemployment over time can be attributed to shifts in institutions. In the more specific case of the collective bargaining literature stemming from the seminal work by Calmfors and Driffill (1988), several papers note (see Traxler and Brandl, 2012; Aidt and Tzannatos, 2008) that the literature strongly disagrees about which bargaining structure performs best. Therefore,

the complicated arguments concerning the direct effect institutions may have on unemployment is a debate that is beyond the scope of the paper and, which for reasons of focus and clarity we have sought to avoid.

We model the labor supply and demand estimating equations using a standard approach. Using the functional forms given in equations (5a) and (5b), we assume that the shift factors can be parameterized as the product of a group of covariates in the following way:[8]

$$A_d = \prod_{i=1}^{m} x_i^{\beta_i} \qquad [11a]$$

and

$$A_s = \prod_{j=1}^{k} z_j^{\gamma_j} . \qquad [11b]$$

The estimating regressions come directly from a log transformation of equations (5a), (5b), (11a), and (11b) and have the following form for each country, c, at time, t, for labor demand and supply, respectively:

$$\ln w_t^c = \varepsilon_d^c \ln E_t^c + \beta_d^c X_t^c + \mu_t^c \qquad [12a]$$

and

$$\ln w_t^c = \varepsilon_s^c \ln LF_t^c + \gamma_s^c Z_t^c + \eta_t^c \qquad [12b]$$

where w is the market wage, E is employment, X are variables that constitute the demand side shift parameter, A_d (with corresponding coefficients in β_d), LF is the labor force, Z are the covariates

[8]To estimate the ULI, the calculation of A_s and A_d are slightly different than presented in (11a) and (11b), as these would not guarantee that the employment-wage and the labor force-wage points would lie on the labor supply and demand curves, respectively. Therefore to force these curves through the actual data points for the market wage, employment and labor force, A_s and A_d are calculated by using the following formulae:

$$A_s = \frac{w_0}{\left(N_0^f\right)^{\hat{\varepsilon}_s}} \quad \text{and} \quad A_d = \frac{w_0}{\left(N_0^e\right)^{\hat{\varepsilon}_d}}$$

where w_0, N_0^e, and N_0^f are defined in Figure 1, and $\hat{\varepsilon}_s$ and $\hat{\varepsilon}_d$ are the estimated inverse labor supply and inverse demand elasticities, respectively.

constituting A_s (with corresponding coefficients in γ_s), ε_d and ε_s are the inverse demand and supply elasticities, and μ and η are random error terms.[9]

Since the regressions are meant to be illustrative of the points set out in the previous section (namely, that the labor supply and demand elasticities are different across countries), the estimation procedure is admittedly rather simplistic. That said, we do recognize the potential problem of autocorrelation and therefore correct for AR(1) serially correlated disturbances using the Prais-Winsten correction. In addition, to control for the endogeneity between real wages and employment on the demand side and real wages and labor force on the supply side, we estimate an instrumental variables procedure, using the standard technique of lagged values of the independent covariates as instruments.[10]

IV. Results

Elasticities

Table 1 contains the estimated inverse supply and demand elasticities for the eighteen countries. There are notable differences between countries. For example, the inverse demand elasticities range from a relatively elastic -0.042 for Australia to a relatively inelastic -1.131 for the U.S. while the inverse supply elasticities range from an elastic 0.028 in Italy to an inelastic 1.373 for Austria.[11] That said, most of the regressions find relatively elastic supply and demand elasticities. To obtain a better sense of these estimates, the second and fourth columns of Table 1 test whether the estimated coefficients are significant

[9] In nearly all regressions, this specification consists of regressing the level of wages on levels of all the covariates. The only exceptions are in the demand regressions for Australia, Austria, France, Japan, Switzerland, and the UK where the level covariates in X are replaced by first differences (and trend and trend squared terms added to X). Likewise for the supply regression for Austria, the level covariates of the variables in Z are replaced by first differences. Full results from the regressions are available from the authors.

[10] More sophisticated time-series methods could be used to analyze the labor supply and demand equations. Bender *et al*. (2006) apply time-series techniques in an error-correction framework to examine such issues for a longer span of data for the U.S. and U.K. Given the shorter span of data available for the countries in question in this study, an error-correction formulation is not possible. Our estimates are similar to Bender *et al*. (2006), particularly for US supply and demand and UK demand. The UK supply elasticity is smaller here. This difference is due to a difference in data, where Bender *et al*. (2006) used the entire labor force, including the military, to obtain the long time series. The labor supply numbers used here are harmonized across countries and only count the civilian labor force.

