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1

Work and Leisure in the United States and Europe: Why So Different?

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1 Introduction

In the early 1970s, hours worked per person were about the same in the United States and in Western Europe (Europe in short). Today they are almost 50 percent less in Europe than in the United States (figure 1.1). Americans average 25.1 working hours per person of working age; Italians, 16.7; the French, 18.0; and Germans, 18.7. The average employed American works 46.2 weeks per year; the average French, 40.5; the average Swede, 35.4. While Americans work today just about as much as in 1970, Europeans work much less. Why?

Both academics and policymakers have recently focused on the decline in work hours in Europe. The former have been attracted by the remarkable size of this phenomenon and its relevance to longstanding controversies in macroeconomics and public finance. The latter are particularly interested in whether the decline in European hours worked is causing a slowdown in growth. This paper is *not*, we repeat *not*, about the cause of the differential in growth between the United States and Europe, or whether hours worked is fully responsible for it. Our goal is to understand the evolution of working hours.[1] It should also be clear that when we say that Europeans work less, we mean they work less for pay in the market place; unpaid home production is part of "non working time." In fact, even though we say little regarding what Europeans do when they do not work, it is an excellent topic for future research.[2]

In a recent, provocative paper, Prescott (2004) argues that "virtually all of the large differences between U.S. labor supply and those of Germany and France are due to differences in tax systems." Prescott calibrates a dynamic model of investment and labor supply, and shows that under certain assumptions about parameter values, all of the

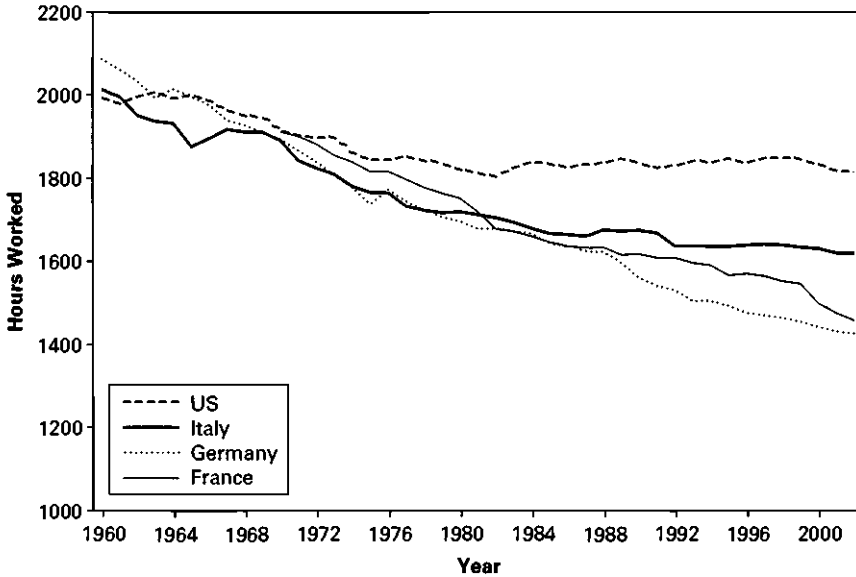

Figure 1.1
Annual Hours Worked over Time
Source: OECD data. Annual hours per employed person. Annual hours are equivalent to 52 × usual weekly hours minus holidays, vacations, sick leave.

difference between the United States and the major European countries can be explained by different marginal tax rates. Indeed, the marginal income tax rate differences between the United States and Europe were much smaller in the 1970s, when labor supply differences were much smaller. Prescott's view is partly supported by the statistical evidence of Davis and Henrekson (2004).

Prescott's argument relies critically on assumptions that ensure a high elasticity of labor supply that is hard to reconcile with most standard estimates of labor supply elasticities. In the case of male labor supply, we are not aware of any within-country estimates of labor supply elasticities that are even in the same ballpark as those used in Prescott's calibration. For women, estimated labor supply elasticities are much closer to those used by Prescott (his assumptions still veer toward the upper limit of available estimates); however, the reduction of hours worked is by no means a women-only phenomenon. Prescott himself is well aware of this discrepancy between the traditionally estimated elasticities from "micro" evidence and the "macro" elasticity needed for his calibration exercise to work, but he offers little explanation of why the "micro" elasticities are wrong.

This paper examines two different hypotheses for the mismatch between macro and micro labor supply estimates. The same hypotheses also offer us different theories of the differences in hours worked between the United States and Europe. First, we consider the possibility that the macro estimates are right in this context and that the micro estimates are misleading. Micro estimates may be statistically correct, but they are inappropriate because they consider only the direct impact of taxation. One indirect effect of taxation is the government transfers that it funds. These transfers create an income effect that might induce lower work hours. However, this does not take us far enough.

A potentially more important reason why macro elasticities would be much higher than micro elasticities is that the presence of positive complementarities either in production, consumption, or leisure would imply the existence of a social multiplier (Glaeser, Sacerdote, and Scheinkman 2003). For example, if the utility from not working is increasing in the number of people who do not work, macro elasticities will both be greater than micro elasticities and more appropriate for understanding the impact of policy differences.

The social multiplier is one way of making sense of the hypothesis that Europeans have a cultural predilection for leisure, as emphasized by Blanchard (2004). Simply invoking different cultures to explain this fact is unconvincing: why did culture start diverging in the early 1970s across the Atlantic so dramatically? Until World War I, work hours per employee were actually lower in the United States than in most European countries, including France and Germany (Huberman 2004). Work hours per employee started to fall a bit more rapidly in Europe than in the United States, but up until the late 1960s, work hours per employee were about the same in the United States and Europe, including Germany and France (Huberman 2003). Unless one invokes a reversal of cultures, the purely cultural argument is weak or at best incomplete. A more convincing story is that as hours worked started to decline in Europe (perhaps because of taxation), people's utility from leisure increased and the social multiplier reinforced the decline, creating a desire for Europeans to vacation en masse, a culture of leisure, so to speak.

Our second hypothesis is that the cross-sectional relationship between taxes and hours worked is just the result of omitted variables that are correlated with the tax rate and that also impact hours worked. In particular, unionization and labor market regulations are strongly

correlated with both hours worked across countries and marginal tax rates. The importance of unionization and labor market regulation is not constant over time; on the contrary, it sharply increased with the structural shocks of the 1970s and 1980s (Blanchard 2004; Blanchard and Wolfers 2000). It may also be related to the leftist surge of the late 1960s, from the May 68 in France to the Autunno Caldo (Hot Fall) of 1969 in Italy. Hunt (1998, 1999) documents how German and French unions pursued a policy of work sharing, demanding a reduction in hours worked as a response to rising unemployment, with slogans like "work less—work all." Italian unions followed suit.[3]

Work sharing may make little sense as a national response to a negative economic shock, but at a single firm, a membership-maximizing union may indeed find work sharing to be an attractive policy. Unions also demanded higher hourly wages to keep total income from falling, making it hard to support the same level of employment and thus creating a multiplicative effect on total hours worked per person. Large declines of hours worked in unionized sectors (the large majority of sectors in Europe) may also have triggered reduction in hours worked in other sectors via a social multiplier effect.

