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Work Absence in Europe

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Work absence is a part of an individual's decision concerning hours worked. This paper focuses on sickness absence in Europe and builds on an analytical framework in which absence enters both labor supply and demand considerations, with sickness insurance provisions and labor market institutions affecting the costs of absence. The results from a panel of 18 European countries indicate that absence is higher under generous insurance systems and where employers bear little responsibility for their costs. Shorter working hours reduce absence, but flexible working arrangements are preferable if labor supply erosion is a concern. [JEL C23, I18, I38, J22]
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Low and falling labor utilization has been blamed for the lackluster growth performance of many European countries (OECD, 2003). To a large extent, labor supply erosion can be attributed to the decline in working time. In fact, although participation—possibly owing to labor market reforms—has increased in most European countries in the past 20 years, average working time has continued falling, in line with a long-standing

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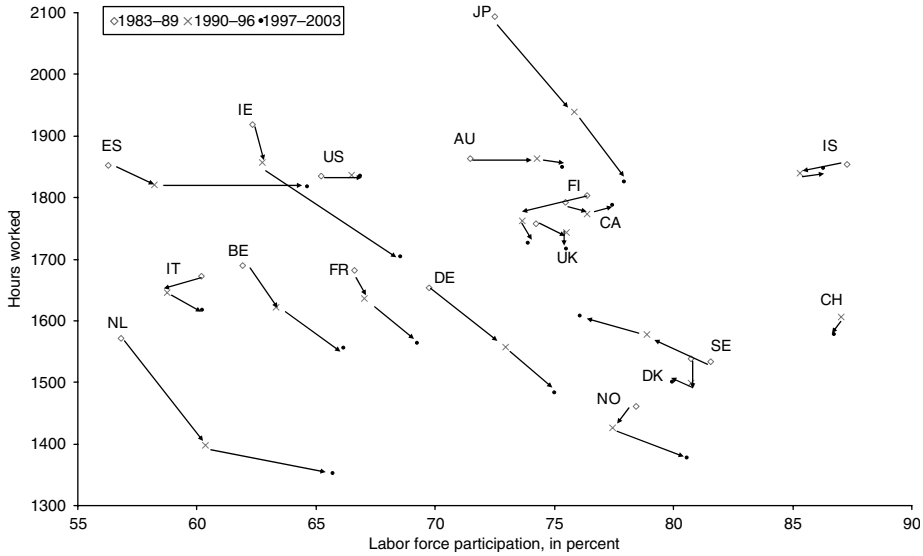
Figure 1. Labor Force Participation Rate and Average Hours Worked Annually per Employee



Source: Organization for Economic Cooperation and Development (OECD), *OECD Economic Outlook Database*.

Notes: AU = Australia; BE = Belgium; CA = Canada; CH = Switzerland; DE = Germany; DK = Denmark; ES = Spain; FI = Finland; FR = France; IE = Ireland; IS = Iceland; IT = Italy; JP = Japan; NL = Netherlands; NO = Norway; SE = Sweden; UK = United Kingdom; US = United States.

trend, also common to Japan, but not to the United States or Australia (Figure 1).[1]

Declining hours worked can be a reflection of policies as well as changing preferences. Prescott (2004) finds that differences in the marginal tax rate on labor income can explain most of the historical and cross-country variation in labor supply in the Group of Seven countries. Preferences could, however, have also affected the trend of falling working time, which has been a prominent objective of unions in many European countries for some time (Blanchard, 2004). In contrast to Prescott (2004), Alesina, Glaeser, and Sacerdote (2005) argue that European labor market regulations explain most of the difference between Europe and the United States. In any case, this trend presents a challenge for European economies in many ways. With a dwindling labor supply, it is not clear that the current level of potential growth and the financing of large welfare states can be maintained over time.

[1]The data on average hours are intended for comparisons of trends over time and are not suitable for comparisons of levels (Organization for Economic Cooperation and Development (OECD), *OECD Employment Outlook*, Statistical Annex, various issues).

Indeed, the negative consequences for competitiveness have already been triggering pressures to change course in France and Germany.

Actual hours worked may be lower because contractual hours are falling or work absence is rising. In Europe, the decline seems to be driven by the reductions in working time negotiated by unions. In 2003–05, average hours collectively agreed to range from a weekly minimum of 35 hours in France to a maximum of 40 hours in Greece, with most countries having a working week between 37 and 39 hours. The European Union-15 average (together with Norway) has fallen from 38.6 hours in 1999 to 38.0 hours in 2005.[2] Looking ahead, the pressure for working-time reductions is likely to continue as unions remain committed to this objective.

If national holidays and annual leave—for which country provisions vary widely—are excluded, absence can be accounted for essentially by sickness. On average, absence due to sickness is not unusually high in Europe. In the period 1995–2003, the share of full-time employees on sick leave was 2.8 percent, on average, which is very close to the 2.6 percent registered in the United States (Figure 2). There are wide differences across countries, however. Absence seems to be particularly high in the Netherlands (6 percent), Sweden (5.2 percent), Norway (5.0 percent), and the United Kingdom (3.9 percent). For these countries, reducing sickness absence could provide a substantial boost to the labor supply.

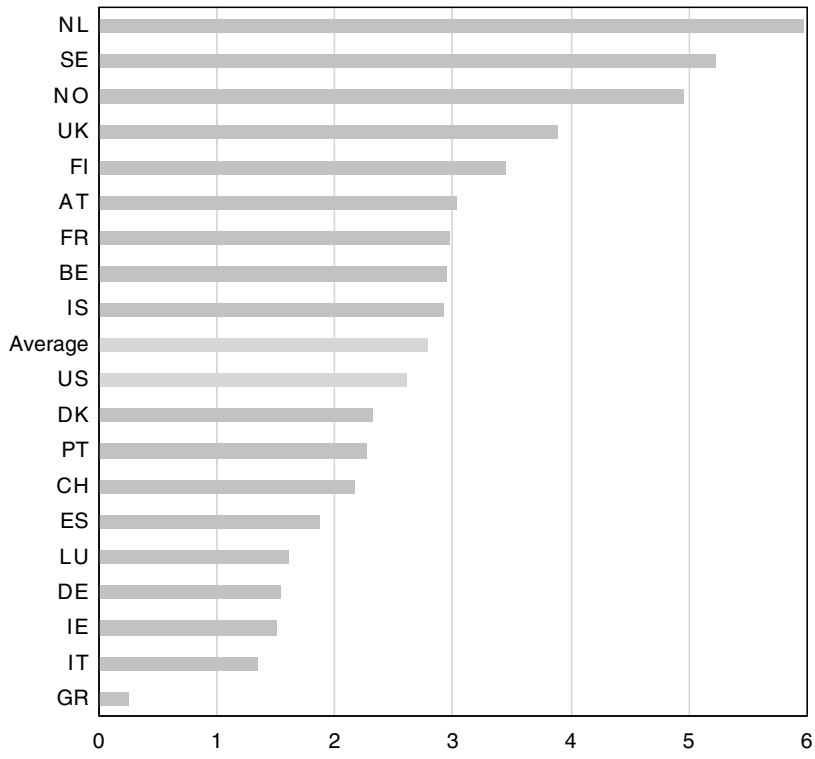
Containing work absence can be beneficial for a number of reasons. Excessive work absence involves significant social and economic costs. In the presence of institutional constraints affecting the choice between work and leisure, such as minimum working hour requirements, absence can be seen as an efficient individual response to the need for flexibility (Dunn and Youngblood, 1986). When absence costs are not internalized by workers, however, significant efficiency costs may arise. Moral hazard may become widespread if insurance is too generous, altering incentives in a way that may not provide the best trade-off between protection and efficiency. Output and employment are likely to be lower in equilibrium owing to the imperfect substitutability of absent workers. If insurance costs are borne mainly by the government, as is the case in most European countries, significant fiscal costs will also arise.[3]

The main approach in the literature to analyzing labor absence and absenteeism has been based on a standard labor-leisure choice framework (Allen, 1981; and Leigh, 1985). Health, age, gender, and working-time arrangements may influence the preference for leisure. With imperfect monitoring, the decision about sick leave is ultimately left to workers, and moral hazard arises. Its impact can be compounded by changing social

[2]See European Foundation for the Improvement of Living and Working Conditions (various issues).

[3]Indeed, even though public sickness benefits as a percentage of GDP have generally declined during the past two decades, they remained on average higher than 1 percent of GDP in the Netherlands, Sweden, and Norway over 1990–99 (OECD *Social Expenditure Database*).

Figure 2. Average Sickness Absence, 1995–2003
(*As a percentage of employment*)



Source: Eurostat, *New Cronos Database*.

Notes: AT = Austria; BE = Belgium; CH = Switzerland; DE = Germany; DK = Denmark; ES = Spain; FI = Finland; FR = France; GR = Greece; IE = Ireland; IS = Iceland; IT = Italy; LU = Luxembourg; NL = Netherlands; NO = Norway; PT = Portugal; SE = Sweden; UK = United Kingdom; US = United States.

norms, a weakening work ethic, and decreasing stigma associated with "benefit cheating" (Lindbeck, 1997). This paper extends the literature to include labor demand considerations, with a role for labor market institutions and sickness insurance systems. Employers' reaction to absence is likely to depend on the costs they have to bear as a result of it, such as output loss and costs related to insurance schemes (disbursement of cash benefits or contributions to insurance funds). The more costly absence is to employers, the more likely they are to respond. If absence is clearly connected to the working environment, the employer may attempt to improve it. The employer can also increase monitoring or reinforce sanctions for absence. Then labor market institutions come into play. Both employment protection and unemployment insurance reduce the expected cost of work absence to the individual employee either by making it more difficult to sanction absenteeism or reducing the effective cost of the sanction.

The paper contributes to the empirical literature by analyzing the determinants of sickness absence in a panel of 18 European countries during the period 1983–2003, using novel data sets of sickness insurance provisions and costs to employers. The following section describes some key facts about sickness absence in Europe. Section II discusses the model of work absence. Section III elaborates on the econometric issues and presents the results from panel data model estimations. Concluding remarks and policy implications follow in Section IV.

I. The Facts

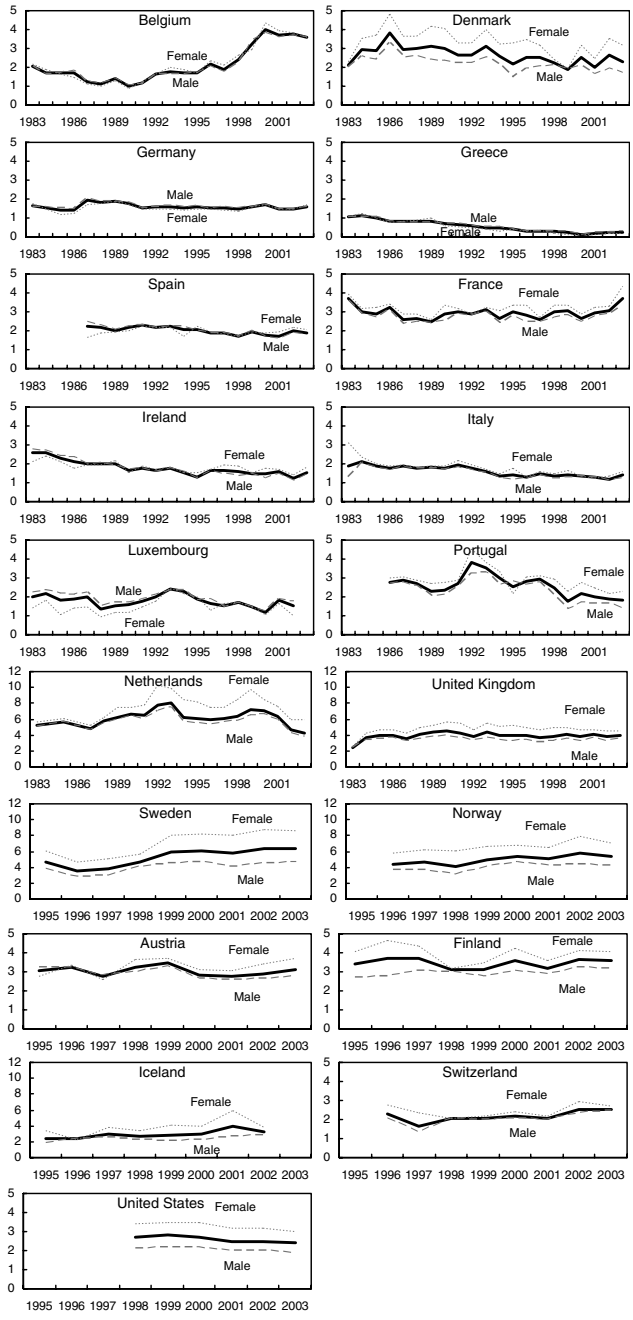
A glance at the data on sickness absence and some key variables that may affect absence behavior suggests large differences across Europe, in terms of both the importance of the problem and the evolution of the sickness absence and its determinants.

Sickness absence on average is not particularly high in Europe (Figure 2), and the problem seems to be confined to a few countries. Furthermore, Figure 3 shows that sickness absence has been generally stable over the past two decades. There are however some exceptions. In Belgium, for example, the sickness absence rate surged from 1 to 4 percent between 1990 and 2000. Among the countries with the highest absence rates—the Netherlands, the United Kingdom, Sweden, Norway, and Iceland—Sweden has exhibited an upward trend in recent years, whereas the Netherlands has seen absence declining since 1999. Absence in the United Kingdom has remained broadly stable throughout the period. In most countries, sickness absence is higher for women than for men.

Sickness absence has often been linked to cyclical fluctuations in the economy. Procyclicality of work absence may arise for two main reasons suggested in the literature (Leigh, 1985; Kaivanto, 1997; and Audas and Goddard, 2001). High unemployment acts as a "disciplining device" (Shapiro and Stiglitz, 1984), raising the expected cost of absence to workers. Others emphasize a "selection" effect, because employers are more likely to lay off absence-prone workers in recessions, and hire them during expansions. Arai and Skogman Thoursie (2001) provide evidence in favor of the market discipline effect in Sweden. However, the strength of procyclicality in countries where employment protection is high may cast some doubt on this interpretation. An alternative explanation could rely on sick leave as a reaction to work pressures, which are likely to be more intense when production volumes are high and labor flexibility is limited. For a selected group of countries, Figure 4 shows how sickness absence changed over time with changes in the cyclical position.[4]

[4]In Figure 4, cyclical fluctuations are proxied by the unemployment gap, which is defined as the percentage deviation of the unemployment rate from its linear trend (relations remain largely robust to using a deviation from the quadratic trend).

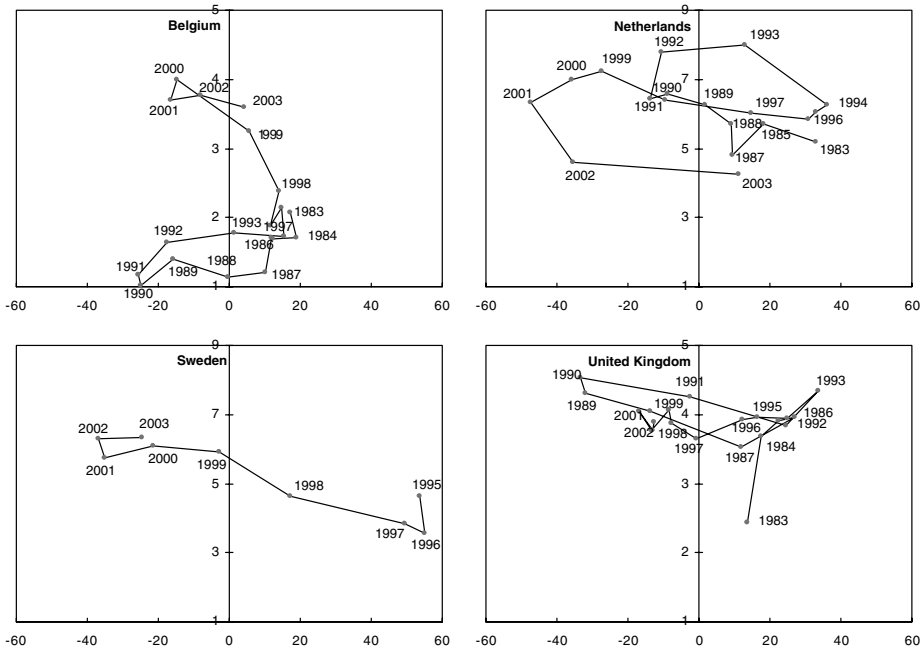
Figure 3. Sickness Absence
(*Employees absent due to sickness as a percentage of total employed*)



Sources: Eurostat, *New Cronos Database*; and U.S. Department of Labor, *Bureau of Labor Statistics*.