[11] Since the estimated coefficients are inverse elasticities, the actual elasticities are calculated by taking $1/\varepsilon_d$ or $1/\varepsilon_s$.

in indicating elastic supply or demand. On the demand side, the coefficients for all countries except Germany, Japan, Spain and the US indicate elastic labor demand at the 10% level or above. All countries except Austria, Belgium, Finland, France, and Norway indicate elastic labor supply curves.[12]

Unemployment rates and UFER

As indicated before, the unemployment rate (UR) is the most popular form of summarizing the efficiency in the labor market. The first column of Table 2 records the average UR for each country. The range is fairly large – from 1.6% in Switzerland to 13.7% in Spain. The data show the commonly perceived phenomenon of relatively high unemployment rates for continental European countries (sometimes referred to as Eurosclerosis) compared to more flexible markets such as Japan or the US.

However, we know that not all those who are unemployed would stay in the labor market at a market clearing wage, and so the UR is an overestimate of what might be considered as 'true' unemployment, the difference between the market clearing quantity of labor and the actual employment. In the discussion above, we define this rate as the Under Full Employment Rate (UFER). Using the estimated elasticities from Table 1, the UFER is calculated for each country and the averages for 1970-2004 are given in the second column of Table 2. For some countries, such as Australia, Austria, Belgium, Finland, and Switzerland, the UR and UFER are quite similar. For these countries, then, there seems to be a close correspondence of UR and the 'true' underutilization of labor, here measured by the proportion of the unemployed who would be employed at the market clearing wage.

On the other hand, the UR is clearly a large overestimate of those who would actually be employed. For some countries, such as Norway and the UK, the UFER is about half of the UR. For other

[12] These elasticities are in the ballpark of elasticities estimated in the literature. The US and UK elasticities are similar to those found in Bender *et al*. (2006) and those for the other countries are similar to those found in Layard *et al*. (1991). However they differ somewhat from the labor demand elasticities reported in Hamermesh (1993), which reviews studies generally finding inelastic demand. It is interesting to note that such low elasticities would make the DWL *even smaller* than those calculated here. Cahuc and Zylberberg (2004, pp. 38-41) report relatively inelastic labor supply. While this would generate higher DWL for a given unemployment rate, simulations (available from the authors) show that the elasticity would have to be on the order of a very small 0.05 for the DWL to approach one percent for many countries. Also see Keane and Rogerson (2012) for a discussion reconciling relatively inelastic labor supply figures based on individual labor supply decisions with relatively elastic labor supply figures typically found in the macroeconomics literature.

countries like Denmark, Germany, Japan, the Netherlands, New Zealand, Sweden, and the US, the UFER is somewhere between a fourth and a third of the UR. At the extreme end are the traditionally high UR countries of Spain and Italy, where the UFER is only a fraction of the UR, highlighting that the very high URs experienced in these countries are not indicative of the relatively few people who would actually receive a job at the market wage. Indeed, the UFER's of Spain and Italy are lower than the UFER's in the relatively low standard UR countries such as Austria or Norway or the UK.

Unemployment rates and DWL

The UFER indicates the number of individuals who would be employed at the market wage. However, it does not give a good indication of the amount of inefficiency experienced in labor markets caused by these workers not being employed. To obtain an estimate of this level of inefficiency, we calculate the DWL 'triangle' using the estimated supply and demand elasticities given in Table 1. In order to compare across countries, the DWL is divided by GDP to give the Unemployment Loss Index (ULI). The estimates of the average ULI from 1970 to 2004 for each country are given in Table 3, along with the UR for comparison.

The primary result from these estimates is that the ULIs are remarkably small (as found for the US and UK in Bender *et al*. 2006) – ranging from 0.001% of GDP for Italy to 0.219% for Belgium. Overall, the (unweighted) average ULI across all countries is just 0.039% of GDP. That said, there is quite a bit of variation across countries, as shown by the coefficient of variation statistic of 1.576. Generally, the ULI measure shows more standardized variation relative to the UR, which has a coefficient of variation of 0.463.

The low ULIs have implications for the debate concerning the overall effect of institutions on labor market inefficiency. For example, take the case of Spain, where Jaumotte (2011) argues that the large Spanish unemployment rate is due to low wage flexibility and an insider-outsider problem, with the first arising from the intermediate level of collective wage bargaining and the latter from

the high level of severance payments. However, while it may be plausible that the *large* Spanish unemployment rate is rooted in specific Spanish institutions, it is arguably less reasonable to believe that the same institutional factors of Spain are capable of simultaneously explaining the absolute *low* level of inefficiency as measured by the ULI.