To distinguish between these two hypotheses, we begin in Section II of this paper with the basic facts on labor supply across countries. In Section III of the paper, we review the evidence on taxes and labor supply. The primary finding of this section is that if taxes were the only difference between the United States and Europe, then labor supply elasticities would need to be much greater than those found in the micro literature. In Section IV, we consider the possibility that factors other than tax rates explain the differences between the United States and Europe. We begin with a simple model that suggests that the impact of unionization should increase after sectoral shocks, such as those that hit the United States and Europe in the 1970s and 1980s. This is related to work by Bertola and Ichino (1995), who discuss the effects of unions in a model with sectoral shocks. Ljungqvist and Sargent (2004) show how large firing costs generate high unemployment in the presence of negative shocks. In an economy with free mobility, mean zero shocks that increase productivity in some sectors and decrease productivity in others tend to increase average productivity; if the labor supply curve slopes up, this increases hours worked. In a unionized economy, when unions in a declining industry try to keep their membership constant, this leads to a decrease in hours worked. Under reasonable parameter values, the same shock that increases hours

worked in a non-unionized economy decreases hours worked in a unionized economy.

We examine these predictions empirically in several ways. First, we show that in a cross-section of countries without using any panel information, it is impossible to disentangle the impact of taxes, regulation, and unions. Second, using a panel of countries and following Davis and Henrekson (2004), we find that the impact of taxes on labor supply disappears once we control for unionization or labor market regulation.[4] Third, using U.S. data, we show that the impact of union status on vacation and hours worked across states is at least as large as the impact of tax rates across states. Fourth, we show, in an accounting sense, that legally mandated holidays can explain 80 percent of the difference in weeks worked (among the employed) between the United States and Europe and 30 percent of the difference in total labor supply between the two regions (see table 1.4). On net, we think that the data strongly suggest that labor regulation and unionization appear to be the dominant factors in explaining the differences between the United States and Europe. The effect of generous pension systems, which reduced participation rates among the elderly for older workers, is also strong.[5]

In Section V, we discuss whether the macro elasticities are more appropriate than the micro elasticities. Can a social multiplier explain the difference between the micro and macro labor supply estimates? Is it possible that income effects from higher tax rates act to make these tax elasticities much larger than standard labor supply elasticities? We believe that most so-called micro elasticities already include some effect of the social multiplier. Moreover, little available evidence suggests that the social multiplier can at most double the estimated labor supply elasticities. Thus, this section leaves us with the view that labor regulations and union policies are the dominant causes of hours differences between the United States and Europe. In Section VI we briefly examine the question of house work versus leisure.

We conclude with a question. Are all these regulations and union policies (and taxation) suboptimal because they distort labor/leisure decisions, or do they help solve a coordination problem? If a social multiplier exists because of complementarities in the consumption of leisure, then national policies that enforce higher levels of relaxation can, at least in theory, increase welfare. Perhaps everybody on both sides of the Atlantic would like to work less but it is difficult to coordinate on a fewer hours equilibrium in a competitive market where all

workers act individually. According to this view, all would like more vacation if their friends, spouses, and relatives also had it, but no coordination device is readily available.

In Section VII, we make an attempt at shedding some light on this question using data on life satisfaction. The individual-level evidence shows a tight link between self-reported happiness and weeks of vacation. But these results are difficult to interpret because of omitted variables and reverse causality. Perhaps people who are more balanced in their approach to life are both happier and take more vacations. A more satisfying approach is to use the legislation on vacations that differs across countries and over time. Using a panel of countries, we are able to use these mandated holiday differences as an instrument for weeks of vacation. We find that indeed, places with more mandated vacations do seem to be a bit happier. The gap between this finding and any sort of policy recommendation is large.

2 The Data[6]

Table 1.1 illustrates the basic data on work hours for several European countries and the United States (the source is Organisation for Economic Co-operation and Development). The United States has the highest value for working hours per person per week: 25.1. The lowest is Italy, with 16.7. Germany has 18.7, and France, 18.0. The United Kingdom has the second highest value, with 21.4, and Ireland, the fourth, with 20.1, making it clear that the starkest comparison is between continental Europe and the United States.

Differences in working hours per person can result from a combination of three factors: participation in the labor force and unemployment rates, number of days of vacation, and number of hours worked in a normal week (i.e., without holidays). Reduction in the hours worked per person related to the third effect may arise because full-time workers work less or the share of part-time workers increases. The United States has by far the longest number of weeks of work per year (46.2). It is third after Greece and Portugal for number of hours worked in the normal week, and it is sixth in terms of employment over population. These data already highlight the importance of the amount of vacation time as an explanation of U.S. exceptionalism.

Table 1.2 splits the difference between the United States versus France, Germany, and Italy into the three components. A comparison

Table 1.1
Hours per Person per Week and Employment Ratios, by Country[a]

Country	Weekly Hours per Person	Employment/ Pop	Weeks per Year (Employed)	Usual Weekly Hours (Employed)
Belgium	17.92	0.643	40.0	36.29
Denmark	20.63	0.761	38.9	36.27
Finland	19.73	0.688	38.5	38.75
France	17.95	0.636	40.5	36.21
Germany	18.68	0.656	40.6	36.48
Greece	20.10	0.576	44.6	40.71
Ireland	20.10	0.659	43.7	36.29
Italy	16.68	0.565	41.0	37.42
Netherlands	17.25	0.734	38.4	31.79
Norway	19.94	0.774	36.0	37.25
Portugal	16.98	0.523	41.8	40.37
Spain	18.14	0.576	42.2	38.85
Sweden	19.06	0.735	35.4	38.10
United Kingdom	21.42	0.721	40.5	38.19
United States	25.13	0.719	46.2	39.39

[a] E/P, Weeks per Year, Usual Hours use OECD data. Hours per person per week is calculated as the product of E/P*weeks/52*usual hours. OECD data on weeks and usual hours provided by the secretariat and use the same sources as OECD Employment Outlook 2004. OECD data on E/P are from http://www1.oecd.org/scripts/cde. U.S. data on usual hours and weeks worked are from Luxembourg Income Study. We use usual hours and weeks worked for **all employed**, including part time.

of the United States versus Germany and versus France shows that roughly one-quarter of the total difference is explained by differences in working hours in a normal week. Part of the reduction in hours worked in a normal week is explained by an increase in part-time work, a point also raised by Bell and Freeman (1995) and Hunt (1998). The latter reports that between the early 1970s and the mid-1990s, part-time workers increased as a share of all workers from 5.9 to 9.6 percent in France. Over the same period, the share of workers who worked part-time increased from 10.1 to 12.6 percent in Germany.