Notes: Bold line is the total sickness absence; the vertical axis for the Netherlands, the United Kingdom, Sweden, Norway, and Iceland has a higher scale.

Figure 4. Cyclicality of Sickness Absence



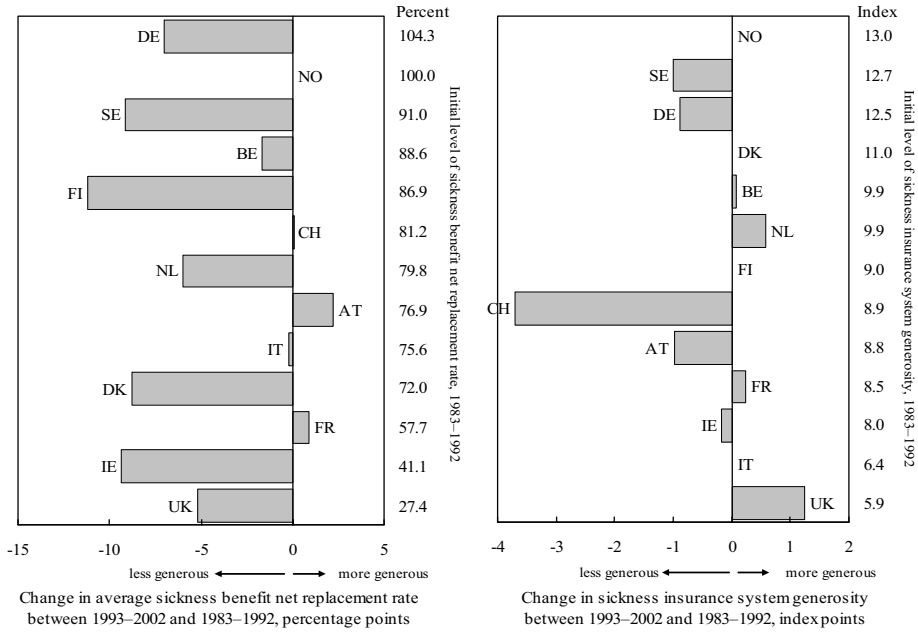
Sources: Eurostat, *New Cronos Database*; OECD, *OECD Economic Outlook Database*; and authors' calculations.

Notes: Vertical axis: employees absent due to sickness as a percentage of total employed; horizontal axis: unemployment gap— percentage deviation of unemployment rate from trend.

The incentives stemming from a country's insurance system may have a strong impact on absence behavior.[5] The sickness insurance systems are most generous in the Nordic countries and Germany (Appendix III; and MISSOC, 2006). Cash benefit replacement rates are high—as high as 100 percent in Norway—with many labor contracts providing for additional benefits from employers. Coverage tends to be universal and benefits are provided for a long period. Sickness benefits can generally be converted into a disability pension if illness continues for a long time. In the past 20 years, most countries have cut replacement rates (Figure 5, left panel). In Finland, for example, the after-tax replacement rate fell by more than 11 percentage points over the past two decades. However, the overall generosity of the

[5]There is a large body of Swedish literature providing empirical evidence of strong moral hazard effects of the insurance system. See, for example, Andrén (2001a, 2001b, and 2003); Johansson and Palme (1996 and 2002); Skogman Thoursie; and Henrekson and Persson (2004). Skogman Thoursie (2002), for example, finds a noticeable increase in men's sickness absence when popular sports events take place. The interaction of sickness insurance with other elements of the social insurance system, especially unemployment insurance may also produce perverse incentives (Larsson, 2002 and 2004; and Palme and Svensson, 2003).

Figure 5. Changes in Sickness Insurance System, 1983–2002



Sources: Scruggs (2004); and authors' calculations.

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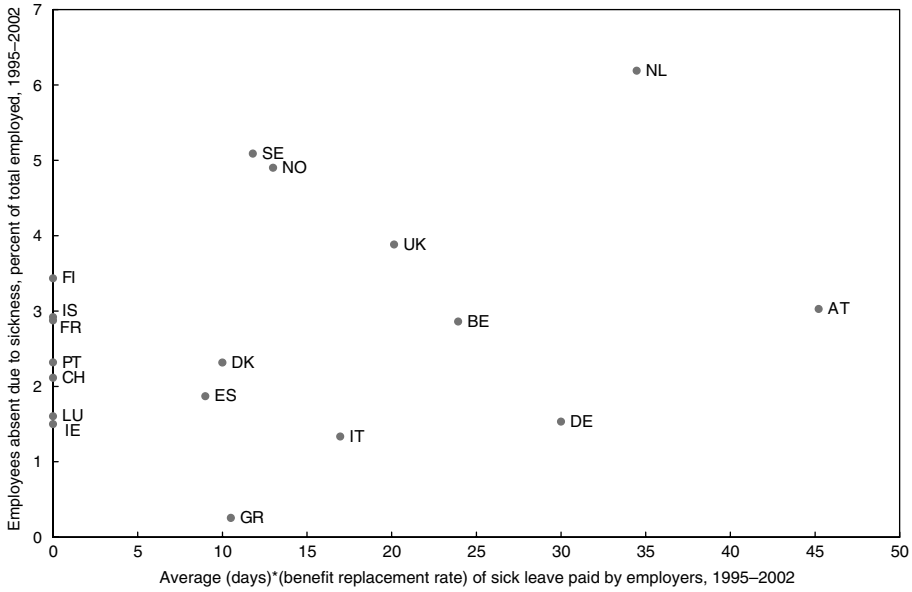
system—including also other aspects such as coverage, duration, qualifying and waiting periods—has actually increased in some cases (Figure 5, right panel). In the United Kingdom, for example, the entitlement period has been substantially extended.

Employers' responsibility in sharing the costs of the public insurance system can create a stronger incentive for employers to reduce sickness absence. Provisions vary widely across countries. Figure 6 shows a measure of costs to employers of the public insurance system, which reflects the gross replacement rate of benefits paid and their average duration.[6] Employers' costs are highest in Austria and the Netherlands. The Netherlands took a radical approach in 1996, making employers responsible for the full cash benefit payment up to one year of absence. Most firms, however, opted to reinsure their sick pay liability with private insurance companies, reducing the incentive effect. Nonetheless, De Jong and Lindeboom (2004) do not find any difference in absence rates of firms that opted for reinsurance. Although

[6]This measure does not include the costs to employers arising from separate provisions negotiated with workers.

Figure 6. Sickness Cash Benefits Paid by Employer



Sources: U.S. SSA, *Social Security Programs Throughout the World*; Eurostat, *New Cronos Database*; and authors' calculations.

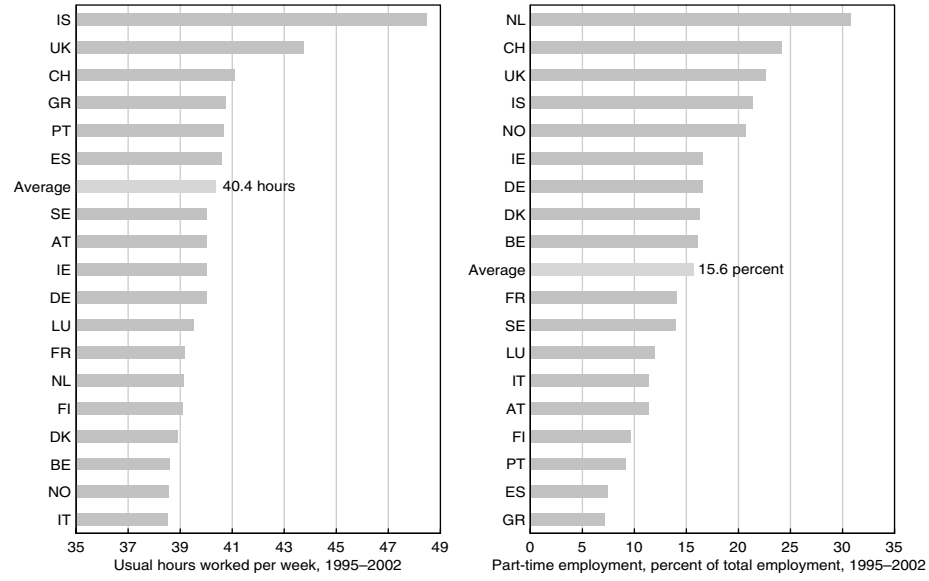
Notes: AT = Austria; BE = Belgium; CH = Switzerland; DE = Germany; DK = Denmark; ES = Spain; FI = Finland; FR = France; GR = Greece; IE = Ireland; IS = Iceland; IT = Italy; LU = Luxembourg; NL = Netherlands; NO = Norway; PT = Portugal; SE = Sweden; UK = United Kingdom.

any conclusion from that experience is still tentative, absence started declining three years later and has now dropped below the Swedish level. In general, an analysis of developments since the early 1980s suggests a trend toward shifting more responsibility for sickness insurance costs to employers in most countries.

Finally, the choice of work effort may be influenced by working-time arrangements, with long working hours likely increasing and flexible working arrangements reducing the incidence of absence. Usual (contractual) hours of work show a wide range, with Iceland and the United Kingdom at the top (Figure 7, left panel). The United Kingdom, in particular, presents a large difference between usual hours worked (43.3 hours per week in 2002 and 43.1 hours per week in 2003) and the average working time collectively agreed to between employers and unions (37.2 hours per week in 2002–2003).[7] Figure 7 (right panel) indicates that the prevalence of part-time arrangements varies

[7]The gap between agreed to and usual hours arguably reflects the United Kingdom's long hours and overtime culture and the low coverage of collective bargaining (European Foundation for the Improvement of Living and Working Conditions).

Figure 7. Working-Time Arrangements



Sources: Eurostat, *New Cronos Database*; and International Labor Organization (2003).

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widely between the Netherlands (more than 30 percent of employment) and Greece (about 7 percent).

II. The Model

Theoretical literature on labor absence and absenteeism has focused mostly on the labor supply side.[8] This section presents an analysis of work absence within a model that, while still kept simple, combines labor supply and labor demand. Furthermore, the conventional determinants of the labor-leisure choice are augmented in two key areas: (1) a number of institutional characteristics such as the generosity of paid leave provisions and employment protection are introduced; and (2) differences in the impact of publicly and privately financed insurance schemes on work absence are explored.

The economy is populated by a large number of workers whose mass is normalized to 1. A worker's preference toward absence is given by the desired absence hours, a, such that $a \in [0, c]$, where, if contracted hours of work are given by c and total number of hours is normalized to 1, $a = 0$ indicates no

[8]See, for example, Allen (1981) and Leigh (1985). Brown and Sessions (1996) provide an extensive survey of the theoretical literature on labor absence.

absence, and $a = c$ corresponds to full absence from work.[9] Let the worker's maximization problem be given by

$$\max\ U(x,\ l), \tag{1}$$

subject to

$$x = R + P(A,\ V)w(c - \beta a) + [1 - P(A,\ V)][B + G(\gamma)] \tag{2}$$

$$l = 1 - (c - a), \tag{3}$$

where x and l are consumption and leisure, respectively; R is nonlabor income; w is wage; c is the given contractual hours of work; a is absence hours (due to sickness); β is the inverse of the sickness benefit replacement rate (ratio of sick pay to wage) such that $\beta \in [0, 1]$, with $\beta = 0$ corresponding to the case when sickness absence is fully compensated (100 percent replacement rate) and $\beta = 1$ when there is no compensation. B is unemployment benefits. γ is the degree of employment protection and/or level of unionization and can generally be regarded as a combination of labor market regulations that impose costs on employers to discipline or dismiss employees. Assume $\gamma \in [0, 1]$, where $\gamma = 1$ is the situation of "complete" employment protection (no firing possibility) and $\gamma = 0$ is the case of no protection at all. G is firing-related entitlements, such that higher entitlements are associated with stronger employment protection, $G_\gamma(\gamma) > 0$, and $G(0) = 0$. The probability of keeping the job (inverse of the penalty for being absent), $P(A, V)$, is a function of the joint impact of absence behavior, a, and employment protection, γ, denoted by A, such that the probability of keeping the job declines with absence, $P_a(\cdot) < 0$, and increases with the degree of employment protection, $P_\gamma(\cdot) > 0$. $P(A, V)$ is also assumed to depend on the joint impact of some business cycle characteristics, v, and employment protection, γ, denoted by V, such that, if v is a procyclical variable, the probability of remaining employed is higher during upswings $P_v(\cdot) > 0$. Also assume $P_{av}(\cdot) = 0$.[10]

Thus, the budget constraint (Equation 2) states that income spent on consumption is equal to the sum of nonlabor income and wage income if the worker retains her job or unemployment and other firing entitlements if the worker is dismissed.[11] In turn, the time constraint (Equation 3) assumes that

[9]We focus only on work absence; a more general setup could consider also overtime work, such that $a \in [-(1-c), c]$, where $a = -(1-c)$ would be the extreme case of overtime work equal to the total time remaining after the contracted hours of work.

[10]The following standard assumptions about the utility function are made: $U_x(\cdot) > 0$, $U_l(\cdot) > 0$, $U_{xx}(\cdot) < 0$, $U_{ll}(\cdot) < 0$, $U_{xl}(\cdot) = 0$.

[11]In this static setting, the paper follows the literature by capturing savings or wealth with the nonlabor income and abstracts from a savings decision. Introducing dynamics along with a possibility of self-insurance through savings can be an interesting extension and provide useful insights into such policy issues as optimal sickness insurance. For such extensions in the context of job search models and implications for optimal unemployment benefit policy, see,

if total hours are normalized to 1, then total leisure time is the difference between total and actual hours worked.

The firm chooses its desired input of hours of work, which, in the case of a given number of contracted hours, translates into a decision on absence tolerance. It maximizes its profit given by

$$\Pi = Y - P(A, V)w(c - \theta\beta a) - [1 - P(A, V)]G(\gamma), \tag{4}$$

where

$$Y = Ak^{1-\eta}(c - a)^{\eta} \tag{5}$$

is the production function, which depends on actual hours worked, $(c-a)$, with the labor share being η. Note that the replacement rate β enters the profit Equation (4) with an additional parameter θ, which indicates whether the insurance system is private or public, that is, whether sick pay is paid by the firm or by the government. In particular, if the employer pays sick pay at the rate β, as set by regulations, then $\theta = 1$. Alternatively, $\theta = 1/\beta$. We will discuss these two cases separately when deriving the main results below.

From the first-order conditions of the optimization problems in Equations (1)–(3) and (4)–(5) with respect to the absence hours, a, we can obtain the optimal wage for the worker and the firm, respectively, from Equations (6) and (7) below.

$$w^W = \frac{P_a(B + G) - \frac{U_l}{U_x}}{P_a(c - \beta a) - P\beta} \tag{6}$$

$$w^F = \frac{Y_a + P_a G}{P_a(c - \theta\beta a) - P\theta\beta} \tag{7}$$

Case 1: Privately Financed Insurance

When sickness benefits are paid by the firm, $\theta = 1$, equating (6) and (7) yields

$$\frac{U_l}{U_x} - P_a B = -Y_a, \tag{8}$$

stating that in equilibrium, the marginal product of labor (MPL) $(-Y_a)$ equals the marginal rate of substitution (MRS) between leisure and consumption, net of the marginal unemployment benefit. Recall that $P_a < 0$; hence, MPL should be higher or MRS should be lower than in the standard case when $P_a B = 0$.[12] Using the Implicit Function Theorem, the

for example, Werning (2002), Kocherlakota (2003), Lentz (2007), and Lentz and Tranæs (2005). We owe the latter observation to an anonymous referee.