Comparing the UR and ULI shows that sometimes they do compare well, while other times they do not. Belgium, for example, has a relatively large UR and has the highest average ULI. Likewise, Finland and France have relatively high UR and ULI measures. On the other hand, as in Table 2, Italy and Spain give a vastly different story. The URs of 9.3% and 13.7% for Italy and Spain, respectively, correspond with very small ULIs of 0.001 and 0.005. In general, there is not a strong relationship between average UR and ULI, as seen in the positive, but statistically insignificant, correlation of 0.314 between these variables.

So how do countries such as Spain and Italy accomplish having relatively low ULIs while having large URs? In general, it is due to the relatively elastic labor supply curves in these countries. Indeed, given that most countries have relatively elastic demand curves of similar magnitudes, most of the differences in ULIs across countries seem to be dominated by labor supply differences. One way to see this is to use a common tool from the public finance literature on determining the incidence of the inefficiency in markets, by breaking it down into demand and supply incidences. Table 4 reports the results from this exercise. By and large, those countries with low ULIs (at the top half of the table) show relatively low levels of supply incidence. Except for Switzerland, the predominant influence on inefficiency comes from the demand side of the market, although the inefficiency itself is generally very small. Conversely, towards the bottom of the table (where the ULIs are higher), we see the relative impact switch, so that inefficiencies in countries such as Australia, the UK, Finland, France, and Belgium are all due to the supply side.

Table 3 also reports some measure of the time series variation in the ULI by looking at the standard deviations of the average ULI measures. In general, the standard deviations are relatively large

compared to the means. Particularly when the average ULI is small, the standard deviation is relatively large (e.g. Denmark, Italy, Japan, New Zealand, Norway, Spain, Sweden), but even for countries with larger average ULIs (e.g. Belgium, Finland, and France) the standard deviation is large, indicating that the relative changes in inefficiency can be large. However, the absolute level of labor market inefficiency continues to be small. The largest ULI estimated for any country at any time is Finland in 1993 when the DWL was still only 0.56% of real GDP.

Unemployment rates and perceived losses

The ULIs discussed above have one common feature: even if they are quite different across countries, they are generally very small. Thus, one might wonder why there is such a research and policy focus on the unemployed (at least from a labor market perspective). One possible answer is that market imperfections in labor markets operate differently than in goods markets, affecting behavior more directly by inducing individuals out of one state (being out of the labor force) and into another (being unemployed). These unemployed are not able to get a job, and yet see high wages being paid for jobs. Consequently, there is a perceived loss between the market wage and the value of their 'leisure' time (as summarized by their labor supply curve). As discussed above, this 'perceived loss' will be felt by *all* the unemployed, even those who would not be employed at the market wage. Hence, the PLI will yield (potentially much) larger values than the ULI.

Table 5 includes calculations of the PLI measure defined earlier, along with the UR and ULI for comparison. Again, by definition, the PLI is larger than the ULI, and so the primary question is whether the perceived loss by itself is relatively large. In general, the answer to that question is no. The largest average PLI is still only 0.238% of GDP for Belgium, a small 0.02 percentage point increase over the ULI. For many countries (Australia, Austria, Belgium, Finland, France, Norway, Switzerland, and the UK), the PLI is not very much larger than the ULI as seen in the fourth column, and so adding area K from Figure 1 adds little to the losses. Ten countries, though, see a substantial relative increase when the perceived loss is added to the ULI, e.g. Canada, Denmark, Japan, the Netherlands, New Zealand, Sweden,

and the US see at least a doubling in the loss, while Germany and Italy experience at least a fivefold increase. Spain experiences the largest relative increase of 1100%! However, given the base with which it started, Spain's PLI is still below those for Belgium, Finland, France, the UK, and the US. Indeed, it is important to note that these countries with the higher relative increases in losses once the perceived loss is added in are among those with the lowest ULIs.

To add some further context to the PLI, we calculate two related statistics. First, we calculate the PL of the inframarginal unemployed person, defined as the difference between the market wage (w_0 from Figure 1) and his/her reservation wage (w_0^r) as a percentage of the market wage. This is termed the 'Marginal Loss' in Table 5 and is interpreted as the potential gains to trade by hiring the inframarginal worker. Contrary to our PLI measure, the marginal loss measure is relatively large in some countries. In Belgium, it is nearly eight percent of the market wage, and in France it is nearly seven percent. In Italy, the Netherlands, Sweden, and Switzerland, however, it is less than one percent of the wage – showing that the gains to efficiency for employing the unemployed person who would gain the most are quite small.