The remaining three-quarters of the difference is explained by a lower number of weeks worked and labor force participation. The former is slightly more important in both countries; it explains 44 percent of the total difference in Germany and 39 percent in France. Overall,

Table 1.2
Hours Differences Among United States, France, Germany, and Italy[a]

		Fraction of Hours Difference Explained
Total Hours per Week per Person		
United States	25.13	
France	17.95	
Germany	18.68	
Italy	16.68	
United States–France	7.18	1.00
United States–Germany	6.45	1.00
United States–Italy	8.45	1.00
Employment/Pop 15–64		
United States	0.72	
France	0.64	
Germany	0.66	
Italy	0.57	
United States–France	0.08	0.36
United States–Germany	0.06	0.31
United States–Italy	0.15	0.59
Weeks Worked per Year		
United States	46.16	
France	40.54	
Germany	40.57	
Italy	40.99	
United States–France	5.62	0.39
United States–Germany	5.59	0.44
United States–Italy	5.17	0.29
Usual Weekly Hours per Worker		
United States	39.39	
France	36.21	
Germany	36.48	
Italy	37.42	
United States–France	3.18	0.25
United States–Germany	2.91	0.26
United States–Italy	1.97	0.13

[a]The first panel shows the total hours worked per week per person age 15–64. The next panels decompose the total differences into the differences in labor force participation, weeks worked, and usual weekly hours. The Fraction of Hours Difference Explained column uses the accounting identity that total hours = lfp*weeks worked*hours per week. Total hours worked and employment data use OECD data. Usual hours are from the Luxembourg Income Study. Weeks worked is calculated as the residual.

the picture for France and Germany looks pretty similar, while Italy is different. For this country, more than half of the difference is explained by employment rates, one-third by vacation time, and only about 10 percent by hours worked in a normal week.

Table 1.3 provides a breakdown of weeks in a year spent at work and not at work in several countries. Germany and Italy have the two highest number of vacation weeks, with 7.8 and 7.9, respectively. The United States has 3.9. The United States has twenty fewer days of vacation and holiday than Italy and Germany and fifteen fewer than France. Table 1.4 shows holidays and federally mandated vacation days in several countries. Table 1.5 displays the statutory and collectively agreed minimum paid leave in many countries. In the United States, there is no statutory minimum. In France, both statutory and agreed are twenty-five days, while in Germany, there are twenty statutory and almost thirty agreed. Italy has twenty and twenty-eight, respectively. Clearly the increase in mandatory vacation time in Europe relative to the United States is a major factor in explaining work hours.

Figures 1.2 and 1.3 illustrate labor force participation for men and women since the early 1970s in the same four countries. Men's participation dropped in all countries but less so in the United States. Female participation increased tremendously in the United States but significantly less so in Germany and France. Female participation in Italy is much lower than in the other countries and in fact is an outlier in Europe. Recall from above that in Italy, much more so than in Germany or France, the difference with the United States in hours worked per capita was due to employment participation; this chart shows that the effect comes primarily from women.

Figure 1.4 shows participation rates for older workers age 55–64. In the United States, participation rates today are pretty similar to what they were in 1970. Participation rates are much lower in France and Italy, where generous pension systems and early retirement age play a key role for individuals in this age group. The effect is less marked for Germany simply because the participation rate for this category in Germany was already quite low in the 1970s. Italy has a particularly low participation rate for older workers. As noted by Giavazzi and Dornbusch (2000), it also has a very low participation rate for younger workers, who find entry barriers in the labor market and thus prolong their stay in school; the average completion rate of college in Italy is 27.8 years of age!

Table 1.3
Breakdown of 52 Weeks into Weeks Worked, Holiday and Vacation Weeks, and Other Leave[a]

	Annual Weeks Worked	Holidays and Vacation Weeks	Full-Week Absences Due to Non-holiday Reasons	Part-Week Absences Due to Non-holiday Reasons	Absences Due to Sickness and Maternity
Austria	39.5	7.3	2.6	0.4	2.3
Belgium	40.3	7.1	2.2	0.5	2.0
Denmark	39.4	7.4	2.2	1.0	1.9
Germany	40.6	7.8	1.8	0.3	1.5
Finland	38.9	7.1	2.4	1.5	2.1
France	40.7	7.0	2.0	0.4	1.8
Greece	44.6	6.7	0.3	0.2	0.2
Hungary	43.9	6.3	0.9	0.1	0.8
Ireland	43.9	5.7	1.2	0.2	0.9
Italy	41.1	7.9	1.7	0.3	0.9
Luxembourg	41.9	7.5	1.3	0.1	1.1
Netherlands	39.6	7.6	2.0	0.8	2.0
Norway	37.0	6.5	4.0	1.1	3.5
Poland	43.5	6.2	1.2	0.3	0.9
Portugal	41.9	7.3	1.4	0.2	1.2
Spain	42.1	7.0	1.3	0.4	1.2
Sweden	36.0	6.9	3.8	1.7	3.7
Switzerland	42.6	6.1	1.5	0.7	1.1
United Kingdom	40.8	6.6	1.5	1.5	1.6
United States	46.2	3.9	.94		.96

Source: Reprinted from OECD Employment Outlook 2004. This entire table is taken directly from the OECD. Sickness and maternity leave estimates are adjusted for an estimated 50 percent underreporting rate. This is for full-time employees, and thus weeks worked differs slightly from table 1.1.

[a] For US data we calculate weeks of vacation and illness for full time heads in the PSID. We calculate weeks of holidays using Federal and stock market holidays. We allow other non-holiday absences to be the residual.