[12]Looking at labor-leisure distortions for the U.S. economy over the past century, Mulligan (2002) discusses a number of factors that can drive a wedge between MRS and MPL, including marginal tax rates, transfer payments, labor market regulations, monopoly unions, and the unemployment rate. At the business cycle frequency, Galí, Gertler, and López-Salido (2005) relate the wedge to price and wage markups.

following relationship can be obtained for the equilibrium hours of absence, a^*:

$$a^* = a\underset{- \; + \; + \; + \; + \; +}{\left(\beta, \gamma, c, v, B, R\right)}, \tag{9}$$

whereas the equilibrium wage can be found by evaluating Equations (6) or (7) at the point $a = a^*$.[13]

Case 2: Publicly Financed Insurance

Similarly, when the employer does not pay for the sickness absence, and $\theta = 1/\beta$, from Equations (6) and (7) we have

$$\frac{P_a(B+G) - \frac{U_l}{U_x}}{P_a(c-\beta a) - P\beta} = \frac{Y_a + P_a G}{P_a(c-a) - P}, \tag{10}$$

which after some algebraic transformations yields

$$Q + \frac{N(1-\beta)(Y_a + P_a G)}{(M-N)} = 0, \tag{11}$$

where $Q = Y_a + \frac{U_l}{U_x} - P_a B$, $M = P_a C$, and $N = P_a a + P$. Note that Equation (11) differs from the above case when $\theta = 1$ (Equation 8) by the second term; that is, the difference between equilibrium absence under public and private insurance is given by $D = \frac{N(1-\beta)(Y_a + P_a G)}{M-N}$, which will be equal to zero if $\beta = 1$ (no compensation for absence) and/or $N = 0$.[14] Rewrite Equation (11) as

$$\frac{U_l}{U_x} - P_a B + D = -Y_a, \tag{12}$$

from which it follows that when $N > 0$ ($N < 0$), the wedge between MRS and MPL increases (decreases) and absence in the case of the publicly financed system is higher (lower) than in the case of the employer paying all benefits ($D = 0$). Observe that the condition $N > 0$ ($N < 0$) can be rewritten as $\varepsilon_{Pa} > -1$ ($\varepsilon_{Pa} < -1$), where $\varepsilon_{Pa} \in (-\infty, 0]$ is the elasticity of the probability of keeping the job, P, with respect to absence, a. This implies that a privately financed system will yield lower absence than a publicly financed one if the elasticity of the probability of being fired with respect to absence is low. In other words, if

[13]Equation (9) can be obtained by assuming in addition that $w(c-\beta a)-(B+G) > 0$ and $P_{aa}(\cdot) \geq 0$. It can be shown that Equation (9) simplifies to the solution presented in Prescott (2004), assuming $U(x, l) = (1-\sigma)\ln x + \sigma \ln l$ and $B = 0$, with $\sigma \in [0, 1]$ interpreted as the value of the leisure or sickness index.

[14]The latter condition requires some strict assumptions on the probability function to be inversely dependent on a (only or separably from v), and, given that P is a probability and $a < 1$, on the constant term in the solution of the differential equation. Note also that D has the same sign as N and that given our assumptions on the function P, $N_a < 0$.

the decision on employment continuation is not very sensitive to absence behavior, then to achieve lower absence it is optimal to shift to employers the responsibility for sickness insurance costs.

The main predictions of the model can be summarized as follows. Sickness absence is expected to decline with the inverse of the replacement rate (or equivalently, increase with the generosity of sickness benefits) and increase with the degree of employment protection and contractual hours. Higher absence is also positively related to cyclical expansions, unemployment benefits, and nonlabor income.[15] The direction of the impact of a privately as opposed to publicly financed insurance scheme, given its relationship to various assumptions in the model, largely remains to be determined by the data.

III. Econometric Analysis

Although the empirical literature on work absence in individual countries is vast, there are only a few cross-country comparative studies. Drago and Wooden (1992), using a micro database from 15 plants in the United States, Canada, New Zealand, and Australia, find higher absence rates among women, full-time, low-wage, and long-tenure employees. In their study, absence also appears to be positively correlated with shift work, the generosity of sick leave entitlements, and better labor market options. Using labor force survey data from the Luxembourg Employment Study, Barmby, Ercolani, and Treble (2002) come to similar conclusions. The relationships identified seem to be true for all nine countries in the sample (eight European countries and Canada), in spite of large differences in country mean rates of absence. The authors also identify a robust relationship with hours usually worked, with absence increasing with the number of regular hours worked. Bergendorff and others (2004) investigate the determinants of absence looking at aggregate data from labor force surveys collected by Eurostat for a sample of eight European countries. Showing remarkably high sickness absence in Norway, Sweden, and the Netherlands, their results confirm that sickness absence increases with age, is higher among female employees and, in some countries, is positively correlated with the employment rate, particularly of older workers. They also find some support for the cyclicality of absence, which is shown to be particularly pronounced in Sweden, the Netherlands, and Norway. Moreover, there is evidence that temporary workers, who enjoy lower employment protection, tend to be less sickness prone than permanent workers; however, over time, even though the share of temporary employment has increased, the level of sickness absence in most countries has not declined. Finally, no clear relationships have been found between sickness absence and health status, working conditions, and, largely owing to data limitations, public insurance schemes.

[15]Given a lack of consistent cross-country data on wealth or nonlabor income, the latter has not been included in the empirical analysis.

This section discusses the data and empirical results for the determinants of sickness absence in a panel of 18 European countries (Appendix Table A.1). In addition to broadening the country coverage and the range of econometric techniques used previously, the analysis contributes to the existing empirical studies by introducing and exploring novel data sets on sickness insurance provisions and costs to employers as well as controlling for labor market regulations.

Data

The data on sickness absence draw on labor force surveys and, particularly, on the Eurostat Labour Force Survey Results, which include aggregated data on average usual and actual hours of work. Our definition of absence includes both short-term (at least one hour) and long-term (at least one week) absences,[16] unlike Bergendorff and others (2004), who use only long-term absence data. Data on age, health, unemployment, and participation are drawn from the International Labor Organization's *Key Indicators of the Labour Markets* (ILO, 2003). Data on institutional characteristics of social security systems are derived from Scruggs (2004). Data on the cost to employers of the sickness insurance system are based on information from the U.S. Social Security Administration and social security programs throughout the world (Appendix Table A.2). Basic descriptive statistics of the variables used in the analysis and their cross-correlations are summarized in Appendix Table A.3 and A.4, respectively.

Empirical Strategy

The econometric exercise is based on standard panel data models, with particular consideration given to their performance in the context of macroeconomic applications. Though extensive cross-sectional information, typical of microeconomic data sets, is not available in such cases, the panel data approach allows us to analyze sickness absence developments over time and across countries. The availability of working-time data and some of the absence determinants by gender makes it possible to combine sickness absence for males and females and double the effective cross-sectional dimension of the panel data.

[16]Employees are grouped into two main subgroups: those who worked at least one hour during the reference week, and those who had a job, but did not work at all during the reference week. For the first group there are 13 reasons provided for absence—defined as a positive difference between usual and actual hours of work—and nine for the second group. We refer to sickness absence as absence because of a worker's own illness, injury, or temporary disability. Sickness absence of those in the first group is defined as "short-term" and that of those in the second group is defined as "long-term." Absence spells tend to be considerably longer than one week in all countries except the United Kingdom and Iceland, but long-term sickness is of particular concern because it is likely to change into disability status. Palme and Svensson (2003) show that in Sweden this has become one of the most common ways to exit the labor force before the statutory retirement age.

In a general setup, the model is given by

$$a_{i,t} = \sum_{j=1}^{k} a_{i,t-j}\beta_{0,j} + X_{i,t}\beta_1 + W_{i,t}\beta_2 + \eta_i + \varepsilon_{i,t},$$

$$i = 1, \ldots N;\ t = 1, \ldots, T_i, \tag{13}$$

where $a_{i,t}$ is the absence rate for country-gender pair i at time t, $X_{i,t}$ is a vector of exogenous covariates, and $W_{i,t}$ is a vector of predetermined and endogenous covariates treated similarly to the lagged dependent variables. X and W may contain lagged independent variables and time dummies, and can be either country-gender or only country specific. η_i is an unobserved unit-specific fixed effect, and $\varepsilon_{i,t}$ is the disturbance term.

The determinants of sickness absence have been estimated with both static ($\beta_{0,j} = 0$) and dynamic ($\beta_{0,j} \neq 0$) panel data (DPD) models that control for fixed effects. The former follows the common approach applied in the earlier literature; the latter, however, allows us to build richer dynamics into the relationship between absence and its determinants by taking into account potential persistence in absence rates and endogeneity of some right-hand-side variables. Furthermore, DPD models can help us address the error autocorrelation problem, which, if ignored, results in consistent but inefficient estimates of regression coefficients and biases the inference. Serial correlation, in turn, may occur, mostly as a result of omitting variables that change gradually over time. Because the inclusion of a lagged dependent variable makes the least squares dummy variable (LSDV) and generalized least squares (GLS) estimators biased and inconsistent for finite T, an instrumental variable or a generalized method of moments (GMM) estimation method can be used. Monte Carlo results of Judson and Owen (1999) suggest that, in macroeconomic panel data applications, the one-step GMM estimator by Arellano and Bond (1991) is a second-best choice.[17] Furthermore, as shown in Blundell and Bond (1998), persistence in the dependent variable may result in weak instruments and losses in asymptotic efficiency when using the first-difference GMM estimator. As an alternative, the system GMM estimator is suggested, which combines the regressions in differences used in the standard first-difference GMM estimation with the regressions in levels.

Our empirical strategy has been the following. For each specification, static (fixed-effects, random-effects, and pooled ordinary least squares (OLS)) and dynamic (GMM; Anderson and Hsiao, 1982) panel data

[17]The LSDV estimator with the Kiviet's (1995) correction outperforms all other estimators in small samples, but an implementation of this technique for unbalanced panels had not been derived. Recently, Bruno (2004) proposed an extension of the Kiviet's correction to unbalanced panels with strictly exogenous covariates, using a bootstrap approach to estimate the variance-covariance matrix.

models have been estimated.[18] For static models, the appropriateness of the random-effects specification has been tested by the Hausman test, together with a test of serial correlation in idiosyncratic error terms (Wooldridge, 2002; and Drukker, 2003). In a dynamic setup, we have used a one-step GMM estimator, which generally tends to be less biased in small samples than the two-step estimator and outperforms the latter in macroeconomic applications (Judson and Owen, 1999; and Lusinyan, 2005). The two-step estimator has, however, been used for robustness checks, along with the LSDV estimator with the Kiviet's (1995) correction. The one-step estimations have been implemented using first-difference and system GMM estimators, with standard errors assumed to be both robust and nonrobust to general heteroscedasticity over individuals and over time. The results have also been checked by using different sets of GMM instruments. Although the GMM procedure of Arellano and Bond (1991) implies using all lagged values as instruments, Judson and Owen (1999) argue that a "restricted GMM," with a reduced number of values of the lagged dependent variables and exogenous regressors used as instruments, does not substantially affect the performance of this technique.[19] Finally, robustness of the results to the exclusion of some countries from the sample as well as restricting the dependent variable to short- or long-term sickness absences have been checked.

Before presenting the main results, it is worth discussing endogeneity. In a static setup, some covariates, such as the demographic variables (labor force participation rate, age structure of the labor force, and health status) can be assumed as given by construction for the sickness absence behavior in a certain year.[20] When we have a choice between alternative measures for the same determinant, such as the share of part-time employment and absence because of a flexible working-time arrangement, we do not use the variable, which is likely to be endogenous by construction (for example, in this case, the share of people absent because of a flexible working-time arrangement). The section on the robustness analysis discusses the findings from exogeneity tests, particularly for the usual hours of work and sickness insurance characteristics. With little evidence to support the endogeneity of these covariates by the data, addressing error autocorrelation and potential omitted variable bias remains a key consideration in the static setup.

In the dynamic models, however, the assumptions of exogeneity can be challenged. For example, the current level of sickness absence may affect future realizations of demographic variables, especially if current sickness is

[18]The dependent variable has been tested for nonstationarity using Levin and Lin (1992) and Im, Pesaran, and Shin (1997) panel unit root tests. The results, not reported here, indicate that the null of nonstationarity can be rejected when a trend is included in the specification.

[19]Moreover, for the Arellano-Bond estimator, Bun and Kiviet (2006) show that reducing the total number of instruments by a factor T reduces the bias in a finite sample by a factor T.

[20]Because our dependent variable is the sickness absence rate among full-time employees in a given year, independent of sick leave status, the employees would be part of the labor force that year, with their life expectancy at birth also given.

correlated with disability and exit from the labor force, as discussed earlier. Similarly, it can be suggested that taking sick leave when needed would positively influence an employee's health, allowing more people to remain longer in the labor force and possibly also increasing life expectancy. We can also expect some intertemporal relationship between the sickness absence rate among full-time employees in a given year (our dependent variable) and the share of part-time employees, because health conditions may require employees to quit full-time employment and work part-time. To address the potential endogeneity problem, most of these covariates have been modeled as predetermined variables in the dynamic specifications, with the Sargan test for overidentifying restrictions supporting this choice.

Discussion of Results

The results from the static and dynamic panel data regressions are reported in Tables 1 and 2, respectively. Lower labor force participation and better health (here, longer life expectancy) are shown to be associated with lower sickness absence.[21] The positive relationship between labor force participation and sickness absence seems to hold with a lag in the dynamic models, with the contemporaneous effect being negative but mostly insignificant. In addition, even though the contemporaneous effect of life expectancy remains negative in the dynamic models, the overall intertemporal impact could be positive if dominated by a strong positive lagged effect. A larger share of workers aged 55–64 in the total labor force increases sickness absence, but this result is less robust.

The results from both static and dynamic models show the existence of a significant impact of working-time arrangements on sickness absence. In particular, usual hours worked are estimated to have a strong positive impact on sickness absence, whereas more flexibility—measured by the share of part-time employment and flexible working-time arrangements—helps reduce sickness absence, both directly and through interaction terms. The estimated impact of usual hours worked appears to be close to the findings by Barmby, Ercolani, and Treble (2004) for the United Kingdom, for which the estimated coefficient of usual hours is 0.16. Indeed, a major conclusion of Barmby, Ercolani, and Treble is that sickness absence is relatively more sensitive to the determinants that measure contractual arrangements than to individual characteristics. Our results suggest that an increase in the average usual hours by one hour will increase the average absence rate from 2.75 to 2.9 percent, whereas with just a 1 percentage point increase in the average share of part-time employment, the absence rate will decline to 2.45 percent. Among the

[21]In particular, based on the estimates of the contemporaneous impact coefficients, a 1 percentage point increase in the average participation rate would increase the average absence rate from 2.75 to 2.8 percent; a one-year increase in life expectancy is estimated to lower the average absence rate to 2.65 percent (estimates of the elasticity at the mean of about 1.25 and −2.8 are used for the participation rate and life expectancy, respectively).

Table 1. Determinants of Sickness Absence: Static Panel Data Models
(Dependent variable: share of employees absent due to sickness in total employed)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$LFPR_{i,t}$	0.05**	0.05**	0.05**	0.05**	0.08**	0.08**	0.09**	0.08**
	(4.01)	*(3.83)*	*(3.97)*	*(3.80)*	*(4.47)*	*(4.55)*	*(5.02)*	*(5.24)*
Age $structure_{i,t}$	0.01		0.002					
	(0.34)		*(0.07)*					
Life $expectancy_{i,t}$	−0.09**	−0.07*	−0.11**	−0.09**	−0.01		−0.10^{+}	−0.33**
	(3.91)	*(2.56)*	*(2.77)*	*(3.19)*	*(0.28)*		*(1.82)*	*(4.71)*
Usual $hours_{i,t}$		0.18**		0.18**				
		(2.66)		*(2.78)*				
Part-time employment$_{i,t}$			−0.31*		−0.50**	−0.59**	−0.41**	−0.37*
			(1.98)		*(2.87)*	*(2.91)*	*(2.59)*	*(2.40)*
Part-time employment* Usual hours $_{i,t}$			0.83*		1.21**	1.48**	1.15*	0.99*
			(2.25)		*(2.96)*	*(2.93)*	*(2.87)*	*(2.48)*
UE $gap_{i,t}$ (quadratic trend)				−0.01**	−0.01**	−0.01**	−0.01*	−0.01*
				(2.71)	*(3.39)*	*(3.66)*	*(2.05)*	*(2.73)*
Sickness $benefit_{i,t}$					0.03**	0.04**	0.01	
					(3.09)	*(3.90)*	*(1.35)*	
UE $benefit_{i,t}$					−0.01**	−0.01*	−0.01	
					(3.24)	*(2.29)*	*(1.07)*	
Employer sick $pay_{i,t}$						−0.01^{+}		−0.01^{-}
						(1.74)		*(1.64)*
Union $density_{i,t}$							0.04*	
							(2.48)	
Union*Employer sick pay$_{i,t}$								0.0002^{-}
								(1.52)
Constant	6.35**	−2.56	7.21*	−0.93	−2.17	−4.37**	1.55	21.90**
	(3.53)	*(0.65)*	*(2.49)*	*(0.23)*	*(0.53)*	*(2.93)*	*(0.34)*	*(4.24)*
Within R^2	0.09	0.13	0.13	0.14	0.22	0.22	0.28	0.31
Between R^2	0.01	0.001	0.01	0.001	0.003	0.000	0.01	0.000
Overall R^2	0.02	0.01	0.03	0.01	0.001	0.002	0.003	0.01
Observations	545	546	531	546	364	364	296	318
(groups)	(36)	(36)	(36)	(36)	(26)	(26)	(26)	(30)

Notes: The table reports the results from the fixed-effects models with robust errors. Annual panel data over the period 1983–2003 (time periods vary, see Appendix Table A.1) are used including the following groups of countries: 18 countries in columns 1–4 (see Table A.1); 13 countries in columns 5–7 (countries in Table A.1, excluding Greece, Spain, Luxembourg, Portugal, and Iceland); and 15 countries in column 8 (countries in Table A.1, excluding Greece, Luxembourg, and Iceland). The cross-sectional unit, i, is the country-gender pair. All regressions include time fixed effects (not reported) that are statistically significant at least at the 10 percent level. Robust t-values are in parentheses. **(*, $^{+}$, $^{-}$) = significant at the 1 (5, 10, 15) percent level. LFPR = labor force participation rate, UE = unemployment. See Appendix Table A.2 for the definitions and sources of the variables.