In a similar spirit, we also calculate the average perceived loss an unemployed individual believes he/she faces, calculated as the difference between the market wage and the PL per unemployed worker, divided by the market wage. This 'Average Loss' statistic is in the last column of Table 5 and is for most countries relatively small – under one percent of the market wage in ten countries. However some countries have larger average losses with Belgium and France being the main 'sufferers'. Thus although all countries have low DWLs and all have low perceived losses as calculated as a percentage of GDP, some countries may have relatively large perceived losses for at least some workers.

Discussion

As stated in the introduction, the UR is often used as a statistic to measure the relative labor market inefficiency between countries. However, there are theoretical reasons to think that the UR itself is only part of the story – that the elasticities of labor supply and demand also play a large role in

describing labor market inefficiency. How badly does the UR do in describing inefficiency? Table 6 addresses this issue by ranking the countries by the four potential measures of labor market inefficiency: the UR, UFER, ULI and PLI statistics described earlier. If the ranking based on the UR is mirrored by the other measures, then it may be a good proxy for inefficiency. If the rankings differ, however, then the potential shortcomings that we mention above are realized.

As Table 6 shows, the rankings are substantially different. Comparing the UR with the UFER we see that Spain, which has the highest average UR, has the third lowest UFER. Italy also ranks much more favorably in the UFER rankings compared to the UR rankings. On the other hand, Austria drops from third best UR to the twelfth best UFER. Overall, even though both measures are variations on an unemployment rate, there is little correlation across countries. The correlation is positive at 0.328 but is statistically insignificant.

Moving to the ULI, we see that Italy is the country with the lowest inefficiency, although it has one of the highest UR. Spain also does remarkably better on the ULI scale. Canada, whose UR is somewhat higher than the US, has a ULI that is lower than the one for the US. Switzerland and Austria, both with very low URs find themselves in the middle of the ULI ranking. Similar movements are found between the UR and the PLI, although, as mentioned before, Spain drops to the bottom third of the table due to the large amount of extra perceived loss. Clearly, using the UR to compare labor market inefficiency across countries does not provide the most accurate ranking.

Correlations between these two measures and the UR confirm that they are not strongly correlated. As mentioned before, the correlation between the ULI and UR is a statistically insignificant 0.312. On the other hand, the correlation between the UR and PLI is somewhat stronger at 0.444, which is statistically significant at the 10% level. This stronger correlation makes sense, though, since the PLI includes perceived loss by *all* the unemployed. Finally, we note that the UFER, ULI and PLI are all strongly positively correlated, all above 0.88 and statistically significant. Given the strong correlation between these measures without a corresponding relationship with the UR indicates the relative

importance of the elasticities in the measuring of inefficiencies, compared to the absolute or relative number of the unemployed.

Implicitly, it is the relative rankings in Table 6 that we attribute to cross-country differences in labor market institutions (or other country features not included in our set of covariates). Note, however, that the measured inefficiencies are remarkably small for all countries regardless of institutional differences. In short, this paper questions the narrative that institutions cause large labor market inefficiencies. Indeed, while institutional differences may affect unemployment rates, they have only a small absolute impact on labor market inefficiency.

This is not to say that unemployment does not have undesirable income distributional effects. The Krugman (1994) hypothesis offers an institution-based explanation for the differences in wage dispersion and unemployment across the Atlantic. It is argued that flexible labor markets, such as those in the US, are able to absorb (macroeconomic) shocks through changes in wage inequality, whereas labor market institutions in most European countries tend to protect wages at the expense of higher unemployment, implying that "U.S. inequality and European unemployment are different sides of the same coin" (Krugman, 1994, p. 31). The corollary of the Krugman argument is that flexible labor markets have the advantage of reducing unemployment and the inherent inferred inefficiency. Our argument is that this consideration matters less than previously recognized, since the current paper demonstrates that the inefficiency of unemployment is remarkably small or even negligible. Thus any concern for changes in unemployment, whether or not they stem from institutions, should not in the main be motivated by the small effect it has on labor market efficiency. Instead we would argue it is the distributional issues that arise from changes in unemployment that matter.

We have also explored the stability of the estimated elasticities by allowing the elasticities to vary broadly over decades (results available from the authors). The elasticities are remarkably stable. Further,

allowing the elasticities to vary over time has very little impact on the relative rankings of countries for the various measures of inefficiency in Table 6. This is likely due to the fact that broad institutional and cultural effects on country-specific elasticities change only slowly over time.