Table 1.4
Breakdown of Days off into Holidays, Federally Mandated Days of Vacation, Additional Days of Vacation[a]

	Holiday and Vacation Days Total (From OECD)	Holidays (Authors Compilation)	Federally Mandated Vacation (EIRO Data)	Additional Vacation Days
Germany	39	16	20	3
France	35	16	25	−6
Italy	39.5	16	20	3.5
United States	19.5	12	0	7.5

[a] Here we attempt a further breakdown of OECD "holiday plus vacation time" into holidays, statutorily required vacation, and additional vacation. The first column shows the OECD holiday and vacation weeks number*5. The second column shows our survey of holidays, which includes the union of federal holidays, stock market holidays, and days when most stores are closed. Column (3) shows federally mandated vacation days as reported in the EIRO report "Working Time Developments 2003." The last column is column (1) minus (2) + (3). The fact that we get negative additional days for France may indicate that either the OECD total days figure is too low for France or the EIRO mandated number is too high.

Table 1.5
Statutory Minimum and Agreed upon Annual Paid Leave (Vacation), by Country

Country	Statutory	Collectively Agreed
Austria	25	25
Belgium	20	ND
Denmark	25	30
Finland	20	25
France	25	25
Germany	20	29.1
Greece	20	23
Hungary	20	ND
Ireland	20	20
Italy	20	28
Luxembourg	25	28
Netherlands	20	31.3
Norway	21	25
Poland	20	ND
Portugal	22	24.5
Romania	20	24
Spain	22	ND
Sweden	25	33
United Kingdom	20	24.5

Source: EIRO: "Working Time Developments—2003," March 2004.
ND denotes no data.

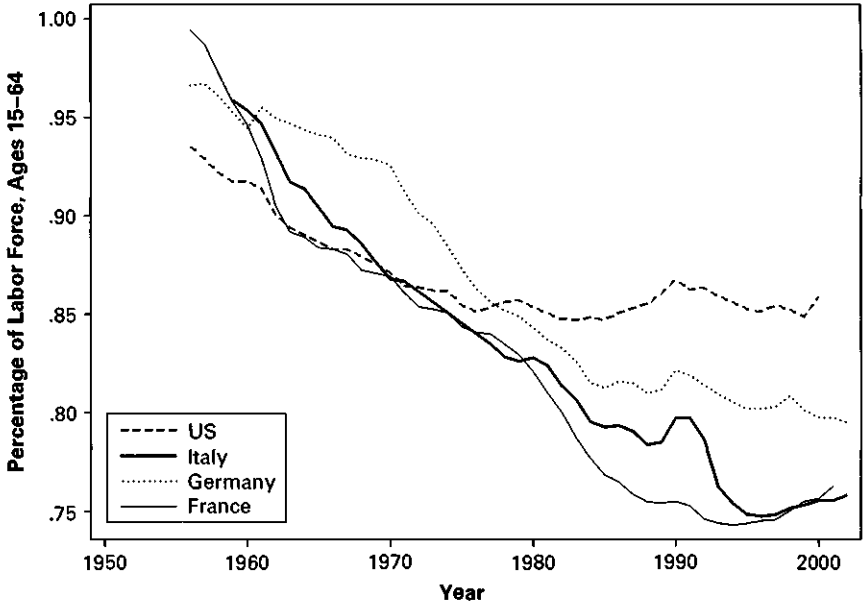

Figure 1.2
Men's Labor Force Participation over Time
Source: OECD. Men age 15–64.

3 Taxation and Hours Worked

Given that hours worked fell so much from the early 1970s onward in Europe but not in the United States, the explanation most likely has to do with some large change that occurred in Europe and not in the United States. An obvious candidate is the large increase in the income tax rate in Europe compared with a much smaller increase in the United States. There is little doubt that increasing marginal tax rates have reduced hours worked, especially through an effect on female participation in the labor force. But the question is whether the tax effect is enough to explain the current very large difference between Europe and the United States for both men and women. The answer to this question obviously hinges on the elasticity of the labor supply to after-tax salaries.[7]

3.1 Labor Supply Elasticities

Prescott (2004) argues that the entire difference between the United States and Europe is due to taxes. He evaluates what elasticity of labor

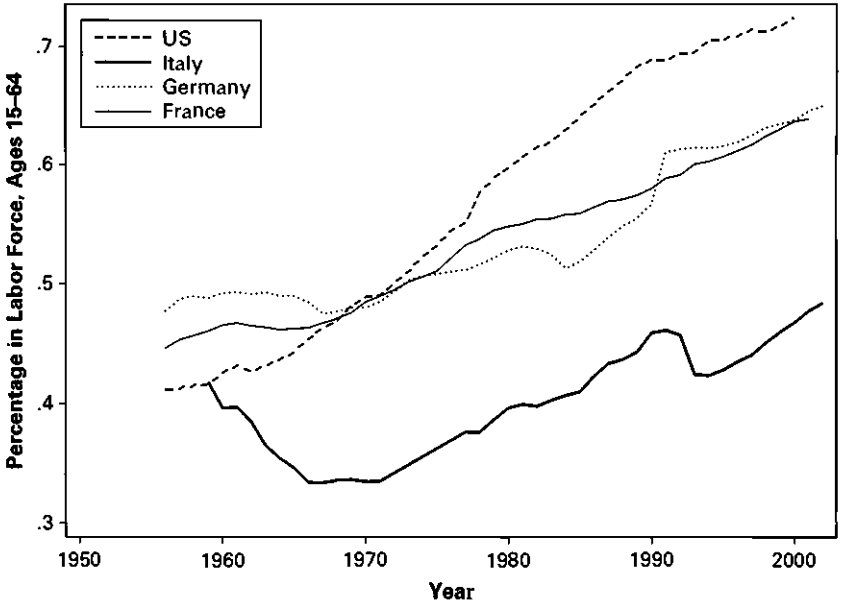

Figure 1.3
Women's Labor Force Participation over Time
Source: OECD. Women age 15–64.

supply would be needed to explain the entire difference between hours worked in the G7 countries, and he shows that the differences between the United States and Europe can be explained by the tax rate if he assumes a log-log utility function on consumption and leisure. Obviously, leisure is used here in the broad sense of the term, that is, any nonmarket (and not taxed) activity such as home production, work in the black economy, or indeed having fun.

The core element of the model is that it delivers a high labor supply elasticity with respect to the tax rate. This high labor supply elasticity, if true, also implies that reducing taxes in Europe would lead to very large gains in hours worked and welfare. Prescott also uses this evidence to suggest that indeed the elasticity of the labor supply must be much higher than what is normally thought. The key to his calibration is choosing a functional form where the average levels of hours works delivers a labor supply elasticity on its own, and that this functional form—which has little basis in the empirical labor supply literature—essentially drives his calibration.