Table 2. Determinants of Sickness Absence: Dynamic Panel Data Models

(Dependent variable: share of employees absent due to sickness in total employed)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Absence rate$_{i,t-1}$	0.58**	0.60**	0.56**	0.45**	0.57**	0.55**	0.30**	0.33**
	(7.31)	*(8.15)*	*(7.33)*	*(5.33)*	*(8.50)*	*(9.25)*	*(4.99)*	*(6.14)*
LFPR$_{i,t}$	−0.01			−0.02			−0.06	−0.07*
	(0.45)			*(0.53)*			*(1.40)*	*(2.57)*
LFPR$_{i,t-1}$	0.02			0.04^{-}			0.09*	0.10**
	(0.71)			*(1.44)*			*(2.48)*	*(4.00)*
Age structure$_{i,t}$	0.08^{+}		0.08*					
	(1.89)		*(2.46)*					
Age structure$_{i,t-1}$	−0.06							
	(1.12)							
Life expectancy$_{i,t}$	−0.28*	−0.27**	−0.29**		−0.22*	−0.15	−0.33**	−0.32**
	(3.20)	*(3.74)*	*(3.28)*		*(2.11)*	*(1.28)*	*(2.64)*	*(3.43)*
Life expectancy$_{i,t-1}$	0.48**	0.46**	0.36**		0.51**	0.43**	0.37**	0.14
	(4.69)	*(3.62)*	*(3.70)*		*(3.61)*	*(3.44)*	*(3.15)*	*(1.26)*
Usual hours$_{i,t}$		0.14*	0.17*		0.11^{-}	0.18^{+}	0.36**	0.29**
		(2.11)	*(2.28)*		*(1.44)*	*(1.84)*	*(5.40)*	*(4.17)*
Flexible hours$_{i,t}$				−0.39^{+}				
				(1.76)				
Usual hours*		0.13						
Part-time employment $_{i,t}$		*(1.11)*						
Usual hours*		−0.19*						
Part-time employment $_{i,t-1}$		*(1.87)*						
Usual hours*			−0.12*	0.87^{+}				
Flexible hours $_{i,t}$			*(2.56)*	*(1.71)*				

UE $gap_{i,t}$ (quadratic trend)				−0.004*	−0.004−	−0.004^{+}	−0.01	
				(2.25)	*(1.58)*	*(1.74)*	*(1.42)*	
Sickness $benefit_{i,t}$					0.03**	0.03**	0.01^{+}	
					(2.70)	*(2.72)*	*(1.60)*	
UE $benefit_{i,t}$					0.01			
					(0.91)			
UE $benefit_{i,t-1}$					−0.02^{+}			
					(1.69)			
Employer sick $pay_{i,t}$						−0.01*		−0.03**
						(2.41)		*(5.11)*
Union $density_{i,t}$							0.04**	
							(6.12)	
Union*Employer sick $pay_{i,t}$								0.001**
								(5.46)
Union*UE $gap_{i,t}$							0.0001	
							(0.92)	
Constant	−0.05**	−0.03^{+}	−0.01	0.003	−0.05^{+}	−0.04^{+}	0.0002	0.04*
	(2.67)	*(1.75)*	*(0.43)*	*(0.45)*	*(1.86)*	*(1.75)*	*(0.02)*	*(2.26)*
AR(2) (p-values)	0.36	0.45	0.31	0.33	0.90	0.61	0.67	0.60
Sargan test (p-values)	0.79	0.36	0.97	0.68	0.81	0.81	0.73	0.81
Observations (groups)	461 (36)	452 (36)	437 (36)	437 (36)	320 (26)	320 (26)	220 (26)	262 (30)

Notes: The table reports the results from the Arellano-Bond (1991) one-step GMM models with restricted set of instruments and robust standard errors. Annual panel data over the period 1983–2003 (time periods vary, see Appendix Table A.1) are used including the following groups of countries: 18 countries in columns 1–4 (see Table A.1); 13 countries in columns 5–7 (countries in Table A.1, excluding Greece, Spain, Luxembourg, Portugal, and Iceland); and 15 countries in column 8 (countries in Table A.1, excluding Greece, Luxembourg, and Iceland). The cross-sectional unit, i, is the country-gender pair. All regressions include time fixed effects (not reported) that are statistically significant at least at the 10 percent level. AR(2) is the test of the null of no-second-order autocorrelation in the first-differenced residuals, and the validity of instruments is tested using the Sargan test of overidentifying restrictions. Robust t-values are in parentheses. **(*, $^{+}$, $^{-}$) = significant at the 1 (5, 10, 15) percent level. LFPR = labor force participation rate, UE = unemployment. See Appendix Table A.2 for the definitions and sources of the variables.

determinants considered in this paper and based on the assumptions about their possible changes, the working-time arrangements appear to have the most economically significant impact on absence behavior. In discussing the robustness of the results, we show that the relationship between the working-time arrangements and sickness absence is particularly strong for short-term sickness absence.

The unemployment gap is estimated to have a negative sign, implying that an increase in the gap between the unemployment rate and its trend—a proxy for a cyclical contraction—would reduce sickness absence, in line with the hypothesis that market conditions exert a disciplining effect on absence. It appears, however, that the size and significance of the impact of the unemployment gap are to some extent driven by the Swedish data, as discussed in the section on the robustness analysis.

As expected, we find a positive relationship between sickness absence and the generosity of the sickness insurance scheme or sickness benefits, as measured by the after-tax replacement rate. The robustness checks further show that, in contrast to working-time arrangements, the effect of sickness benefits is stronger on long-term absence. Unemployment benefits are shown to have a negative impact on sickness absence, which appears to be at variance with the predictions of the model. However, it should not be surprising, given that our dependent variable measures the share of full-time employees absent due to sickness. Indeed, even though in the model a higher unemployment benefit implies higher income in the event a worker is fired because of absence—and thus weakens the disciplining effect—for the data used, this would translate into a lower number of full-time employees (total and on sick leave), which will result in a smaller share of absentees.

There is some evidence in the data that absence declines when employers bear larger costs of sickness insurance. Measured as the product of the cash benefit replacement rate and the period that falls under the employer's responsibility, the employer-sick-pay variable could have both a positive (increase in generosity of sick pay) and negative (stricter monitoring) impact on absence. Our findings suggest that the employer's incentive-and-behavior effect generally outweighs that of employees, particularly in the case of long-term absence.[22]

Finally, labor market institutions affect the absence rate both directly and through their interaction with sickness insurance provisions and business

[22]The impact of privately financed insurance, in the model, has been shown to depend on the model assumptions, particularly concerning the sensitivity of employment continuation with respect to absence behavior. In the robustness analysis, we look into two subsamples with more and less stringent employment protection and with a higher and lower level of unionization, factors that, to a large extent, could determine the degree of such sensitivity. We find support for the model's predictions showing that more private financing of sickness insurance will have a much stronger negative impact on sickness absence in the subsample corresponding to stricter labor regulations.

cycle characteristics. Given the assumptions of the model, we expect to find a positive relationship between the degree of employment protection and sickness absence. This relationship appears strongest for the level of unionization, implying, for example, that a 1 percentage point reduction in average union density (with an elasticity at the mean estimated at about 0.6) will lower the average absence rate from 2.75 to 2.71 percent.[23] Furthermore, the data support the hypothesis that the negative impact of an employer's sick pay provision appears to decrease somewhat with the degree of unionization (as shown by the positive interaction term), suggesting that the latter may reduce the employer's ability to enforce better work attendance. The robustness analysis shows that this result is particularly important for long-term sickness absence.

Robustness Analysis

This section discusses the robustness of the results presented in Tables 1 and 2, based on a number of alternative specifications and tests reported in Appendix II.

The results concerning the relationship between sickness absence and demographic characteristics remain largely robust across various specifications (Appendix Table A.5), including models with robust standard errors adjusted for within-group (here, country-gender pair) correlation (columns 1 and 3);[24] random-effects models, supported by the Hausman and Breusch-Pagan LM tests (not reported here) (columns 2 and 3); pooled OLS with country dummies (column 4); the Anderson-Hsiao (1982) estimator (column 6); as well as Arellano-Bond one-step GMM, when the dependent variable is long-term and short-term sickness absence (columns 7 and 8, respectively). The significant coefficient for the gender dummy indicates that women are more likely to be on sick leave than men; the large and highly significant coefficient estimates on the country dummies for the Netherlands, Sweden, Norway, and the United Kingdom once again support the facts concerning relatively high sickness absence rates in these countries (Section I). The health variable has a similar impact on both long- and short-term sickness absence, but other demographic variables seem to be more important for long-term sickness absence in terms of the persistence and size of their impact.

Moving to the robustness tests for the relationship between sickness absence and working-time arrangements, we first discuss the issue of possible

[23]In general, however, the direct impact of labor market institutions on absence behavior can be ambiguous, as discussed in the section on the robustness analysis. Alternative measures for employment protection, such as the index measuring the strictness of employment protection and the degree of wage bargaining coordination, are also discussed.

[24]Allowing observations to be correlated within countries but independent across countries lowers the statistical significance of life expectancy while making labor force participation slightly more significant.

endogeneity of this set of determinants. Although the decision to be absent is made given specific working-time arrangements, absence behavior may have implications for the employer's reaction. Assuming that employers want to maintain the same total hours of work and employment regulations permit such adjustments, employers may opt to demand longer hours of work from employees other than the ones prone to sickness absence. In line with the model's predictions, institutional characteristics of the labor market, such as the degree of employment protection, strength of trade unions, and employees' bargaining power would be important in determining the relationship between sickness behavior and employers' reaction, including the probability of imposing a penalty for being absent.[25] In a specification (not reported here) with labor force participation and usual hours of work, instrumenting the latter with the employment protection index and union density is strongly supported by the Hansen-Sargan test of instrument validity and C-statistic test of exogeneity of instruments.[26] At the same time, the Davidson-MacKinnon (1993) test for exogeneity for a fixed-effects regression does not reject the consistency of OLS estimates.

Appendix Table A.6 reports some robustness results that confirm the significance of working-time arrangements for sickness absence behavior. Columns 1–3 are variations of the specifications reported in Table 1 for random-effects models and with robust standard errors adjusted for within-group correlation, and columns 5–7 report some further specifications for dynamic models with different combinations of covariates. Sickness absence is again shown to increase with the usual hours of work, but the impact of the latter decreases with the availability of more flexible working-time arrangements (that is, a higher share of part-time employment or a higher absence rate owing to flexible working-time arrangements). Alternatively, more flexible work arrangements are associated with lower sickness absence, but this relationship weakens with an increase in usual working hours. As is also shown in Table 2, the results for the dynamic models support the importance of the lagged impact of the share of part-time employment (column 6).

The impact of working-time arrangements is particularly significant and robust for short-term absence (Appendix Table A.6, columns 4 and 8). In the case of long-term (and hence, total) absence, the results for flexible work arrangements appear to be sensitive to the exclusion of Belgium (especially, Belgian women), where the long-term absence rate increased sharply in 1998 (Figure 3), likely reflecting the extension of various sabbatical leave programs. The results (not reported here), however, remain robust to the

[25]The high and persistent level of employment protection in Europe (IMF, 2003 and 2004) would support a weak impact of absence behavior on changes in working arrangements. We owe this observation to an anonymous referee.

[26]It is common in the literature on labor market institutions to assume that institutional variables are exogenous (IMF, 2003).

exclusion of the countries with the longest usual hours, Iceland and the United Kingdom.[27]

Appendix Table A.7 shows several extensions of the previous regressions that control for cyclical developments in the economies. The negative relationship between sickness absence and the unemployment gap continues to hold for alternative definitions of the latter, although the use of a quadratic trend in calculating the unemployment gap improves the significance of its estimated coefficient. The results are, however, somewhat sensitive to excluding the Swedish data, in which case the unemployment gap becomes less significant (compare column 3 in Appendix Table A.7 with column 4 in Table 1, and column 7 in Appendix Table A.7 with column 4 in Table 2).

The robustness checks for the results concerning the relationship between sickness absence and various forms of insurance schemes (sickness insurance, unemployment insurance, and the sick pay financed by employers) are summarized in Appendix Tables A.8 and A.9.[28] Similarly to the above discussion concerning potential endogeneity of usual hours of work demanded by the employer, one could argue that sickness insurance characteristics, such as the benefit replacement rate and the costs paid by the employer, may react to higher sickness absence. We analyze possible endogeneity of these regressors using as instruments a number of labor market institutional variables such as the employment protection index, union density, and wage bargaining coordination, and find strong support (not reported here) for non-IV fixed-effects specifications.

The positive impact of sickness benefits on absence is shown to hold in various specifications, but in the static model, the statistical significance of these estimates appears to be sensitive to the exclusion of Sweden from the sample, as well as affected by some collinearity with the life expectancy variable.[29] In contrast to working-time arrangements, sickness benefits are more significant for long-term absence (Appendix Table A.8, column 3 and Appendix Table A.9, columns 2 and 6), and are robust to changes in the country sample. Generally, dynamic models provide more robust estimates of the impact of sickness benefits.

[27]In addition, other estimates (not reported here) indicate that the impact of working-time arrangements is more significant and robust to changes in the country sample and the type of absence if: (i) instead of using robust variance estimators in the static models, the disturbance term is assumed to be of a first-order autoregressive form; and (ii) richer dynamics, particularly in terms of higher autoregressive lags, are assumed in the dynamic models.

[28]These results apply to 13 out of 18 countries in our sample, for which data on sickness and unemployment insurance schemes are available (see Figure 5).

[29]In Appendix Table A.8, column 2, for example, the *t*-value of sickness benefits would drop to 1.36 from the reported 1.87 when life expectancy is included, and to 1.29 when Sweden is excluded, partly owing to a smaller coefficient estimate of 0.01. Indeed, a significant and large positive interaction term of Sweden's fixed effect with sickness benefits indicates that the impact for Sweden is substantially stronger than for the cross-country average (not reported here).

The results are less conclusive when the index of sickness insurance system generosity is included instead of or together with the sickness benefits variable. First, in static panel data models, the impact of this variable is insignificant for total sickness absence (Appendix Table A.8, column 4); although it has the expected positive sign for short-term absence, the estimate is not robust to the exclusion of the United Kingdom from the sample (not reported here). Second, for long-term absence, it shows a significant negative influence (not reported here), but, by construction, there might be important lagged effects because the index includes the share of the labor force with sick pay insurance, and, as discussed earlier, some intertemporal relationship between long-term sickness absence and labor force participation could exist. Indeed, in the dynamic models, the specification tests suggest that the sickness index is better specified as a predetermined variable and has a relatively significant positive lagged effect on sickness absence (Appendix Table A.9, column 4). However, the overall robustness of the results with the sickness index is low.

The relationship between the generosity of the unemployment insurance system and sickness absence remains negative, but with a lagged impact in the dynamic models. The results are especially robust when instead of the unemployment benefit variable the index of unemployment insurance system generosity (Appendix Table A.8, column 5, and Appendix Table A.9, column 5) or the combined index of sickness and unemployment insurance systems generosity, without a lag, is included (not reported here).