The rankings of the various countries over the measures of inefficiency are also quite stable to business cycle movements. The OECD tracks economic growth using the Composite Leading Indicators and provides dates for the turning points (peaks and troughs) in the series. To see whether the rankings of countries by the various inefficiency measures change for expansionary or contractionary periods, we categorize expansionary years as those with at least six months of growth and contractionary years as those with at least six months of contraction and then rank the countries by the measures of inefficiency. For the most part, the rankings are little changed (results available from the authors). There is some movement in rankings using the unemployment rate as the measure of inefficiency but very little change for the other measures of inefficiency. Countries with low inefficiency in contractions are also ranked with low inefficiency in expansions. Again, the stability of rankings may not be that surprising since any broad changes in economic health (essentially a shift in the aggregate labor demand curve) will have similar shifts in each country since the elasticities remain so stable. It would be an interesting course of future research (using a longer time series of data for each country) to investigate just how stable the labor demand and supply elasticities are over the business cycle.

V. Conclusions

The results discussed above clearly indicate four things: 1) that the unemployment rate is not a particularly good measure of comparative losses in the labor market, 2) that the underutilization of labor, as reflected by the number of individuals who would get jobs if the labor market were to clear, is not particularly well measured by the unemployment rate, 3) that the labor market inefficiencies, even for countries with high unemployment rates, are generally very low, and 4) that the perceived losses as measured as a fraction of GDP are also low, but that for some unemployed individuals in some countries, these losses may be significant.

These results lead to several implications: From a purely labor market viewpoint, unemployment does not generate much inefficiency. This is a fairly common assumption in neoclassical economics, and we confirm it with our results. However, some caution needs to be made here. First, we are only measuring the losses in efficiency in the labor market. In the event that there are spillover effects from the unemployed into other markets (e.g. increased crime or increased taxes to pay for unemployment benefits or health care), these measures of inefficiency will not capture these costs.

Second, even recognizing that we have restricted the losses to only the labor market, the inefficiency generated by high unemployment countries such as Spain seem very small. This confirms the results found in Bender *et al*. (2006) and is also consistent with two different strands of literature which find either absent or low levels of inefficiency where one would *a priori* expect to find substantial levels. In the first strand of literature, Fogel and Engerman (1971) show that slavery in the US, although inequitable, was not inefficient. However, Fogel and Engerman (1974) argue in this respect that a more efficient use of labor does not indicate a greater good, as freedom has a value in itself, and that the gain in measured output under slavery was outweighed by the loss of freedom. In the second strand of literature, Harberger (1954) estimates that the welfare loss emanating from monopolies does not exceed more than 0.1% of GDP.

An interesting extension is a further examination of the perceived loss of unemployment. Although this somewhat unconventional measure of inefficiency is also found to be relatively low, there are significant losses for the (particularly inframarginal) unemployed in some of the countries. As we have mentioned, even if there are not large labor market inefficiencies per se, these perceived losses in not being able to obtain the market wage may play a role in public choice and may give unemployment a higher profile than might be the case from a strict labor market inefficiency standpoint.

Finally, further work should check the robustness of the, admittedly, simple model described here. Statistical models encompassing longer time series of data and country-specific institutional features in the labor market (such as unionization rates, level of collective bargaining, generosity of unemployment benefits, etc.), may offer a richer description of inefficiencies in labor markets. Further

examination of other countries and disaggregating from a broad macro labor market to industry or occupational labor markets might also provide more insight into efficiency issues.

References

Aidt, T.S. and Tzannatos, Z. (2008) Trade unions, collective bargaining and macroeconomic performance: A review. *Industrial Relations Journal*, **39**, 258–95.

Alesina, A. (1987) Macroeconomic policy in a two-party system as a repeated game, *Quarterly Journal of Economics* **102**, 651-78.

Altonji, J. (1986) Intertemporal substitution in labor supply: Evidence from micro data, *Journal of Political Economy* **94**, S176-S215.

Ball, L. (1990) Intertemporal substitution and constraints on labor supply: Evidence from panel data, *Economic Inquiry* **28**, 706-24.

Bassanini, A. and Duval, R. (2009) Unemployment, institutions, and reform complementarities: re-assessing the aggregate evidence for OECD countries, *Oxford Review of Economic Policy* **25**, 40–59

Bender, K., Neumann, R. and Skåtun, J. (2006) Unemployment and other measures of labor market inefficiency: a comparison of U.K. and U.S. labor markets 1931-1996, *Economic Inquiry* **44**, 629-43.