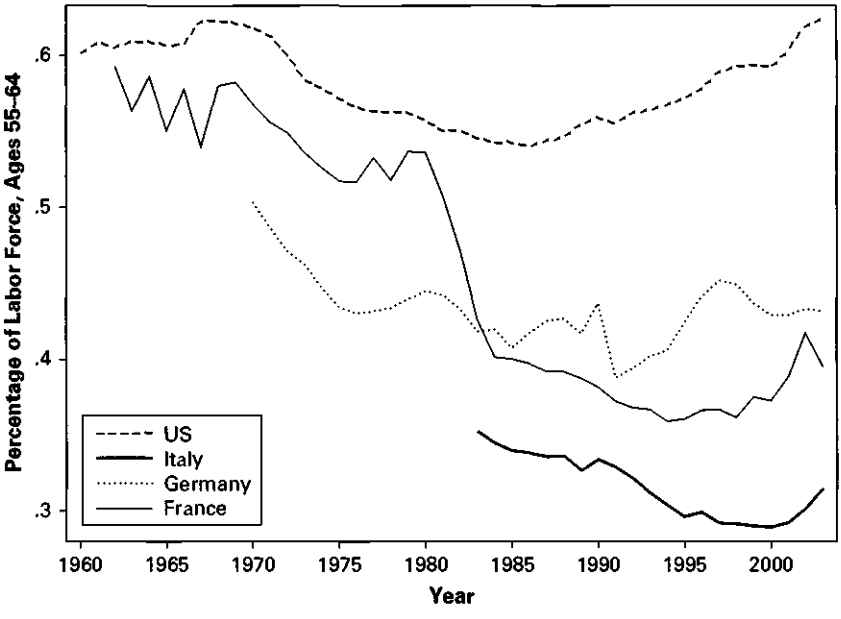

Figure 1.4
Labor Force Participation of People Age 55–64
Source: OECD.

Prescott's model is a dynamic version of a classic separable utility labor supply model, where individuals choose l (the amount of labor supplied) to maximize: $U(C) + V(1-l)$, where C (or consumption) equals $(1-t)wl + z$, where t is the tax rate, w is the wage, and z reflects unearned income. The term $V(1-l)$ reflects the enjoyment from leisure, and the first order condition sets the marginal utility of leisure equal to the marginal benefits from extra income or $(1-t)wU'(C) = V'(1-l)$. The dynamic elements of the model are not critical for delivering the high labor supply elasticities in his calibration, so we will omit them in our analysis and focus on the more standard labor supply case.

Prescott (2004) assumes that some taxes are returned to consumers in the form of transfers or government services. This effect, which is included by Prescott, tends to increase the labor response to higher taxes because it reduces the income effect of raising taxes. We can reflect this effect in the model by making unearned income a function of government revenues and assuming that $z = z_0 + \delta t\overline{wl}$, where δ ranges between 0 and 1 and reflects the fact that some revenues make it back

to consumers. The value of $\overline{wl}$ represents national labor earnings. With this assumption, using the fact that in equilibrium $wl = \overline{wl}$, it follows that:

$$\frac{\partial Log(l)}{\partial t} = \frac{1}{1-t}\left(-\frac{\partial Log(l)}{\partial Log(w)} + \delta\frac{(1-t)wl}{z}\frac{\partial Log(l)}{\partial Log(z)}\right) \tag{1.1}$$

The term $((1-t)wl/z)(\partial Log(l)/\partial Log(z))$ is often called the marginal propensity to earn (Pencavel 1986). The term $\partial Log(l)/\ \partial Log(w)$ is the uncompensated labor supply elasticity, and $\partial Log(l)/\partial Log(w) - ((1-t)wl/z)(\partial Log(l)/\partial Log(z))$ is the compensated labor supply elasticity.

Equation (1.1) tells us that the size of δ is important because it determines whether compensated or uncompensated labor supply elasticities should be used when thinking about the impact of taxes on labor supply. If $\delta = 1$, then the tax elasticity is $-1/(1-t)$ times the pure "compensated" labor supply elasticity because in this case tax dollars are completely returned to consumers. In this case, taxation only changes the returns to labor; it does not reduce income. If $\delta = 0$, then the tax elasticity is $-1/(1-t)$ times the uncompensated labor supply elasticity because in this case tax dollars are completely lost to consumers.

In the Prescott formulation, $\delta = 1$, and government spending is valued by consumers just like income. This assumption helps to ensure a high labor supply elasticity. A second ultimately less important adjustment that Prescott (2004) makes to the standard model is to assume that wages are not fixed but are determined also by labor demand. We can incorporate this effect into our model by allowing wages, w, to equal $w(l)$ where $w'(l) < 0$ to take into account a downward-sloping labor demand. This effect will generally mute the impact of taxes on hours worked because as taxes reduce hours worked, wages will rise and keep some people in the labor market.[8]

The most critical aspect of the Prescott (2004) model is that individuals maximize a log-log (or in a static setting Cobb-Douglas) utility function: $Log(C) + \alpha\ Log(1-l)$. In this case when $w'(l) = 0$ and $\delta = 0$, the elasticity of hours worked with respect to the wage is $\alpha z/(1+\alpha)(1-t)wl$. The most striking feature of the Cobb-Douglas utility is that one parameter, α, determines down both the level of hours worked and the elasticity of hours worked with respect to the tax rate. With this functional form, Prescott's quite reasonable parameter assumptions, $\alpha = 1.54$, $wl = .6776 \bullet Y$, and $t = .5$ (both midway between the United States and Germany), delivers a labor supply

elasticity of .77. Since this elasticity excludes any general equilibrium effects, it can be compared directly with usual estimates of labor supply elasticities. The Cobb-Douglas functional form is so powerful that without any assumptions directly related to labor supply elasticity, this function form delivers a strikingly high labor supply elasticity. This high labor supply elasticity is the first prediction of the model.

Prescott himself uses the equation $l = 1/(1 + \alpha C/(1 - \theta)(1 - t)Y)$ for his calculations and if C/Y is held constant (changes in this variable do not drive his results), the elasticity of labor supply with respect to the tax rate equals $(-t/(1 - t))(1 - l)$. No knowledge of α is actually needed to determine the response of labor supply to taxes, which will generally be around .8 (a reasonable value of $1 - l$).

A second prediction of the model is that the labor supply will respond sharply to increases in unearned income. The Prescott assumptions suggest that the elasticity of labor supply with respect to unearned income, $\partial Log(l)/\partial Log(z)$, equals $-\alpha z/(1 + \alpha)(1 - t)wl$, which will also equal $-.77$. This elasticity can also be checked against the available income elasticity estimates.

A third prediction of the model is that labor supply elasticities should be quite different for individuals with large unearned income and small unearned income. For example, in Prescott's model, if $C = (1 - t)wl$, the functional form predicts that there will be no impact of either taxes or wages on the supply of hours worked because the price effect of higher wages or lower taxes is completely offset by the income effect making workers richer or poorer. As such, a third test of the model is to look at whether labor supply elasticities change significantly with unearned income.