The robustness checks also confirm that absence declines when employers bear a larger cost for sickness insurance (Appendix Table A.8, columns 6–7), though the results are somewhat sensitive to excluding Belgium. The employer sick pay appears to be particularly strongly (and negatively) correlated with long-term absence (Appendix Table A.9, column 6). Importantly, as noted in the previous section, when the data are partitioned into two subsamples—more vs. less stringent employment protection or a higher vs. lower level of unionization, choosing as a cutoff point the sample mean or median—the coefficient estimate of the employer sick pay variable has a more significant negative value in the subsample corresponding to stricter labor regulations (Appendix Table A.8, column 8) compared with the one with lower employment protection (Appendix Table A.8, column 9) or weaker trade unions.[30] These findings lend support to the results from our model concerning the factors that could determine the direction of the impact of privately as opposed to publicly financed sickness insurance on sickness absence.

Finally, the role of labor market institutions is analyzed more explicitly in the last set of regressions, reported in Appendix Table A.10. We investigate

[30]See the notes in Table A.8 for more details concerning the choice of subsamples. Given the resulting small size of the subsamples when partitioning the data, we do not report the results from dynamic panel data estimations.

both direct and indirect impacts of institutional indicators on sickness absence, including the index measuring the strictness of employment protection, the density of union membership, and the degree of wage bargaining coordination.[31,32] The direct impact of these variables on absence behavior may, however, be ambiguous. For example, on the one hand, greater employment protection such as large firing costs may lower the probability of being fired and hence weaken work discipline and increase absence incidents.[33] On the other hand, if greater employment protection leads to higher average unemployment, as argued in the literature, the disciplining impact of unemployment would increase the expected cost of absence to workers and result in lower absence. Similar arguments could be put forward when considering the impact of greater unionization. The ambiguity of the impact of wage bargaining coordination can be even greater, because it can have opposite effects on wages and unemployment (IMF, 2004), making it difficult to draw implications for absence behavior. In view of the importance of such interactions, the regressions reported in Tables 1–2 and Appendix Table A.10 look at the impact of some of the above determinants of sickness absence when they are interacted with the indicators of labor market institutions.

The robustness tests seem to reflect the ambiguity concerning the direct impact of labor market institutions on sickness absence. In particular, although the direct impact of the employment protection index on sickness absence is negative (Appendix Table A.10, columns 1 and 5), it is statistically insignificant in a country sample that excludes Belgium. The positive impact of union density, instead, is shown to affect sickness absence (column 2) positively, but is similarly sensitive to changes in the country sample. The impact of wage bargaining coordination is found to be negative and significant (not reported here), but it is not robust to using an alternative version of the index capturing more nuanced variations in the institutional structure. However, the results are more robust when an indirect impact of the institutional variables is considered. Most notably, the results lend further support to the hypothesis that a higher degree of unionization may reduce the negative impact of an employer's sick pay provision. This result seems to be particularly significant for long-term sickness absence (Appendix

[31]Measurement issues, including the degree of enforcement of labor market regulations, arise when using such institutional indicators; however, they are considered to reasonably proxy the most relevant institutional features (IMF, 2003).

[32]In the literature on wage determination and unemployment (for example, Nickell and Nunziata, 2001; Nickell and others, 2001; and IMF, 2003), coordination refers to mechanisms on both the unions' and employers' sides—such as centralized bargaining (as in Austria) or the presence of institutions assisting in bargaining (as in Germany)—whereby the aggregate employment implications of wage determination are taken into account when wage bargains are struck.

[33]Ichino and Riphahn (2005) provide evidence of a significant positive impact of employment protection on absence rates for Italy.

Table A.10, columns 4 and 8); for short-term absence, the estimates are less robust, particularly to changes in the country sample.

IV. Conclusions and Policy Implications

The evidence presented in this paper suggests that sickness absence is very high at least in four countries: the Netherlands, Sweden, Norway, and the United Kingdom. In these countries, between 4 and 6 percent of employees are absent on a given day, with losses in terms of forgone output that are likely to be substantial. Owing to their generous public insurance systems, the Netherlands, Sweden, and Norway bear significant costs in terms of public finances. Containing sickness absence would help prevent erosion of the labor supply stemming from demographics and working-time reductions.

High sickness absence reflects, to some extent, high labor force participation, particularly of women and older people. Countries with high sickness absence have generally high participation rates, to which both the traditional Nordic emphasis on social inclusion and the market-oriented approach followed by the United Kingdom may have contributed. Going forward, as populations age, maintaining high employment rates will be increasingly challenging and containing the erosion of the labor supply even more urgent. With large changes in the composition of the labor force, the overall impact of these changes on sickness absence is difficult to predict.

The high level of sickness absence, however, is not a necessary price for high participation. The results presented in this paper, as well as the evidence provided by the literature, point to a significant incentive problem owing to the generosity and leniency of public insurance schemes, especially in the Netherlands, Sweden, and Norway. Streamlining such systems could help improve labor supply incentives, with the benefits of a well-designed reform likely to be substantial (of the order of 0.5 to 1 percent of GDP for Sweden; Andersen and Molander, 2003). A comprehensive reform of sickness insurance should also consider how it is linked to other components of the social insurance system.[34]

A shift of a portion of insurance costs to employers may be advisable. The experience of the Netherlands, where absence has declined following a major reform in 1996 that shifted all costs to employers, could provide important lessons. This paper shows that higher costs are likely to produce a response by employers, which would ultimately help reduce absence. This effect, however, is likely to be smaller, the higher the level of employment protection. To be most effective, the cost shift must affect employer

[34]The Swedish example shows that the interaction of sickness insurance with unemployment insurance creates a perverse incentive for the unemployed to be listed as sick. By harmonizing the replacement rates between the two systems in 2003, the government has largely reduced this incentive. A review of the link between sickness insurance and disability pensions and their role in promoting early retirement is also desirable.

incentives via an increase in the marginal cost of absence. If the incentive is diluted, and the shift translates into a mere increase in labor costs, negative effects on employment are more likely to result. One way to achieve a more efficient impact would be to leave more room for workers and employers to determine the level of protection; for example, by a substantial reduction in the replacement rate of the public insurance system.

Encouraging flexible work arrangements is likely to pay off. The results presented here suggest that policies promoting shorter working hours may not be inconsistent with the objective of reducing absence. High sickness absence in the United Kingdom, for example, seems to be explained mainly by its comparatively long working hours. These policies, however, may still lead to a net reduction in hours worked, even if the accompanying decrease in sickness absence would partly offset their effect. Promoting flexible work arrangements, which have been shown to substantially reduce absence, may be a better policy option.

APPENDIX I

Data and Descriptive Statistics

See Tables A.1–A.4.

Table A.1. List of Countries and Data Availability

	Country	Working-Time Data
1.	Belgium	1983–2003
2.	Denmark	1983–2003
3.	Germany*	1983–2003
4.	Greece	1983–2003
5.	Spain	1987–2003
6.	France	1983–2003
7.	Ireland	1983–2003
8.	Italy*	1983–2003
9.	Luxembourg	1983–2002
10.	Netherlands*	1983–2003
11.	Austria	1995–2003
12.	Portugal	1986–2003
13.	Finland	1995–2003
14.	Sweden	1995–2003
15.	United Kingdom	1983–2003
16.	Iceland	1995–2002
17.	Norway	1995–2003
18.	Switzerland	1996–2003

Notes: *denotes missing data for Germany (1984), Italy (1992), and the Netherlands (1984, 1986). Working-time data are from the Eurostat *New Cronos Database* (See Appendix Table A.2).

Table A.2. List of Variables, Definitions, and Sources

Variable	Definition	Source
Absence rate	Share of employees absent due to sickness as percent of total employed, full-time employees only; includes those who worked at least one hour (short-term absence) and employees who did not work at all (long-term absence) during the reference week	Eurostat, *New Cronos Database*
Labor force participation rate (LFPR)	Defined as the ratio of the labor force (employed and unemployed) to the working-age population (aged 15–64), in percent	ILO (2003)
Age structure	Share of labor force aged 55–64 in labor force aged 15–64, in percent	ILO (2003)
Life expectancy	Life expectancy at birth, in number of years	ILO (2003)
Usual hours	Average number of usual hours worked during the reference week, full-time employees only	Eurostat, *New Cronos Database*
Part-time employment	Share of part-time employed in total employed, in percent	ILO (2003)
Flexible hours	Share of persons absent due to flexible working time arrangement in percent of total employed, full-time employees only who worked at least one hour	Eurostat, *New Cronos Database*
Unemployment (UE) gap	Deviation of unemployment rate from linear or quadratic trend unemployment rate, in percent of trend unemployment rate	ILO (2003); OECD,*OECD Economic Outlook Database*
Sickness benefit	Sickness benefit net replacement rate	Scruggs (2004)
Index of sickness insurance system generosity (Sickness index)	Weighted sum of four main components of sickness insurance system (net replacement rate, qualification period, duration, waiting period), in turn weighted by general coverage rate of sickness insurance (that is percentage of labor force with sick pay insurance)	Scruggs (2004)
Unemployment (UE) benefit	Unemployment benefit net replacement rate	Scruggs (2004)
Index of unemployment insurance system generosity (UE index)	Weighted sum of four main components of unemployment insurance system (net replacement rate, qualification period, duration, waiting period), in turn weighted by general coverage rate of unemployment insurance (that is percentage of labor force insured for unemployment risk)	Scruggs (2004)
Union density	Net union density, calculated as the percentage of union members among wage and salaried employees (similar to the union density variable from Scruggs, 2004)	IMF (2004)

Table A.2 *(concluded)*

Variable	Definition	Source
Employment protection (EP)	Index of employment protection (with a range between 0 and 2, increasing with the strictness of employment protection)	IMF (2004)
Bargaining coordination	Wage bargaining coordination index (with a range between 0 and 3, increasing with the degree of coordination); two versions of the index are used: one ignores transient changes in the institutional structure and the other contains short-term variations in coordination	IMF (2004)
Employer sick pay	Sick pay paid by employers, calculated as number of days of sick pay multiplied by replacement rate	U.S. SSA (various issues)
Gender	Dummy variable = 1 for male employees, = 0 for female employees	

Table A.3. Descriptive Statistics

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Sickness absence rate	2.75	2.28	1.71	0.09	10.26
Short-term sickness absence rate	0.82	0.48	0.86	0.03	4.38
Long-term sickness absence rate	1.94	1.74	1.00	0.04	6.26
Labor force participation rate	68.56	74.50	14.49	36.20	90.10
Age structure	9.39	9.60	3.12	2.00	17.80
Life expectancy	76.73	76.80	1.61	73.20	80.20
Usual hours	39.90	39.70	2.23	36.20	52.10
Part-time employment	14.14	12.65	6.39	4.20	34.50
Flexible hours	2.40	0.76	3.74	0.01	18.42
Unemployment gap (quadratic trend)	1.83	0.50	28.10	−39.00	352.60
Sickness benefit	68.69	74.91	23.30	20.04	111.00
Unemployment benefit	9.14	63.00	20.56	1.98	86.49
Union density	41.22	40.00	20.26	10.00	90.00
Employment protection	1.25	1.32	0.50	0.35	2.00
Employer sick pay	10.89	5.00	14.02	0.00	65.00

Note: See Appendix Table A.2 for the definitions and sources of the variables.

Table A.4. Cross-Correlations Between Variables of Model

	LFPR	Age Structure	Life Expectancy	Usual Hours	Part-Time Employment	Flexible Hours	UE Gap (quadratic trend)	Sickness Benefit	UE Benefit	Union Density	EP
LFPR											
Age structure	0.59*										
Life expectancy	0.15*	0.13*									
Usual hours	0.58*	0.51*	0.05								
Part-time employment	0.34*	0.09*	0.35*	0.14*							
Flexible hours	0.32*	0.26*	0.12*	0.25*	0.48*						
UE gap (quadratic trend)	0.01	0.03	0.01	−0.03	0.01	−0.03					
Sickness benefit	0.06	0.09*	0.16*	−0.41*	−0.05	−0.46*	−0.03				
UE benefit	0.18*	0.30*	0.20*	−0.23*	0.25*	−0.32*	−0.04	0.58*			
Union density	0.27*	0.21*	−0.19*	−0.14*	0.02	0.25*	0.08	0.13*	0.06		
EP	−0.13*	−0.08	−0.02	−0.25*	−0.45*	−0.58*	0.09*	0.66*	0.16*	−0.10*	
Employer sick pay	0.04	−0.09*	0.001	−0.06	0.19*	0.09	0.02	0.24*	0.08	0.12*	0.002

Notes: * = significant at the 5 percent level; LFPR = labor force participation rate; UE = unemployment; EP = employment protection. See Appendix Table A.2 for the definitions and sources of the variables.

APPENDIX II

Robustness Analysis

See Tables A.5–A.10.

Table A.5. Determinants of Sickness Absence: Demographic Characteristics
(Dependent variable: share of employees absent due to sickness in total employed, unless otherwise indicated)

	Static Panel Data Model				Dynamic Panel Data Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Absence rate$_{i,t-1}$					0.58**	0.02	0.58**	0.34**
					(15.46)	*(0.46)*	*(11.89)*	*(8.42)*
LFPR$_{i,t}$	0.05*	0.05**	0.05**	0.06**	−0.01	−0.01	−0.05*	0.01*
	(2.44)	*(5.47)*	*(3.11)*	*(11.87)*	*(0.51)*	*(0.45)*	*(2.37)*	*(2.30)*
LFPR$_{i,t-1}$					0.02	0.05^{+}	0.05**	
					(0.78)	*(1.84)*	*(2.73)*	
Age structure$_{i,t}$	0.01	0.01	0.01	0.01	0.08^{+}	0.07	0.05	0.01
	(0.16)	*(0.26)*	*(0.13)*	*(0.48)*	*(1.77)*	*(1.35)*	*(1.25)*	*(0.41)*
Age structure$_{i,t-1}$					−0.06		−0.07^{+}	
					(1.16)		*(1.70)*	
Life expectancy$_{i,t}$	−0.09^{+}	−0.09**	−0.09^{+}	−0.10**	−0.28*	−0.40**	−0.13^{-}	−0.13*
	(1.69)	*(3.95)*	*(1.67)*	*(4.05)*	*(2.47)*	*(3.14)*	*(1.48)*	*(2.13)*
Life expectancy$_{i,t-1}$					0.48**	0.19^{-}	0.24**	0.20**
					(4.39)	*(1.45)*	*(2.79)*	*(3.30)*
Gender		−1.83**	−1.83*	−1.89**				
		(3.14)	*(2.55)*	*(12.57)*				
Sweden				3.24**				
				(9.18)				
Netherlands				5.04**				
				(17.98)				
Norway				2.99**				
				(11.89)				
United Kingdom				1.88**				
				(12.10)				
Constant	6.35^{-}	6.89**	6.89^{+}	6.47**	−0.05**	0.03	−0.02*	−0.02**
	(1.47)	*(4.06)*	*(1.66)*	*(3.17)*	*(3.63)*	*(0.81)*	*(2.15)*	*(2.64)*
Within R^2	0.09	0.09	0.09			0.000		
Between R^2	0.01	0.25	0.25			0.305		
Overall R^2	0.02	0.20	0.20	0.87		0.002		
AR(2) (p-values)					0.26		0.95	0.80
Sargan test (p-values)					0.79		0.99	0.98
Observations	545	545	545	545	461	426	388	464
(groups)	(36)	(36)	(36)		(36)	(36)	(36)	(36)

Notes: Annual panel data over the period 1983–2003 (time periods vary) for 18 countries are used (see Appendix Table A.1). Reported specifications include (1) fixed-effects (FE) model with robust errors adjusted for correlation within country-gender groups; (2) random-effects

Table A.5 *(concluded)*

(RE) model with robust errors; (3) RE model with robust errors adjusted for correlation within country-gender groups; (4) pooled OLS with robust errors; country dummies for other countries are not reported; (5) Arellano-Bond (1991) one-step GMM (AB) model with restricted set of instruments and non-robust errors; (6) Anderson-Hsiao (1982) two-stage least-squares first-differenced estimator; (7) dependent variable is long-term sickness absence; AB model with restricted set of instruments (similar results with robust errors) and three lags of the dependent variable (only the first lag is reported); (8) dependent variable is short-term sickness absence; AB model with restricted set of instruments (similar results with robust errors). The cross-sectional unit,*i*, is the country-gender pair. All regressions include time-fixed effects (not reported) that are statistically significant at least at the 10 percent level (particularly for the years 1993 and 1994). AR(2) is the test of the null of no-second-order autocorrelation in the first-differenced residuals, and the validity of instruments is tested using the Sargan test of overidentifying restrictions. *t*-values are in parentheses. **(*, $^{+}$, $^{-}$) = significant at 1 (5, 10, 15) percent level. LFPR = labor force participation rate. See Appendix Table A.2 for the definitions and sources of the variables.