Blanchard, O. and Wolfers, J. (2000) The role of shocks and institutions in the rise of European unemployment: the aggregate evidence, *Economic Journal* **110**, C1-33.

Blinder, A. (1987) *Hard Heads, Soft Hearts*, Addison Wesley Publishing Co.: New York.

Cahuc, P. and Zylberberg, A. (2004) *Labor Economics*, MIT Press: Cambridge, MA.

Calmfors, L. and Driffill, J. (1988) Bargaining structure, corporatism and macroeconomic performance, *Economic Policy* **6**, 13–61.

Clark, A. and Oswald, A. (1994) Unhappiness and unemployment, *Economic Journal* **104**, 648-59.

Di Tella, R. and MacCulloch, R. (2005) Partisan social happiness, *Review of Economic Studies* **72**, 367-93.

Di Tella, R., MacCulloch, R. and Oswald, A. (2001) Preferences over inflation and unemployment: evidence from surveys of happiness, *American Economic Review* **91**, 335-41.

Freeman, R. (2008) Labor market institutions around the world in *The Sage Handbook of Industrial Relations* (Eds) P. Blyton, N. Bacon, J. Fiorito and E. Heery, Thousand Oaks, CA, pp. 640-58.

Fogel, R. and Engerman, S. (1971) The relative efficiency of slavery: a comparison of northern and southern agriculture in 1860, *Explorations in Economic History* **8**, 353-67.

Fogel, R. and Engerman, S. (1974) *Time on the Cross: The Economics of American Negro Slavery*, Little Brown: Boston.

Hamermesh, D. (1993) *Labor Demand*, Princeton University Press: Princeton.

Harberger, H. (1954) Monopoly and resource allocation, *American Economic Review* **44**, 77-87.

Hibbs, D. (1977) Political parties and macroeconomic policy, *American Political Science Review* **71**, 1467-87.

Hurd, M. and Kapteyn, A. (2003) Health, wealth, and the role of institutions, *Journal of Human Resources* **38**, 387-415.

Jaumotte, F. (2011) The Spanish labor market in a cross-country perspective, IMF Working Paper WP/11/11.

Keane, M. and Rogerson, R. (2012) Micro and macro labor supply elasticities: A reassessment of conventional wisdom, *Journal of Economic Literature* **50**, 464-76.

Krugman, P. (1994) Past and prospective causes of high unemployment, *Economic Review,* Federal Reserve Bank of Kansas City, **79**, 23-43.

Layard R., Nickell, S. and Jackman, R. (1991) *Unemployment: Macroeconomic Performance and the Labour Market*, Oxford University Press: Oxford.

MaCurdy, T. (1981) An empirical model of labor supply in a life-cycle setting, *Journal of Political Economy* **89**, 1059-85.

Nickell, S., Nunziata, L. and Ochel, W. (2005) Unemployment in the OECD since the 1960's. What do we know? *The Economic Journal* **115**, 1–27.

OECD (2010) "Labour Force Statistics: Summary tables," *OECD Employment and Labour Market Statistics* (database).

Theodossiou, I. (1998) The effects of low-pay and unemployment on psychological well-being: a logistic approach, *Journal of Health Economics* **17**, 85-104.

Traxler, F. and Brandl, B (2012) Collective bargaining, inter-sectoral heterogeneity and competitiveness: A cross-national comparison of macroeconomic performance *British Journal of Industrial Relations* **50**, 73–98.

Table 1. Inverse Labor Demand and Supply Elasticities

	Demand		Supply	
Country	Inverse Elasticity	Test for Elastic Demand	Inverse Elasticity	Test for Elastic Supply
Australia	-0.042	3.52***	0.346*	3.80***
	(0.272)		(0.172)	
Austria	-0.539*	1.69*	1.373***	0.90
	(0.273)		(0.414)	
Belgium	-0.075	2.31**	0.897***	0.50
	(0.400)		(0.205)	
Canada	-0.360	2.67***	0.182**	11.52***
	(0.240)		(0.071)	
Denmark	-0.615**	1.58*	0.230	3.03***
	(0.243)		(0.254)	
Finland	-0.121	6.61***	0.762**	0.67
	(0.133)		(0.354)	
France	-0.210*	2.47***	0.810***	1.17
	(0.320)		(0.163)	
Germany	-1.059***	0.35	0.224	3.48***
	(0.169)		(0.223)	
Italy	-0.098	2.06**	0.028	11.71***
	(0.438)		(0.083)	
Japan	-0.942*	0.11	0.440	1.96**
	(0.543)		(0.285)	
Netherlands	-0.355**	3.79***	0.109	8.49***
	(0.170)		(0.105)	
New Zealand	-0.469*	2.01**	0.253**	7.11***
	(0.264)		(0.105)	
Norway	-0.326	3.26***	0.650**	1.19
	(0.207)		(0.294)	
Spain	-0.866**	0.33	0.079	6.44***
	(0.402)		(0.143)	
Sweden	-0.293	2.50***	0.120	3.11***
	(0.283)		(0.283)	
Switzerland	-0.207	5.08***	0.534**	2.19**
	(0.156)		(0.213)	
UK	-0.369**	2.20**	0.512	1.52*
	(0.287)		(0.322)	
US	-1.131***	0.75	0.530***	3.64***
	(0.175)		(0.129)	