3.2 *The Basic Evidence*

At this point, we ask whether the available evidence supports the view that differences in hours worked between the United States and Europe can be explained by differences in tax rates. As discussed above, the OECD numbers tell us that average weekly hours worked are 25.1 in the United States and 18.3 (on average) in Germany and France. The Prescott numbers for the marginal tax rates suggests a difference of .2 between the United States and those European countries. To explain this difference, there would have to be a tax rate elasticity of over 1.5 or, since the wage elasticity is 1 minus the tax rate times the tax rate elasticity, this would require a labor supply elasticity of .75 (which is, in fact, the labor supply elasticity implied by Prescott's simulation).

Table 1.6
Implied Elasticity of Labor with respect to Income Using United States–Europe Differences in Hours Worked and Marginal Tax Rates

	Marginal Tax Rate	Weekly Hours per Person 15–64
United States	34.5%	25.13
Europe average[a]	52.7%	18.68
United States–Europe	−18.2%	5.92
Log(US hours)–log(Europe hours)		0.297
Implied elasticity		−1.629

[a] Europe Average includes Germany, France, the United Kingdom, and Italy.

In table 1.6, we repeat this calculation using our own data. Here, we compute the implied elasticity of the labor supply as if the entire difference of hours worked in Europe (average of the four largest European economies) and the United States were explained by the marginal tax rate. This elasticity to the tax rate is about −1.63 for hours worked per person, which implies an elasticity of the labor supply of about 0.92 [if $1/(1-t)$ equals .564]. Our estimates suggest that a slightly higher elasticity is needed to explain the United States/Europe difference because of tax rate numbers that are slightly different from those used by Prescott (2004).

As we have discussed above, using estimated labor supply elasticities with respect to the wage to understand labor supply elasticities with respect to the tax rate depends on two factors: the labor demand elasticity, and the income effect of government spending. The first effect makes it harder for tax rate differences to explain hours of work differences, so we will simply ignore this effect. However, we will focus on the potential income effects from higher tax-funded government spending. If taxes are spent on commodities that are highly valued by consumers, then compensated labor supply elasticities are appropriate since taxes in this case have only price effects and do not have a negative income effect. If government spending is essentially wasteful, then uncompensated demand elasticities are appropriate because higher taxes have both a price and an income effect. As such, we will present evidence on both elasticities.

We will also briefly consider two other predictions of the Cobb-Douglas functional form assumption that drives the Prescott calibration. One implication of this function form is that the elasticity of labor

supply with respect to unearned income, or $\partial Log(l)/\partial Log(z)$ is equal to $-\alpha z/(1+\alpha)(1-t)wl$, which, given the assumed parameter values, is $-.77$. This elasticity can also be checked against the available income elasticity estimates. The Cobb-Douglas functional form also implies that labor supply elasticity should be wildly different for individuals with large unearned income and small unearned income. For example, in Prescott's model, if $C = (1-t)wl$, the functional form predicts that there will be no impact of either taxes or wages on the supply of hours worked because the price effect of higher wages or lower taxes is completely offset by the income effect making workers richer or poorer. As such, another piece of evidence on whether the Cobb-Douglas functional form is a reasonable basis for calibration is whether labor supply elasticities change significantly with unearned income.

In the next section, we ask whether the available information about labor supply elasticities supports the view that labor supply differences between the United States and Europe can be explained by differences in tax rates.

3.2.1 The Labor Supply Elasticity Literature We begin in table 1.7 by collecting a wide range of estimates (mostly from various issues of the *Handbook of Labor Economics*) of labor supply elasticities from different sources over the past seventy years. Pencavel (1986) reports labor supply elasticities (compensated and uncompensated) and the marginal propensity to earn. Blundell and Macurdy (1999) report uncompensated elasticities and the labor supply elasticity with respect to unearned income.

To make these numbers comparable, we have followed the assumption contained in Prescott (2004) and assumed a ratio of unearned income to earned after-tax income of 1.28. This follows from Prescott's assumptions that $wl = .6776 \bullet Y$ and if $C/Y = .77$, $C = z + (1-t)wl$, and $t = .5$ (midway between the United States and Germany), then $z/(1-t)wl$ equals 1.28, so nonlabor income is greater than labor income in his formulation. This assumption means that we can multiply all marginal propensity to earn figures by 1.28 to find the elasticity of labor supply with respect to unearned income. We can also use the 1.28 ratio to convert the compensated income elasticity from the uncompensated labor supply elasticities and the income elasticities provided by Blundell and Macurdy (1999). Obviously, this procedure eliminates all sample-specific variation in the ratio of unearned income to labor income, but it provides us with a convenient means of com-

Table 1.7
Estimated Hours—Wage Elasticities from *Handbook of Labor Economics*

Author	Estimation Method	Uncompensated Elasticity	Income Elasticity	Compensated Elasticity
Men or Aggregates				
Douglas (1934)	Cross-sectional regression using average wages and hours across 17 U.S. industries for 1890, 1914, 1926	−.1 to −.2		
Winston (1962)	Cross-sectional regression of average hours on average wages across 31 countries	−.07 to −.10		
Finegan (1962)	Cross-sectional regressions of average hours on average wages across 300+ occupations in 1940, 1950 U.S. Census data	−.25 to −.35		
Ashenfelter and Heckman (1973)[a]		−.16	−.34	.12
Kniesner (1976)[a]	Cross-sectional micro regressions. NLS data for 1965. Married men.	−.17	−.01	−.16
Wales and Woodland (1979)[a]	PSID Married men. 226 individuals. Use nonlinear programming to fit cross section of hours and wages to a labor supply model derived from a CES utility function and hours budget constraint.	.14	−.90	.84
Atkinson and Stern (1980)[a]	U.K. Family Expenditure Survey Data. Use cross-sectional variation to identify parameters in several types of utility functions.	−.16	−.09	−.09

Table 1.7
(continued)