Table A.6. Determinants of Sickness Absence: Working-Time Arrangements

(Dependent variable: share of employees absent due to sickness in total employed, unless otherwise indicated)

	Static Panel Data Model				Dynamic Panel Data Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Absence rate$_{i,t-1}$					0.56**	0.61**	0.49**	0.24**
					(8.04)	*(8.31)*	*(5.89)*	*(3.90)*
LFPR$_{i,t}$	0.05**	0.05**	0.05^{+}	0.02^{+}			0.02	0.01^{+}
	(5.05)	*(4.18)*	*(1.90)*	*(1.73)*			*(1.42)*	*(1.77)*
Age structure$_{i,t}$			0.002	0.004	0.05^{-}			
			(0.04)	*(0.27)*	*(1.50)*			
Life expectancy$_{i,t}$	−0.07**	−0.12**	−0.11^{+}	−0.05*	−0.28**	−0.27**	−0.20**	−0.10*
	(2.70)	*(3.30)*	*(1.75)*	*(2.16)*	*(3.47)*	*(3.71)*	*(2.65)*	*(2.40)*
Life expectancy$_{i,t-1}$					0.45**	0.46**	0.30**	0.18**
					(4.18)	*(3.64)*	*(3.16)*	*(3.85)*
Usual hours$_{i,t}$	0.13*	0.08^{+}			0.11^{+}	0.14*		
	(2.52)	*(1.66)*			*(1.87)*	*(2.03)*		
Part-time empl$_{i,t}$			−0.31^{-}	−0.21*		0.05		
			(1.47)	*(2.04)*		*(0.93)*		
Part-time empl$_{i,t-1}$						−0.07^{-}		
						(1.62)		
Flexible hours$_{i,t}$							−0.28^{-}	−0.26**
							(1.62)	*(2.91)*
Usual hours* Part-time empl $_{i,t}$		0.11*	0.83^{+}	0.57*				
		(2.05)	*(1.61)*	*(2.22)*				
Usual hours* Flexible hours $_{i,t}$							0.59^{-}	0.66**
							(1.56)	*(3.16)*

Table A.6 *(concluded)*

Gender	−2.08**	−1.87**						
	(3.49)	*(3.67)*						
Constant	0.56	6.10^{-}	7.21	2.83^{-}	−0.04**	−0.03^{+}	−0.02	−0.02**
	(0.18)	*(1.62)*	*(1.33)*	*(1.52)*	*(2.80)*	*(1.76)*	*(1.26)*	*(4.55)*
Within R^2	0.13	0.11	0.13	0.11				
Between R^2	0.17	0.26	0.01	0.04				
Overall R^2	0.17	0.31	0.03	0.06				
AR(2) (p-values)					0.45	0.45	0.37	0.73
Sargan test (p-values)					0.50	0.70	0.41	0.68
Observations	546	532	531	531	464	452	439	439
(groups)	(36)	(36)	(36)	(36)	(36)	(36)	(36)	(36)

Notes: Annual panel data over the period 1983–2003 (time periods vary) for 18 countries are used (see Appendix Table A.1). Reported specifications include (1) random-effects (RE) model with robust errors; similar results for models excluding Iceland and the United Kingdom; (2) RE model with robust errors; (3) fixed-effects (FE) model with robust errors adjusted for correlation within country-gender groups (higher significance with non-cluster robust errors); in RE model with robust errors, part-time employment and its interaction with usual hours of work are significant when Iceland is excluded; (4) dependent variable is short-term sickness absence; FE model with robust errors adjusted for correlation within country-gender groups (higher significance with non-cluster robust errors); similar results for RE model; (5)–(8) Arellano-Bond (1991) one-step GMM model with restricted set of instruments and robust errors; (8) dependent variable is short-term sickness absence. The cross-sectional unit, i, is the country-gender pair. All regressions include time fixed effects (not reported) that are statistically significant at least at the 10 percent level. AR(2) is the test of the null of no-second-order autocorrelation in the first-differenced residuals, and the validity of instruments is tested using the Sargan test of overidentifying restrictions. t-values are in parentheses. **(*, $^{+}$, $^{-}$) = significant at the 1 (5, 10, 15) percent level. LFPR = labor force participation rate. See Appendix Table A.2 for the definitions and sources of the variables.

Table A.7. Determinants of Sickness Absence: Cyclicality and Unemployment Gap

(Dependent variable: share of employees absent due to sickness in total employed, unless otherwise indicated)

	Static Panel Data Model				Dynamic Panel Data Model		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Absence rate$_{i,t-1}$					0.55**	0.60**	0.44**
					(7.10)	*(7.71)*	*(4.21)*
LFPR$_{i,t}$	0.05**	0.05**	0.05**	0.05^{+}	−0.03		−0.02
	(4.94)	*(3.61)*	*(4.07)*	*(1.89)*	*(1.10)*		*(0.52)*
LFPR$_{i,t-1}$					0.04^{+}		0.04^{-}
					(1.68)		*(1.52)*
Age structure$_{i,t}$	0.01				0.06		
	(0.28)				*(1.43)*		
Age structure$_{i,t-1}$					−0.05		
					(0.88)		
Life expectancy$_{i,t}$	−0.11**	−0.09**	−0.10**	−0.13*	−0.24**	−0.24**	
	(4.68)	*(2.96)*	*(3.43)*	*(2.06)*	*(2.60)*	*(3.48)*	
Life expectancy$_{i,t-1}$					0.42**	0.44**	
					(4.32)	*(3.52)*	
Usual hours$_{i,t}$		0.18**	0.19**			0.15*	
		(2.73)	*(2.85)*			*(2.12)*	
Part-time empl$_{i,t}$				−0.30			
				(1.36)			
Flexible hours$_{i,t}$							−0.47**
							(2.70)
Part-time empl* Usual hours $_{i,t}$				0.81		0.14	
				(1.45)		*(1.19)*	
Part-time empl* Usual hours $_{i,t-1}$						−0.22*	
						(2.18)	

Table A.7 *(concluded)*

Usual hours* Flexible hours$_{i,t}$							1.05** *(2.60)*
UE gap$_{i,t}$ (linear trend)	−0.004** *(3.00)*	−0.003^{+} *(1.91)*				−0.003* *(2.12)*	
UE gap$_{i,t}$ (quadratic trend)			−0.002 *(1.43)*	−0.01^{+} *(1.74)*	−0.004* *(2.02)*		−0.002^{+} *(1.73)*
Gender	−1.71** *(2.93)*						
Constant	8.58** *(4.92)*	−0.99 *(0.24)*	−1.01 *(0.25)*	9.06^{-} *(1.60)*	0.04** *(2.60)*	0.03^{+} *(1.88)*	0.005 *(0.58)*
Within R^2	0.11	0.14	0.14	0.14			
Between R^2	0.23	0.001	0.001	0.01			
Overall R^2	0.19	0.01	0.01	0.03			
AR(2) (p-values)					0.38	0.45	0.35
Sargan test (p-values)					0.56	0.63	0.87
Observations	545	546	530	532	461	452	425
(groups)	(36)	(36)	(34)	(36)	(36)	(36)	(36)

Notes: Annual panel data over the period of 1983–2003 (time periods vary) for 18 countries are used (see Appendix Table A.1), except in column 3 (see below). Reported specifications include (1) random-effects (RE) model with robust errors; similar results for fixed-effects (FE) model; (2)–(3) FE model with robust errors; (3) excluding Sweden; (4) FE model with robust errors adjusted for correlation within country-gender groups (higher significance with non-cluster robust errors); (5)–(7) Arellano-Bond (1991) one-step GMM model with restricted set of instruments and robust errors; unemployment gap is modeled as predetermined, as supported by the test of instrument validity; (7) excluding Sweden. The cross-sectional unit, i, is the country-gender pair. All regressions include time fixed effects (not reported) that are statistically significant at least at the 10 percent level. AR(2) is the test of the null of no-second-order autocorrelation in the first-differenced residuals, and the validity of instruments is tested using the Sargan test of overidentifying restrictions. t-values are in parentheses. **(*, $^{+}$, $^{-}$) = significant at the 1 (5, 10, 15) percent level. LFPR = labor force participation rate, UE = unemployment. See Appendix Table A.2 for the definitions and sources of the variables.

Table A.8. Determinants of Sickness Absence: Sickness Insurance (1)

(Dependent variable: share of employees absent due to sickness in total employed, unless otherwise indicated)

	Static Panel Data Model								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$LFPR_{i,t}$	0.06**	0.08*	0.05*	0.09*	0.09**	0.07*	0.09*	0.07^{-}	0.08**
	(3.97)	*(2.55)*	*(2.38)*	*(2.32)*	*(2.89)*	*(2.55)*	*(2.51)*	*(1.59)*	*(4.03)*
Life $expectancy_{i,t}$	−0.06^{-}			−0.13^{-}			−0.03	−0.35**	−0.20**
	(1.57)			*(1.66)*			*(0.40)*	*(6.06)*	*(3.56)*
Usual $hours_{i,t}$	0.27**					0.34*			
	(3.34)					*(2.01)*			
Part-time $empl_{i,t}$		−0.52^{+}	−0.20	−0.40^{+}	−0.36*		−0.63^{+}	−1.07	−0.50**
		(1.90)	*(1.02)*	*(1.99)*	*(2.18)*		*(1.83)*	*(1.39)*	*(2.99)*
Part-time empl*		1.25^{+}	0.46	1.02*	0.88*		1.62^{+}	3.26	1.12*
Usual $hours_{i,t}$		*(1.79)*	*(0.90)*	*(2.06)*	*(2.15)*		*(1.82)*	*(1.55)*	*(2.84)*
UE $gap_{i,t}$ (quadratic trend)	−0.01**	−0.01^{+}	−0.01^{-}	−0.01	−0.01	−0.01*	−0.01*	−0.004	−0.01*
	(3.88)	*(1.99)*	*(1.66)*	*(1.39)*	*(1.29)*	*(2.17)*	*(2.15)*	*(0.95)*	*(2.17)*
Sickness $benefit_{i,t}$	0.01^{-}	0.02^{+}	0.01*		0.02*	0.02^{+}	0.03*		
	(1.58)	*(1.87)*	*(2.38)*		*(2.20)*	*(2.03)*	*(2.03)*		
Sickness $index_{i,t}$				−0.07					
				(0.92)					
UE $index_{i,t}$					−0.18**				
					(3.18)				
Employer sick $pay_{i,t}$						−0.01*	−0.01^{-}	−0.02^{+}	0.003
						(2.28)	*(1.59)*	*(1.72)*	*(1.02)*

Table A.8 *(concluded)*

Constant	−8.46^{+}	−3.51^{+}	−2.00^{-}	7.63	−2.50	−16.25*	−2.19	22.71**	13.49**
	(1.81)	*(1.75)*	*(1.52)*	*(1.19)*	*(1.36)*	*(2.17)*	*(0.28)*	*(7.35)*	*(2.96)*
Within R^2	0.20	0.21	0.15	0.23	0.27	0.22	0.21	0.31	0.42
Between R^2	0.001	0.000	0.001	0.003	0.02	0.004	0.002	0.24	0.09
Overall R^2	0.01	0.000	0.001	0.001	0.01	0.01	0.001	0.26	0.01
Observations	378	364	364	344	336	378	364	192	126
(groups)	(26)	(26)	(26)	(26)	(26)	(26)	(26)	(20)	(14)

Notes: Annual panel data over the period 1983–2003 (time periods vary, see Appendix Table A.1) for 13 countries (see Figure 5) are used, except in columns 8–9 (see below). Reported specifications include (1)–(9) fixed-effects models with robust errors adjusted for correlation within country-gender groups (higher significance with non-cluster robust errors); similar results for random-effects (RE) models with high overall R^2 (the latter is in the range of 0.20–0.30 if regressions are modeled as RE models); (3) dependent variable is long-term sickness absence. Specifications in (8)–(9) correspond to subsamples where the employment protection (EP) variable is used to partition the data set such that EP $\geq$ 1.25 and EP $<$ 1.25 in (8) and (9), respectively; the value 1.25 is the sample mean for EP. Countries in (8) are Belgium, Germany, Spain, France, Italy, the Netherlands, Austria, Portugal, Sweden, and Norway; countries in (9) are Belgium, Denmark, Ireland, the Netherlands, Finland, the United Kingdom, and Switzerland. The results are robust to other choices of the cutoff value, such as 1.32 (sample median) as well as to considering short- and long-term absence separately; similar results are obtained when the partitioning is done using a union density variable, with cutoff values at 45, 42 (sample mean), or 50 (average value of the variable). The cross-sectional unit, *i*, is the country-gender pair. All regressions include time fixed effects (not reported) that are statistically significant at least at the 10 percent level. *t*-values are in parentheses. **(*,$^{+}$,$^{-}$) = significant at the 1 (5, 10, 15) percent level. LFPR = labor force participation rate, UE = unemployment. See Appendix Table A.2 for the definitions and sources of the variables.

Table A.9. Determinants of Sickness Absence: Sickness Insurance (2)

(Dependent variable: share of employees absent due to sickness in total employed, unless otherwise indicated)

	Dynamic Panel Data Model						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Absence rate$_{i,t-1}$	0.60**	0.64**	0.49**	0.51**	0.48**	0.59**	0.32**
	(10.05)	*(8.62)*	*(6.39)*	*(7.29)*	*(6.59)*	*(8.98)*	*(8.17)*
LFPR$_{i,t}$			0.01				
			(0.39)				
LFPR$_{i,t-1}$			0.01				
			(0.17)				
Life expectancy$_{i,t}$	−0.20^{+}	−0.08		−0.37**	−0.30*	−0.02	−0.12^{-}
	(1.69)	*(0.80)*		*(2.97)*	*(2.32)*	*(0.20)*	*(1.58)*
Life expectancy$_{i,t-1}$	0.52**	0.31**		0.47**	0.39**	0.23**	0.13^{+}
	(3.26)	*(3.36)*		*(4.10)*	*(3.26)*	*(3.27)*	*(1.97)*
Usual hours$_{i,t}$	0.16*	0.07		0.15^{+}	0.13*	0.12^{-}	0.12*
	(2.05)	*(1.30)*		*(1.81)*	*(1.94)*	*(1.60)*	*(2.39)*
Flexible hours$_{i,t}$			−0.27*				
			(2.29)				
Part-time empl*Usual hours $_{i,t}$	0.07	−0.06					
	(0.38)	*(0.65)*					
Part-time empl*Usual hours $_{i,t-1}$	−0.18	−0.03					
	(1.14)	*(0.46)*					
Usual hours*Flexible hours $_{i,t}$			0.56*				
			(2.10)				
UE gap$_{i,t}$ (quadratic trend)	−0.01^{+}	−0.004*	−0.003^{-}	−0.004^{-}	−0.003	−0.003^{+}	−0.001
	(1.94)	*(2.01)*	*(1.60)*	*(1.48)*	*(1.15)*	*(1.92)*	*(1.24)*
Sickness benefit$_{i,t}$	0.02*	0.02*	0.04**		0.03**	0.03**	0.01
	(2.05)	*(2.18)*	*(3.58)*		*(2.60)*	*(3.28)*	*(0.85)*
Sickness index$_{i,t}$				−0.16*			
				(2.17)			

Table A.9 *(concluded)*

Sickness index$_{i,t-2}$				0.11*			
				(2.19)			
UE index$_{i,t}$					−0.03		
					(0.51)		
UE index$_{i,t-2}$					−0.11^{+}		
					(1.81)		
Employer sick pay$_{i,t}$						−0.01*	0.001
						(2.43)	*(0.44)*
Constant	0.04^{-}	0.02^{-}	0.02^{+}	−0.02^{+}	−0.003	−0.03	−0.002
	(1.52)	*(1.11)*	*(1.94)*	*(1.80)*	*(0.15)*	*(1.19)*	*(0.17)*
AR(2) (p-values)	0.59	0.61	0.94	0.51	0.75	0.75	0.72
Sargan test (p-values)	0.58	0.55	0.70	0.40	0.43	0.86	0.62
Observations	304	304	294	298	290	320	320
(groups)	(26)	(26)	(26)	(26)	(26)	(26)	(26)

Notes: Annual panel data over the period 1983–2003 (time periods vary, see Appendix Table A.1) for 13 countries (countries in Table A.1, excluding Greece, Spain, Luxembourg, Portugal, and Iceland) are used. Reported specifications include Arellano-Bond (1991) one-step GMM (AB) model with a restricted set of instruments and robust standard errors (similar results with robust errors), with Sargan test from the specification with non-robust errors; (1) sickness benefit is modeled as exogenous, as supported by the test of instrument validity; (2) dependent variable is long-term sickness absence; (4) the sickness index is modeled as predetermined, as supported by the test of instrument validity; (5) the index of unemployment insurance system generosity is modeled as exogenous, but there are similar results if it is modeled as predetermined; (6) dependent variable is long-term sickness absence; employer sick pay is modeled as exogenous, but there are similar results if it is modeled as predetermined; (7) dependent variable is short-term sickness absence. The cross-sectional unit, i, is the country-gender pair. All regressions include time fixed effects (not reported) that are statistically significant at least at the 10 percent level. AR(2) is the test of the null of no-second-order autocorrelation in the first-differenced residuals, and the validity of instruments is tested using the Sargan test of overidentifying restrictions. t-values are in parentheses. **(*, $^{+}$, $^{-}$) = significant at the 1 (5, 10, 15) percent level. LFPR = labor force participation rate, UE = unemployment. See Appendix Table A.2 for the definitions and sources of the variables.