NOTE: Numbers in parentheses under parameter estimates are standard errors. The tests in columns two and four are one tailed t-tests (t-stats are in absolute value) for whether the estimated demand coefficient is greater than minus one or whether the estimated supply coefficient is less than one.
*, **, *** Significant at the 10% , 5%, and 1% level respectively.

Table 2. Unemployment and Under Full Employment Rates

	Average Unemployment Rate (UR) (%)	Average Under Full Employment Rate (UFER) (%)
Australia	6.4	5.7
Austria	3.1	2.2
Belgium	8.8	8.1
Canada	8.4	2.7
Denmark	6.4	1.7
Finland	7.2	6.1
France	8.3	6.5
Germany	5.9	1.0
Italy	9.3	2.0
Japan	2.8	0.9
Netherlands	6.2	1.4
New Zealand	4.5	1.5
Norway	3.2	2.1
Spain	13.7	1.0
Sweden	4.4	1.2
Switzerland	1.6	1.1
UK	6.8	3.9
US	6.2	2.0

Note: The unemployment rate is calculated as the number of unemployed divided by the labor force using OECD data on employment and the labor force. The Under Full Employment Rate is defined as the difference between the market equilibrium employment and actual employment, divided by equilibrium employment.

Table 3. Unemployment Rates and Unemployment Loss Index

Country	Average UR (%)	Average Unemployment Loss Index (ULI) (%)
Australia	6.4	0.040
		(0.026)
Austria	3.1	0.028
		(0.017)
Belgium	8.8	0.219
		(0.144)
Canada	8.4	0.013
		(0.006)
Denmark	6.4	0.009
		(0.007)
Finland	7.2	0.131
		(0.154)
France	8.3	0.148
		(0.088)
Germany	5.9	0.005
		(0.003)
Italy	9.3	0.001
		(0.001)
Japan	2.8	0.004
		(0.003)
Netherlands	6.2	0.004
		(0.003)
New Zealand	4.5	0.006
		(0.006)
Norway	3.2	0.014
		(0.012)
Spain	13.7	0.005
		(0.004)
Sweden	4.4	0.003
		(0.004)
Switzerland	1.6	0.006
		(0.003)
UK	6.8	0.050
		(0.039)
US	6.2	0.021
		(0.010)
Average	6.3	0.039
Coefficient of Variation	0.463	1.576
Correlation	0.314	

NOTE: The Unemployment Loss Index is defined as deadweight loss divided by GDP. Numbers in parentheses are standard deviations (over 1970-2004).

Table 4. Incidence Analysis

	Overall ULI	Demand side ULI	Supply side ULI
Italy	0.001	0.0011	0.0003
		(77.7%)	(22.3%)
Sweden	0.003	0.0020	0.0008
		(71.1%)	(28.9%)
Netherlands	0.004	0.0027	0.0008
		(76.5%)	(23.5%)
Japan	0.004	0.0024	0.0011
		(68.2%)	(31.8%)
Spain	0.005	0.0043	0.0004
		(91.7%)	(8.3%)
Germany	0.005	0.0041	0.0009
		(82.5%)	(17.5%)
Switzerland	0.006	0.0016	0.0041
		(27.9%)	(72.1%)
New Zealand	0.006	0.0040	0.0021
		(65.0%)	(35.0%)
Denmark	0.009	0.0065	0.0024
		(72.8%)	(27.2%)
Canada	0.013	0.0089	0.0045
		(66.5%)	(33.5%)
Norway	0.014	0.0046	0.0091
		(33.4%)	(66.6%)
US	0.021	0.0146	0.0068
		(68.3%)	(31.7%)
Austria	0.028	0.0081	0.0202
		(28.3%)	(71.7%)
Australia	0.040	0.0044	0.0359
		(11.0%)	(89.0%)
UK	0.050	0.0213	0.0290
		(42.0%)	(58.0%)
Finland	0.131	0.0185	0.1130
		(13.8%)	(86.2%)
France	0.148	0.0311	0.1164
		(20.7%)	(79.3%)
Belgium	0.219	0.0174	0.2012
		(7.7%)	(92.3%)

Note: Relative percentages in parentheses. The 'Demand side ULI' is the amount of the deadweight loss between the labor demand curve and the equilibrium wage. The 'Supply side ULI' is the amount of the deadweight loss between the equilibrium wage and the labor supply curve.