Author	Estimation Method	Uncompensated Elasticity	Income Elasticity	Compensated Elasticity
Ashworth and Ulph (1981)[a]	They impose a GCES utility function with piecewise linear budget constraint on an unnamed U.K. micro data set.	−.13	−.46	.23
Hausman (1981)	Structural model	0 to .03	−.95 to −1.03	
Blundell and Walker (1982)	Estimates structural model of utility in which individuals choose consumption of goods and leisure. Married men in 1974 U.K. Family Expenditure Survey Data.	−.23	−.46	.13
Blomquist (1983)[b]	Structural model	.08	−.03	
Hausman and Ruud (1984)[a]	1976 PSID. Maximum Likelihood estimation of an indirect utility function.	−.08	−.81	.55
MaCurdy et al. (1990)[b]	Structural model	0	−.01	.01
Triest (1990)	1983 PSID. Cross section with nonlinear budget constraint from the multiple tax brackets.	.05		
van Soest et al. (1990)[b]		.12	−.01	.13
Flood and MaCurdy (1992)[b]	Structural with IV	.16	−.1	.24
Kaiser et al. (1992)[b]		−.004	−.28	.21
Ashenfelter (1978)	North Carolina-Iowa rural Negative Income Tax Experiment	0.21	.026	0.19
Hausman and Wise (1977)	NJ-PA NIT	0.10	−.013	0.11
Johnson and Pencavel (1984)	Seattle-Denver income maintenance experiment	0.02	−0.218	0.19

Table 1.7
(continued)

Author	Estimation Method	Uncompensated Elasticity	Income Elasticity	Compensated Elasticity
Married Women Only				
Hausman (1981)[b]	Structural model	.995	−.121	1.08
Arrufat and Zabalza (1986)[b]		2.03	−.02	2.05
Blundell et al. (1988)[b]		.09	−.26	.29
Triest (1990)[b]		.97	−.33	1.23
van Soest et al. (1990)[b]	Structural model	.79	−.23	.97
Blomquist and Hansson-Brusewitz (1990)[b]	1981 Level of Living Survey. Tobits and FIML regression of hours worked on tax rate. Use cross sectional variation in the wage and tax rate.	.79	−.24	.98
Arellano and Meghir (1992)	UK LFS and FES 1983. Multi-equation model estimated with maximum likelihood.	.29 to .71	−.13 to −.40	.5 to .82
Kaiser et al. (1992)[b]		1.04	−.18	1.18
Keane and Moffitt (1995)[b]		1.94	−.21	2.1
Kuismanen (1997)[b]	Finnish Labor Force Survey. Married women 25–60. Cross sections for 87, 89, 91, 93. Use cross sectional variation in tax rates.	.01	.11	−.07
Income Elasticity Estimates				
Imbens, Rubin, and Sacerdote (2001)	Natural Experiment (winners and nonwinners)		−.11	
Holtz-Eakin, Joulfaian, and Rosen (1993)[c]	Natural Experiment using variation in inheritance		−.03	

[a] In these rows, we have translated marginal propensities to earn into income elasticities by multiplying by 1.28.
[b] In these rows, we have calculated compensated demand elasticities by assuming that the ratio of unearned income to after-tax income is 1.28.
[c] The Holtz-Eakin et al. number is conditional on the family still having positive earnings after receipt of inheritance.

paring a wide number of papers. Our use of the 1.28 ratio will lead to high estimates of income elasticities and low estimates of compensated demand elasticities. However, in only one case (Hausman and Ruud 1984) will the choice of this parameter significantly change the compensated demand elasticity.

The first estimates at the top of the table, Douglas (1934), Winston (1962), and Finegan (1962), are done using aggregate data and provide us only with uncompensated elasticities. These three numbers are best seen as a reminder of the number of decades that economists have tried to estimate labor supply elasticities and that even the oldest estimates of these elasticities are quite modest. These early estimates of uncompensated elasticities range from $-.07$ to $-.35$. Somewhat strikingly, most of the later work on uncompensated labor supply elasticities for men falls within this range.

More modern work has relied on individual-level data and has occasionally used the variation created by changes in the tax schedule. As the table shows, the majority of estimates of uncompensated labor supply elasticities are negative (labor supply declines as wages rise), but there are a few estimates that are weakly positive. If anything, these estimates seem to suggest a consensus estimate of 0 as an uncompensated labor supply elasticity. The highest labor supply elasticity, .16, is found by Flood and MaCurdy (1992). Since tax rate elasticities, i.e., $\partial Log(l)/\partial t$, equal $-1/(1-t)$ times labor supply elasticities, this labor supply elasticity translates into a tax elasticity of .32 (assuming a 50 percent tax rate), which is still about one-half of the labor elasticity implied by Prescott (2004) and less than one-half of the elasticity needed to explain the differences in labor supply between the United States and either France or Germany. The median uncompensated labor supply elasticity is closer to 0.

The second part of the table shows estimates of labor supply elasticities for women. While there appears to be an empirical consensus that uncompensated labor supply elasticities for men are quite low, there is no such consensus for estimates of elasticities among women. The median estimate among those reporters is about 1. These assumptions are closer to Prescott's predictions. Furthermore, for this group, labor supply elasticities appear to be high enough so that differences in hours worked between the United States and Europe can indeed be explained by differences in the tax rate. As such, if there is a puzzle to labor supply differences between the United States and Europe, this puzzle really pertains mostly to men.

All of the estimated elasticities (or at least those published since 1981) incorporate both the intensive margin of labor supply and the extensive margin (the participation decision). Indeed, it is largely the participation effect that yields the higher elasticities for women. In many of the studies, the extensive margin is incorporated either by imputing wages for the nonworkers or by using a Tobit or Heckit type correction. For the studies that use the hours worked change in response to tax rate changes (or the negative income tax experiments), the lack of a wage for the nonworkers presents less of a problem.

As we discussed above, since higher taxes are spent on transfers and services and since these transfers may be valued by consumers, uncompensated elasticities are not necessarily appropriate. As such, in the third column of table 1.7, we turn to compensated demand elasticities. In most cases, these compensated demand elasticities range from −.16 to .24. The experimental estimates from the negative income tax experiments and from British experimental data also suggest an upper bound of .24 for compensated labor supply elasticities for men. Since .24 is the upper bound of the estimates and since using compensated supply elasticities implies that government spending is all valued like income by workers, it seems reasonable to think that a somewhat lower number, like .18, is a more sensible benchmark elasticity. In that case, the elasticity estimate is about one-half of the labor supply elasticity implied by Prescott's calibration and one-half of the elasticity needed to explain the differences between the United States and Europe.

It is worth pointing out that there are three studies in the table (Wales and Woodland 1979; Hausman 1981; and Hausman and Ruud 1984) that deliver much higher compensated labor supply elasticities. In these cases, the high elasticities are produced by extremely high elasticities of labor supply with respect to income relative to almost any other work in this area. The income elasticity of labor supply estimated in these papers ranges from .81 to 1.03, while almost everyone else's estimates are below .5. Heckman (1993) presents a more detailed discussion of problems with these estimates.