Table A.10. Determinants of Sickness Absence: Labor Market Institutions

(Dependent variable: share of employees absent due to sickness in total employed, unless otherwise indicated)

	Static Panel Data Model				Dynamic Panel Data Model			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Absence rate$_{i,t-1}$					0.37**	0.37**	0.35**	0.35**
					(6.11)	*(6.19)*	*(6.53)*	*(6.81)*
LFPR$_{i,t}$	0.10**	0.09**	0.08**	0.05**				
	(4.10)	*(2.93)*	*(5.19)*	*(3.89)*				
Life expectancy$_{i,t}$	−0.22*	−0.11^{+}	−0.19**	−0.23**	−0.25*	−0.37**	−0.33**	−0.16**
	(2.74)	*(1.78)*	*(3.88)*	*(4.23)*	*(2.23)*	*(3.14)*	*(3.40)*	*(2.63)*
Life expectancy$_{i,t-1}$					0.34**	0.37**	0.14	0.004
					(2.94)	*(3.52)*	*(1.40)*	*(0.05)*
Usual hours$_{i,t}$					0.22**	0.18*	0.22**	0.08
					(2.75)	*(2.51)*	*(2.59)*	*(1.15)*
Part-time empl$_{i,t}$	−0.50*	−0.47*	−0.35*	0.04				
	(2.52)	*(2.62)*	*(2.43)*	*(0.33)*				
Part-time empl* Usual hours $_{i,t}$	1.33*	1.28**	0.99**	−0.08	−0.04			
	(2.61)	*(2.81)*	*(2.68)*	*(0.26)*	*(0.70)*			
UE gap$_{i,t}$ (quadratic trend)	−0.005	−0.01	−0.01*	−0.004*	−0.002	−0.01*	−0.001	−0.001
	(1.39)	*(1.26)*	*(2.05)*	*(2.25)*	*(0.92)*	*(2.05)*	*(0.49)*	*(0.60)*
Sickness benefit$_{i,t}$	0.01				0.02**	0.02**		
	(1.09)				*(3.42)*	*(3.20)*		
Employer sick pay$_{i,t}$				−0.04**			−0.03**	−0.04**
				(5.67)			*(3.72)*	*(6.15)*
EP index$_{i,t}$	−0.70				−0.57*			
	(1.44)				*(1.98)*			
Union density$_{i,t}$		0.04^{+}	0.01^{-}					
		(2.00)	*(1.52)*					

Table A.10 *(concluded)*

EP index*UE gap$_{i,t}$			0.003			0.004^{-}		
			(1.12)			*(1.52)*		
EP index*Empl. sick pay$_{i,t}$								
Union*Empl. sick pay$_{i,t}$				0.001**			0.0005**	0.0007**
				(5.47)			*(4.35)*	*(6.91)*
Constant	12.71*	2.85	10.96**	16.43**	0.02	0.001	0.04*	0.04**
	(2.08)	*(0.51)*	*(2.81)*	*(3.96)*	*(1.20)*	*(0.09)*	*(2.15)*	*(2.64)*
Within R^2	0.31	0.28	0.29	0.30				
Between R^2	0.000	0.01	0.01	0.001				
Overall R^2	0.01	0.004	0.02	0.004				
AR(2) (p-values)					0.84	0.88	0.72	0.73
Sargan test (p-values)					0.48	0.76	0.66	0.66
Observations	268	296	318	318	212	222	264	264
(groups)	(26)	(26)	(30)	(30)	(26)	(26)	(30)	(30)

Note: Annual panel data over the period 1983–2003 (time periods vary, see Appendix Table A.1) are used including the following groups of countries: 13 countries in columns 1–2 and 5–6 (countries in Table A.1, excluding Greece, Spain, Luxembourg, Portugal, and Iceland); and 15 countries in columns 3–4 and 7–8 (countries in Table A.1, excluding Greece, Luxembourg, and Iceland). Reported specifications include (1)–(2) fixed-effects (FE) model with robust errors adjusted for correlation within country-gender groups (higher significance with non-cluster robust errors); similar results for random-effects (RE) model; (3)–(4) FE models with robust errors (lower significance with cluster robust errors but higher significance in RE model); (4) dependent variable is the long-term sickness absence; (5)–(8) Arellano-Bond (1991) one-step GMM (AB) model with restricted set of instruments and robust standard errors; labor market institutional variables are modeled as exogenous; there are similar results when the sickness benefit variable is dropped, increasing the number of groups to 30, as in (7) and (8); (8) dependent variable is the long-term sickness absence. The cross-sectional unit, i, is the country-gender pair. All regressions include time fixed effects (not reported) that are statistically significant at least at the 10 percent level. AR(2) is the test of the null of no-second-order autocorrelation in the first-differenced residuals, and the validity of instruments is tested using the Sargan test of overidentifying restrictions. t-values are in parentheses. **(*,$^{+}$,$^{-}$) = significant at the 1 (5, 10, 15) percent level. LFPR = labor force participation rate, UE = unemployment, EP = employment protection. See Appendix Table A.2 for the definitions and sources of the variables.

APPENDIX III

Sickness Benefits in Europe

See Table A.11

Table A.11. Comparative Table on Sickness Cash Benefits
(As of January 1, 2006)

AUSTRIA	
Basic principles	Compulsory social insurance scheme for employees with earnings-related benefits. Continuation of payment of wages and salaries by the employer.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor from the fourth day of illness.
2. Qualifying period	Neither work period nor qualifying period required.
B. Waiting period	Sickness benefit (*Krankengeld*): 3 days. Commencement of benefit only from date of notification if incapacity for work has not been reported within 1 week.
C. Benefits	
1. Benefit paid by employers	Continued payment of wages for workers and employees between 6 and 12 weeks, following the length of service. At the end of this period they are entitled to the payment of half their salaries for a period of 4 weeks. No sickness benefit during 100% continued payment of wages, half of sickness benefit for the period in which 50% of the salaries are paid.
2. Benefits of social protection	
Amount	Sickness benefit: 50% of gross wage or salary, 60% from 43rd day of illness. Maximum: €3,750 per month. For persons with earnings below the marginal earnings threshold for compulsory insurance who are voluntarily insured, the sickness benefit is €119.67.
Duration	Sickness benefit: Generally the legally stipulated minimum time period is 52 weeks. According to the insurance funds' statute, however, the sickness benefit can be extended to 78 weeks.
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Continued payment of wages and sickness benefit are both subject to taxation.

Table A.11 *(continued)*

BELGIUM	
Basic principles	Compulsory social insurance scheme mainly financed by contributions, covering the active population. *For the employees*: continuation of payment of wages by the employer for a limited period (guaranteed salary) followed by income-related benefits paid by the mutual insurance fund.
A. Conditions	
1. Proof of incapacity for work	Certificate from a doctor required. The declaration of incapacity has to be delivered to the sickness fund doctor within 2 days.
2. Qualifying period	Period of work and membership required: 6 months, in which 120 days of work or assimilated periods (unemployment, legal holidays, etc.). Proof of payment of minimum contributions. To have ceased all activities because of at least 66% reduction of earning capacity.
B. Waiting period	1 working day. No waiting period if the insured person has been unemployed for at least 9 days within the 21 days prior to the incapacity for work; if incapacity is due to pregnancy or confinement; for unemployed persons in the employment of the public authorities; or if the worker has been in contact with someone suffering from an infectious disease.
C. Benefits	
1. Benefit paid by employers	*Manual workers*: ● for the first 7 days of incapacity for work: 100% of earnings; ● from 8th to 14th day of incapacity: 60% of upper earnings limit and a supplementary allowance *(indemnité complémentaire/aanvullende tegemoetkoming)*; ● from 15th to 30th day of incapacity: supplementary allowance. *White-collar workers*: 100% of earnings for 1 month.
2. Benefits of social protection	
Amount	The compensation insurance starts when the guaranteed salary period paid by the employer is over. This means after 2 weeks of disability for workers and 1 month for employees. General rule: 60% of earnings. Exception: after the 31st day of disability for co-habitant recipients, 55% of earnings. Maximum taken into account for compensation: €105.3055 per day.
Duration	Maximum: 1 year (period of ''primary incapacity for work'').
Special condition for unemployed	The incapacity benefit during the first 6 months cannot be less than the unemployment benefit.
D. Taxation of benefits	Benefits are subject to taxation.

Table A.11 *(continued)*

DENMARK	
Basic principles	Tax-financed protection scheme for the active population (employees and self-employed) with earnings-related benefits.
A. Conditions	
1. Proof of incapacity for work	*Benefits paid by the employer*: The employer can demand a written declaration from the employee stating sickness from the second day and a medical certificate from the fourth day of illness. *Benefits paid by the local authorities*: A medical bulletin—form delivered by the municipality—must be introduced at the latest 1 week after the first day of sickness or 1 week after the last employer payment.
2. Qualifying period	Salaried workers: *Benefits paid by the employer*: Minimum working period of 74 hours during the 8 weeks immediately preceding the sickness. *Benefits paid by the municipality*: Period of work of at least 120 hours in 13 weeks immediately preceding illness, or persons who have just completed a vocational training course for at least 18 months and are doing a paid work placement as part of a vocational training course, or unemployed entitled to benefits from unemployment insurance or similar benefits (anti-unemployment measures), or are in a "flexible job" with a private or public employer. *Self-employed:* Professional activity on a certain scale for at least 6 months within the last 12-month period, 1 month of which immediately precedes the illness. Voluntary insurance for self-employed and helping spouse: 6 months (except work injury and persons who have recently become self-employed and joined the insurance within 3 months after the termination of their salaried activity).
B. Waiting period	*Salaried workers*: No waiting period. *Self-employed*: 2 weeks. For this period, voluntary insurance for self-employed and helping spouse that allows a benefit from the third sickness day, or, with payment of a premium supplement, beginning the first day of sickness.
C. Benefits	
1. Benefit paid by employers	No statutory continuation of payment. Collective agreements provide for the continued payment of wages and salaries in the case of sickness for certain groups of employees. In this case, employers are entitled to receive the sickness cash benefit *(sygedagpenge)* of the employees.

Table A.11 *(continued)*

DENMARK	
2. Benefits of social protection	
Amount	*Salaried workers:* Sickness cash benefit *(sygedagpenge)* calculated upon the basis of worker's hourly wage (contributions to Labour Market Fund, *Arbejdsmarkedsfonden*, deducted), with a maximum of DKr 3,332 (€447) per week or DKr 90.05 (€12) per hour (37 hours per week); and upon the number of hours of work. Period to be covered by the employer: 2 weeks. *Self-employed:* Sickness cash benefit calculated on the basis of the earnings from the occupational activity of the self-employed person, with the same maximum as mentioned above. Self-employed persons who have voluntary insurance (see above) are entitled to at least 2/3 of the maximum amount.
Duration	52 weeks in 18 months; pensioners or people aged 65 (67 for those who turned 60 by July 1, 1999), not more than 13 weeks in a 12-month period. Not included: the first 2 weeks of a period of sickness. Benefits can be paid for a longer period under certain conditions; for example, when beginning a re-education process, when the municipality starts the analysis of an application for disability pension, in the case of employment injury, or when an employee could recover work capacity. If necessary, benefits can be paid for a longer period up to 26 weeks, in order to test the employee's work capacity. Local authorities assess the possible steps to take every 8 weeks. At the first assessment and at the last one after 6 months of illness over 12 months, the local authorities will draw up a future assistance plan to be proposed to the employee. If work capacity is not recovered, the local authorities must start the procedure leading to a disability pension.
Special condition for unemployed	The unemployed and persons participating in labor market measures are entitled to the same amount they would have received had they not fallen ill, with the maximum amount indicated above.
D. Taxation of benefits	Benefits are subject to taxation.
FINLAND	
Basic principles	Universal compulsory sickness insurance scheme for all residents with earnings-related benefits and in some cases a minimum/flat rate benefit.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor from the ninth day of illness.
2. Qualifying period	Neither work period nor qualifying period required.
B. Waiting period	9 days (excluding Sundays) following the day the illness begins.

Table A.11 *(continued)*

FINLAND	
C. Benefits	
1. Benefit paid by employers	Employer pays full salary for the first 9 days if the employment relationship has lasted at least 1 month; if under 1 month, 50% of the salary. By collective agreements most employers pay full salary during the first 1–2 months.
2. Benefits of social protection	
Amount	Daily amounts dependent on annual earnings: ● earnings under €1,090: payable only if sick leave lasts more than 55 days with limitations; €15.20 per weekday; ● earnings €1,091–€28,403: 70% of 1/300 earnings; ● earnings €28,404–€43,699: €66.27 plus 40% of 1/300 of earnings exceeding €28,403; ● above €43,699: €88.66 plus 25% of 1/300 of earnings exceeding €43,699.
Duration	For the same illness, limited to 300 days (excluding Sundays) over a 2-year period.
Special condition for unemployed	If an unemployed person received unemployment benefits for at least 4 months, the sickness benefit will be at least 86% of the unemployment benefit.
D. Taxation of benefits	Benefits are subject to taxation.
FRANCE	
Basic principles	Compulsory social insurance scheme with earnings- or income-related benefits.
A. Conditions	
1. Proof of incapacity for work	General scheme for employees (*Régime général d́assurance maladie des travailleurs salariés, RGAMTS*): Rest prescription by the doctor stating work incapacity. Use of the work interruption sheet, specifying probable incapacity duration.
2. Qualifying period	General scheme for employees: Payment of minimum contributions on the basis of *n* times the minimum wage (*salaire minimum interprofessionnel de croissance, SMIC*) of €8.03 per hour on July 1, 2005 or minimum duration of activity: ● For the first 6 months: 1,015 SMIC in the 6 preceding months or 200 hours worked in the previous 3 months. ● After 6 months and having been registered for a minimum of 12 months since having stopped working: 2,030 SMIC in the 12 previous months, including the 1,015 SMIC of the first 6 months or 800 hours worked in the 12 previous months, 200 of which in the first 3 months.
B. Waiting period	General scheme for employees: 3 days.

Table A.11 *(continued)*

FRANCE	
C. Benefits	
1. Benefit paid by employers	The employer pays the entire (or partial) difference between the salary and the amount of the sickness cash benefits (*indemnités journalières de maladie*) of the General scheme for employees in accordance with the national interprofessional agreement on monthly payments of wages or the collective agreement conditions.
2. Benefits of social protection	
Amount	General scheme for employees: ● 50% of daily earnings with a limit of 1/720th of the annual maximum, up to €43.15. ● 66.66% of daily earnings with a limit of 1/540th of the annual maximum from 31st day for beneficiaries with 3 children, up to €44.38.
Duration	General scheme for employees: 12 months (360 days) per period of 3 consecutive years, but until the end of 36th month for long-term sickness.
Special condition for unemployed	General scheme for employees: No special conditions.
D. Taxation of benefits	General scheme for employees: Benefits are subject to taxation.
GERMANY	
Basic principles	Compulsory social insurance scheme financed by contributions for employees and some categories of persons up to a certain income limit with earnings-related benefits. Continuation of payment of wages and salaries paid by the employer.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor from the fourth day of illness.
2. Qualifying period	Neither work period nor qualifying period required.
B. Waiting period	No waiting period if incapacity with entitlement to statutory sick pay under labor law or if sickness is due to an employment injury or an occupational disease or if hospital treatment is required.
C. Benefits	
1. Benefit paid by employers	Statutory continuation of payment for manual and white-collar workers: 6 weeks.
2. Benefits of social protection	
Amount	Sickness benefit (*Krankengeld*): 70% of the normal salary, not exceeding 90% of the net salary. Normal salary (*Regelentgelt*): Wages and income from work, normally received (during last 3 months), insofar as subject to contribution. After 1 year adjustment as for pensions.
Duration	Sickness benefit for the same illness, limited to 78 weeks over a 3-year period.