Table 5. Relationships between Unemployment Rates, Dead Weight Loss and 'Perceived Loss'

	Average UR (%) (1)	ULI (%) (2)	Perceived Loss Index (PLI) (%) (3)	PLI-ULI / ULI (%) (4)	Marginal loss (% mkt wage) (5)	Average Loss (% mkt wage) (6)
Australia	6.4	0.040	0.045	25.0	2.3	1.1
Austria	3.1	0.028	0.040	42.9	4.2	2.1
Belgium	9.3	0.219	0.238	8.7	7.9	4.0
Canada	8.4	0.013	0.041	215.4	1.6	0.8
Denmark	6.4	0.009	0.034	277.8	1.5	0.8
Finland	7.1	0.131	0.154	17.6	5.5	2.8
France	8.3	0.148	0.188	27.0	6.8	3.4
Germany	5.9	0.005	0.029	480.0	1.4	0.7
Italy	9.3	0.001	0.007	600.0	0.3	0.1
Japan	2.8	0.004	0.011	175.0	1.2	0.6
Netherlands	6.2	0.004	0.015	275.0	0.7	0.3
New Zealand	4.4	0.006	0.018	300.0	1.2	0.6
Norway	3.2	0.014	0.021	50.0	2.1	1.1
Spain	13.7	0.005	0.060	1100.0	1.1	0.6
Sweden	4.4	0.003	0.010	233.3	0.5	0.3
Switzerland	1.6	0.006	0.008	33.3	0.8	0.4
UK	6.8	0.050	0.088	76.0	3.6	1.8
US	6.2	0.021	0.069	228.6	3.4	1.7

Note: The PLI is a measure of the loss perceived by the unemployed, defined as the difference between the market wage and the reservation wage of the unemployed (as summarized by the labor supply curve). The PLI is the aggregated value of these losses across all the unemployed divided by GDP. The 'Marginal loss' is the difference between the market wage and the labor supply for the inframarginal unemployed person as a percentage of the market wage. The 'Average loss' is the total perceived loss divided by the number of unemployed as a percentage of the market wage.

Table 6. Country Rankings by Unemployment Rate, Underutilization Rate, ULI, and 'Perceived Loss'

Average Unemployment Rate (UR) (%)		Average Under Full Employment Rate (UFER) (%)		Average Unemployment Loss Index (ULI) (%)		Average Perceived Loss Index (PLI) (%)	
Switzerland	1.6	Japan	0.9	Italy	0.001	Italy	0.007
Japan	2.8	Germany	1.0	Sweden	0.003	Switzerland	0.008
Austria	3.1	Spain	1.1	Netherlands	0.004	Sweden	0.010
Norway	3.2	Switzerland	1.1	Japan	0.004	Japan	0.011
Sweden	4.4	Sweden	1.2	Spain	0.005	Netherlands	0.015
New Zealand	4.4	Netherlands	1.4	Germany	0.005	New Zealand	0.018
Germany	5.9	New Zealand	1.5	Switzerland	0.006	Norway	0.021
Netherlands	6.2	Denmark	1.7	New Zealand	0.006	Germany	0.029
US	6.2	US	2.0	Denmark	0.009	Denmark	0.034
Denmark	6.4	Italy	2.0	Canada	0.013	Austria	0.040
Australia	6.4	Norway	2.1	Norway	0.014	Canada	0.041
UK	6.8	Austria	2.12	US	0.021	Australia	0.045
Finland	7.1	Canada	2.7	Austria	0.028	Spain	0.060
France	8.3	UK	3.9	Australia	0.040	US	0.069
Canada	8.4	Australia	5.7	UK	0.050	UK	0.088
Italy	9.3	Finland	6.1	Finland	0.131	Finland	0.154
Belgium	9.3	France	6.5	France	0.148	France	0.188
Spain	13.7	Belgium	8.1	Belgium	0.219	Belgium	0.238

Figure 1. An Inefficient Labor Market