Table A.11 *(continued)*

GERMANY	
Special condition for unemployed	Initially (up to 6 weeks) unemployment benefits as continued wage payment paid by the Labour Agency, then sickness benefits paid by the sickness insurance fund to the amount of the previous wage replacement benefit paid by the Employment Agency. Continued payment of the unemployment benefit II (*Arbeitslosengeld II*) by the competent authority for basic resources for up to 6 weeks, then sickness benefits.
D. Taxation of benefits	The continuation of employer's payments is subject to taxation. Sickness insurance benefits are not subject to taxation (but subject to progression).
GREECE	
Basic principles	Compulsory social insurance scheme for employees with earnings-related benefits.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor of the Social Insurance Institute IKA (*ΙΔΡΥΜΑ ΚΟΙΝΩΝΙΚΩΝ ΑΣΦΑΛΙΣΕΩΝ*) from the first day of illness.
2. Qualifying period	100 days of work subject to contributions during the previous year or the 12 first months of the 15 preceding the illness (duration of benefit: 182 days). 300 days subject to contributions during the 2 years, or 27 months of the 30, preceding the illness (duration of benefit: 360 days). 1,500 days of insurance during the last 5 years preceding the incapacity for work due to the same illness (duration of benefit: 720 days).
B. Waiting period	3 days.
C. Benefits	
1. Benefit paid by employers	No statutory continuation of payment.
2. Benefits of social protection	
Amount	For the first 15 days: Maximum for sickness benefit (*ΕΠΙΔΟΜΑ ΑΣΘΕΝΕΙΑΣ*) plus supplement for dependents (max. 4) is €14.07 per day (daily wage assumed for third insurance category). After 15 days: Maximum for benefits plus supplements for dependents (max. 4) is €25.88 per day (daily wage assumed for eighth insurance category).
Duration	Duration of benefits depending on the length of the period of contributions: 182, 360, or 720 days. (See above Conditions.)
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Benefits are subject to taxation.

Table A.11 *(continued)*

ICELAND	
Basic principles	Tax-financed protection scheme for the active population (employees and self-employed) with flat-rate benefits. Continued payment of wages and salaries by the employer for a limited period.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work due to illness certified by a physician.
2. Qualifying period	Generally 2 months of work prior to illness and 6 months of residency for new residents.
B. Waiting period	14 days. The waiting period begins on the day when incapacity for work is confirmed by a physician.
C. Benefits	
1. Benefit paid by employers	Statutory continuation of payment for at least 1 month after 12 months of consecutive employment. Collective agreements provide for the continued payment of wages and salaries for a certain period depending on agreements. Sickness cash benefits (*sjúkradagpeningar*) are not granted until wages have ceased.
2. Benefits of social protection	
Amount	Per diem sickness cash benefits for persons who have to give up full-time gainful employment ISK 911 (€12). Daily amount for persons who have to give up less than full-time but at least half-time employment ISK 456 (€6.11).
Duration	52 weeks in any one period of 24 months.
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Benefits are subject to taxation.
IRELAND	
Basic principles	Compulsory social insurance scheme for employees with flat-rate disability benefit and supplements for dependents.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor from the first day of illness.
2. Qualifying period	• 52 weekly contributions paid from start of employment, and • 39 weekly contributions paid or credited during the relevant contribution year preceding the benefit year, of which a minimum of 13 must be paid contributions. The latter requirement may be satisfied by contributions paid in some other contribution years, or • 26 weekly contributions paid in each of the 2 relevant contribution years preceding the benefit year.

Table A.11 *(continued)*

IRELAND	
B. Waiting period	3 days.
C. Benefits	
1. Benefit paid by employers	No statutory continuation of payment.
2. Benefits of social protection	
Amount	Disability Benefit: €165.80 per week. Family supplements—adult dependent, €110.00 per week; each child dependent, €16.80 per week.
Duration	Unlimited (to age 66) if the claimant has paid 260 weekly contributions. Limited to 52 weeks if between 52 and 260 weekly contributions paid.
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Benefits are fully taxable after 6 weeks' payment in any tax year (including supplement for adult dependents but excluding supplements for child dependents).
ITALY	
Basic principles	Compulsory social insurance scheme for employees with earnings-related benefits. Continuation of payment of salary by the employer.
A. Conditions	
1. Proof of incapacity for work	The employee must deliver a medical certificate to the employer, who can decide to proceed to any control.
2. Qualifying period	No work period nor qualifying period required.
B. Waiting period	3 days. None for Tuberculosis.
C. Benefits	
1. Benefit paid by employers	Statutory continuation of payment of wage for a maximum of 180 days per year (and in some specific cases 180 days again in the next year).
2. Benefits of social protection	
Amount	*Without hospitalization*: 50%. From 21st day, 66.66% (real earnings taken as basis). *With hospitalization*: Allowance is reduced to 2/5 for insured without dependents. *Tuberculosis*: Daily benefit during treatment (*indennità giornaliera di cura*)—Insured person, sickness benefit for 180 days, then €11.21; family members, €5.60. Daily post-sanatorium benefit (*indennità giornaliera postsanatoriale*)—Insured person, €18.67; family members, €9.34. Cure allowance (*assegno di cura postsostentamento*): €75.28 per month. The allowance is granted after the post-sanatorium treatment and is completed where earnings capacity is reduced by at least 50%.

Table A.11 *(continued)*

ITALY	
Duration	Maximum of 6 months (180 days) per year. For tuberculosis: No limit during treatment; maximum of 2 years for post-sanatorium allowance; 2 years for the treatment allowance (renewable every 2 years).
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Benefits are subject to taxation.
LUXEMBOURG	
Basic principles	Compulsory social insurance scheme financed by contributions for the active population (employees and self-employed) with earnings-related benefits.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor from the second day of illness.
2. Qualifying period	No work period nor qualifying period required.
B. Waiting period	No waiting period.
C. Benefits	
1. Benefit paid by employers	Continuation of payment of salary for white-collar employees in the private sector for the month in which the disease occurs and for the following 3 months.
2. Benefits of social protection	
Amount	The full salary the insured person would have earned if work had continued.
Duration	Maximum: 52 weeks. Payment ends if an invalidity pension (*pension d'invalidité*) is granted.
Special condition for unemployed	The unemployed continue to receive the unemployment benefit *(indemnité de chômage)*.
D. Taxation of benefits	Benefits are subject to taxation.
NETHERLANDS	
	Continuation of payment by employer for the first 2 years of sickness. The Sickness Benefit Act (*Ziektewet, ZW*) continues to exist as a safety net for employees who do not or no longer have an employer, and in a few special circumstances.
A. Conditions	
1. Proof of incapacity for work	When reporting sick, the employee must ● stay at home until the Implementation Institution Inspector's visit, ● allow the Inspector to visit the employee at home, notify the Implementation Institution of ones whereabouts within 24 hours, ● facilitate one's own recovery, ● keep appointments with the Medical Insurance Office of the Implementation Institution.

Table A.11 *(continued)*

NETHERLANDS	
2. Qualifying period	No work period nor qualifying period required.
B. Waiting period	No waiting period.
C. Benefits	
1. Benefit paid by employers	Continued payment of 70% of wages for 52 weeks. Maximum daily wage considered: €168. With the minister's approval this percentage can be increased by the industrial boards.
2. Benefits of social protection	
Amount	Sickness Benefit Act as safety net (see "Basic principles"): 70% of the daily wage. Maximum daily wage considered: €168.
Duration	104 weeks.
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Benefits are subject to taxation.
NORWAY	
Basic principles	Compulsory social insurance scheme for the active population (employees and self-employed) with earnings-related benefits.
	Continuation of payment of wages and salaries paid by the employer.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor. Employees have the right to give their employer notice of incapacity due to sickness for up to 3 calendar days at a time. Restrictions in case of frequent recurrence.
	If the employer has entered an Inclusive Workplace Agreement (*IA-avtale*) with the National Insurance Service, the employee may give notice of incapacity for up to 8 calendar days at a time, up to a maximum of 24 days a year.
2. Qualifying period	Generally 4 weeks of work.
B. Waiting period	No waiting period for employees. 16 days for freelancers and self-employed. A voluntary insurance supplement to cover the waiting period is available for both groups.
C. Benefits	
1. Benefit paid by employers	The employer pays sickness cash benefit (*sykepenger*) for up to 16 calendar days. When the employer continues to pay the salary beyond this period, the sickness cash benefit is paid to the employer.

Table A.11 *(continued)*

NORWAY	
2. Benefits of social protection	
Amount	100% of the salary from the first day for employees, 100% of the income basis from the 17th day for freelancers, and 65% from the 17th day for self-employed. A voluntary insurance supplement to cover a rate of 100% is available to the self-employed. A general maximum annual income basis of 6 times the basic amount (*Grunnbeløpet*) applies, i.e., NKr 364,194 (€45,635).
Duration	260 days (52 weeks) for employees, 248 days for freelancers and self-employed.
Special condition for unemployed	The unemployment benefit (*dagpenger under arbeidsløshet*) per week is taken as the income basis for the sickness cash benefit.
D. Taxation of benefits	Benefits are subject to taxation.
PORTUGAL	
Basic principles	Compulsory social insurance scheme for employees (voluntary scheme for self-employed and persons working at home), with benefits depending on registered earnings and duration of incapacity.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor. The certificate has to be sent to the social security institutions within 5 days following its issue.
2. Qualifying period	6-month affiliation with registered remuneration of which 12 days during the 4 months prior to the one preceding the day of incapacity.
B. Waiting period	3 days. No waiting period in the case of hospitalization, for a sickness that started during the receipt of maternity allowance or in case of tuberculosis.
C. Benefits	
1. Benefit paid by employers	No statutory continuation of payment.
2. Benefits of social protection	
Amount	Daily benefit: Fixed by applying a percentage varying according to the incapacity duration to the average daily wage for the 6 months preceding the 2 months in which the illness began: ● 65% when the incapacity period is lower than or equal to 90 days, ● 70% when the incapacity period is between 91 and 365 days, ● 75% when the incapacity period is more than 365 days. In the event of tuberculosis: 80 or 100% if insured has 2 or more dependents. Minimum: 30% of the minimum wage or the average earning if it is lower than this percentage.

Table A.11 *(continued)*

PORTUGAL	
Duration	Maximum: 1,095 days (then, possibly, invalidity). In case of tuberculosis: Unlimited.
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Benefits are not subject to taxation.
SPAIN	
Basic principles	Compulsory social insurance scheme for employees and assimilated groups with contribution-related benefits for temporary incapacity (*Incapacidad temporal*).
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor, to be issued on the fourth day of absence and received by employing firm within 5 days following its dispatch.
2. Qualifying period	Contributions paid for 180 days during 5 years immediately preceding illness (with the exception of accidents).
B. Waiting period	3 days.
C. Benefits	
1. Benefit paid by employers	The employer pays sick pay from the fourth to the 15th day of illness at 60% of wages.
2. Benefits of social protection	
Amount	• From 4th to 20th day of sick leave inclusive, 60% of the calculation basis. • From the 21st day, 75% of the calculation basis. Calculation basis: Quotient of daily salary (contribution basis) in the month preceding the termination of work by the number of days corresponding to this contribution.
Duration	12 months with possibility of extension for 6 months if there is a chance that the beneficiary will become capable for work.
Special condition for unemployed	No special conditions.
D. Taxation of benefits	Benefits are subject to taxation.
SWEDEN	
Basic principles	Compulsory sickness insurance scheme for the active population (employees and self-employed) with earnings-related benefits. Continuation of payment of wages and salaries by the employer.
A. Conditions	
1. Proof of incapacity for work	Incapacity for work certified by a doctor from the eighth day of illness. The illness must be reported to the employer/the local social insurance office (*försäkringskassa*) from the first day of absence.
2. Qualifying period	Neither work period nor qualifying period required.

Table A.11 *(continued)*

SWEDEN	
B. Waiting period	Employees: 1 day. Self-employed: May choose waiting period of 3 or 30 days.
C. Benefits	
1. Benefit paid by employers	The employer pays sick pay (*sjuklön*) from the second to the 14th day of illness at 80% of wages.
2. Benefits of social protection	
Amount	80% of the income qualifying for sickness cash benefit (*sjukpenning*). The social insurance office pays sickness cash benefit as from the 15th day of illness.
Duration	There is no formal limitation but the sickness cash benefit may be converted into activity compensation (*aktivitetsersättning*) (for persons aged 19 to 29 years) or sickness compensation (*sjukersättning*) (for persons aged 30 to 64 years) if the illness continues for an extended time.
Special condition for unemployed	Unemployed persons are entitled to sickness cash benefit in the same amount they received before the last employment ended, as long as they are actively looking for a job.
D. Taxation of benefits	Benefits are subject to taxation.
SWITZERLAND	
Basic principles	Optional insurance that provides benefits in the event of sickness, accident (if not covered by accident insurance), and maternity, financed by contributions. An insurance obligation may result from an individual employment contract, a standard employment contract, or a collective labor agreement. In this case, the daily allowance insurance (*Taggeldversicherung/assurance d'indemnités journalières*) may be taken out as a collective insurance contract.
A. Conditions	
1. Proof of incapacity for work	Incapacity to work of at least 50%, certified by a doctor.
2. Qualifying period	The insurers may exclude from the insurance, by making a reservation, illnesses existing at the time of admission. Reservations end after 5 years at the latest. There are special rules on changing insurers.
B. Waiting period	Unless otherwise agreed, the right to benefits begins on the third day following the beginning of the illness.
C. Benefits	
1. Benefit paid by employers	Under the terms of Book V of the Civil Code, employers are required to continue to pay the salary for a limited period in the event of prevention from working due to an illness or pregnancy. The duration is 3 weeks during the first year of service. Thereafter a longer period is fixed on an "equitable" basis. Collective labor agreements often contain more favorable conditions.

Table A.11 *(continued)*

SWITZERLAND	
2. Benefits of social protection	
Amount	The insurer agrees with the insured person the amount of daily allowances insured.
Duration	At least 720 days in a period of 900 consecutive days.
Special condition for unemployed	Unemployed persons with work incapacity above 50% receive full daily allowances; those with work incapacity between 25 and 50% receive half daily allowances. Unemployed persons can request the transformation of their insurance accompanied by revised premiums.
D. Taxation of benefits	Benefits are subject to taxation.
UNITED KINGDOM	
Basic principles	Statutory Sick Pay (SSP) paid by the employer. Compulsory social insurance scheme for employees and self-employed persons, which has flat-rate benefits.
A. Conditions	
1. Proof of incapacity for work	Incapable of carrying out normal occupation (''own occupation test''). Usually based on medical certificates from a family doctor. The ''personal capability assessment'' applies after 28 weeks of incapacity, or from first week if recent employment is insufficient for ''own occupation test.''
2. Qualifying period	SSP: Employees' earnings before sickness must have reached the Lower Earnings Limit (LEL) for National Insurance contribution purposes. Short-term incapacity benefit: Must have paid sufficient contributions in any one of the 3 tax years before the year of the claim, and have been paid or been credited with sufficient contributions in 2 relevant tax years, normally the 2 preceding the year of the claim. Employees have to satisfy the contribution conditions where they claim short-term incapacity benefit on cessation of SSP.
B. Waiting period	3 days.
C. Benefits	
1. Benefit paid by employers	SSP: Paid by employer in case of illness lasting at least 4 consecutive days up to a maximum of 28 weeks. Standard rate of £68.20 (€99) per week. Earnings less than £82 (€119): No benefit.

Table A.11 *(concluded)*

UNITED KINGDOM	
2. Benefits of social protection	
Amount	Short-term incapacity benefit: Paid at 2 rates, lower rate of £57.65 (€84) per week for first 28 weeks, higher rate of £68.20 (€99) thereafter. If over pension age, up to £76.45 (€111) per week. Additions: Spouse aged 60 or over or adult caring for dependent child, £35.85 (€52) or if over pension age £43.95 (€64). Child dependency increase with higher-rate benefit, or from first day if over pension age: £9.40 (€14) for first child, £11.35 (€17) for each other. Not available for claims after April 2003.
Duration	Short-term incapacity benefit: 52 week maximum in period of incapacity for work; lower rate payable for first 28 weeks, followed by higher rate from week 29. Then replaced by long-term incapacity benefit.
Special condition for unemployed	No special conditions.
D. Taxation of benefits	SSP and higher-rate short-term incapacity benefit are subject to taxation. Lower-rate short-term incapacity benefit is not subject to taxation.

Source: MISSOC (2006).

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