We also tend to discount these estimates partially because they are so different than the other standard estimates and partially because they differ greatly from income elasticities estimated using exogenous income shocks. In the last panel of table 1.7, we report the income elasticities of labor supply estimated by Imbens, Rubin, and Sacerdote (2001) and Holtz-Eakin, Joulfaian, and Rosen (1993). Unlike the other

papers reported in the table, these two papers focus exclusively on income elasticities and, more important, they both use plausibly exogenous income shocks for identification. Imbens, Rubin, and Sacerdote (2001) look at the impact of winning modest lottery prizes on hours worked. Holtz-Eakin, Joulfaian, and Rosen (1993) use variation coming from family inheritance. While neither study is perfect, both have far more compelling sources of exogenous income shocks than any of the other papers cited in the table. Both papers find quite modest elasticities of labor supply with respect to income (−.03 and −.11). These findings are important for two reasons. First, these papers cast doubt on the empirical validity of the high compensated labor supply elasticities, which were high only because of income elasticities close to 1. Second, these papers also cast doubt on the Cobb-Douglas utility function used by Prescott (2004). After all, one of the core implications of that functional form is that labor supply elasticities with respect to income will be extremely high.

A final implication of the Cobb-Douglas utility function is that labor supply elasticities will be very different for people with different levels of unearned income. While we are not aware of studies that solidly confirm this prediction, we are also unaware of studies that solidly reject this prediction. As such, it remains a topic for future research.

Overall, the empirical literature on labor supply elasticities suggests three things. First, for men, uncompensated labor supply elasticities are close to 0. Second, given reasonable estimates of labor supply elasticities with respect to income, compensated labor supply elasticities are also relatively modest. Reasonable elasticity estimates suggest that, at best, one-half of the hours worked difference between the United States and Europe can be explained by differences in tax rates. Third, labor supply elasticities are much higher for women and as a result, tax rate differences can potentially explain all of the differences in hours worked between American and European married women.

3.2.2 Cross-Country Evidence on Labor Supply and Taxes At this point, we turn from the within-country evidence to the cross-country evidence on the connection between tax rates and hours worked. Figure 1.5 plots the marginal income tax rate versus hours worked for OECD countries and displays a significant and negative relationship between the two. Our tax variable is the OECD estimate for 2001 of the marginal tax rate on labor income. Appendix 1 includes details on the construction of this variable. This finding is similar to recent

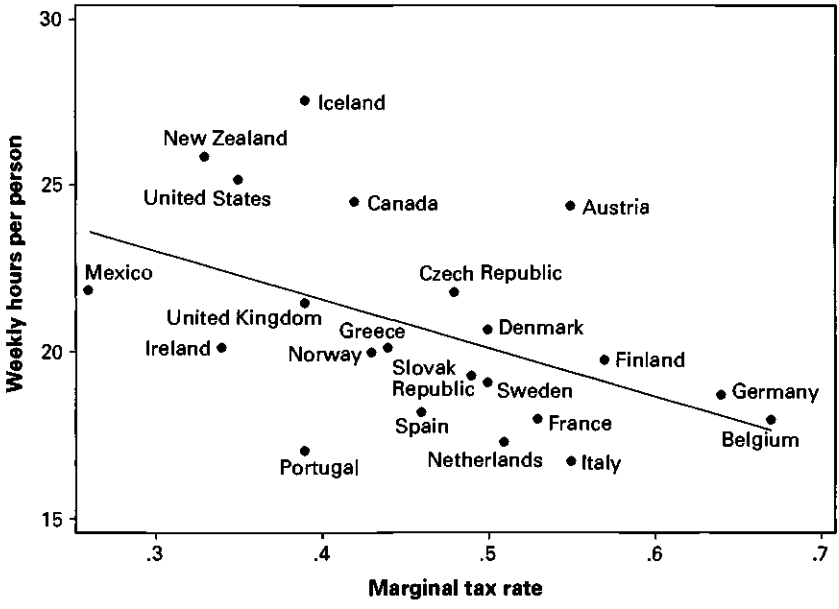

Figure 1.5
Weekly Hours per Person Versus Marginal Tax Rate
Source: OECD.

results reported by Davis and Henrekson (2004), who use different tax variables.

In table 1.8, for the sake of comparison with prior research, we report regressions of hours worked and taxes on two regressions from Davis and Henrekson (2004). In order to facilitate comparisons, we have regressed hours on tax rates. These figures are not directly comparable to the elasticities discussed above. In order to make these into comparable elasticities, we have divided these coefficient estimates by average hours worked in the sample and reported these implied elasticity estimates in brackets.[9] The tax variables are obtained from Nickell and Nunziata (2001) and Schneider (2002b). The details about these two tax series are given in Appendix 1.

For two of the three tax series used, the OECD one and the Schneider data, the correlation is significant; for the third one, the Nickell and Nunziata series, the correlation is insignificant. The tax rate elasticity estimates in this table range from −.184 to −.865, which are somewhat higher than the elasticities that would be implied by within-country estimates but still too low to explain all of the differences in

Table 1.8
Annual Hours Worked per Person Regressed on Marginal Tax Rate: Comparison of Our Results to Davis Henrekson Results

	(1) Annual Hours (OECD 02)	(2) Annual Hours (Davis, OECD 95)	(3) Annual Hours (Davis, OECD 95), Excluding Switzerland	(4) Annual Hours (Davis, OECD 95)	(5) Annual Hours (Davis, OECD 95)
Marginal tax rate (OECD 02)	−7.542 (3.013)* [−0.699]				
Nickell Nunziata tax rate		−3.905 (4.061) [−0.366]	−1.969 (4.263) [−0.184]		
Schneider tax rate				−9.251 (2.442)** [−0.865]	−8.890 (2.940)* [−0.832]
Constant	1,422.535 (142.731)**	1,279.898 (223.197)**	1,159.847 (238.503)**	1,643.272 (154.463)**	1,618.385 (190.274)**
Observations	22	14	13	14	13
R-squared	0.239	0.072	0.019	0.545	0.454

Source: Column (1): our data from OECD 2002. Column (2): Davis Henrekson OECD 1995 hours data on Nickell and Nunziata tax measure. Column (3): same as (2), excluding Switzerland. Column (4): Davis and Henrekson OECD 1995 hours data on Schneider tax measure. Column (5): same as (4), excluding Switzerland. Number in square brackets is the implied elasticity of hours wrt the tax rate. We convert dH/dT to the elasticity of hours wrt taxes by dividing by the mean annual hours worked (roughly 1,073 in our data and 1,069 in the Davis et al. data).
Standard errors in parentheses. Robustness comments: Inclusion of Switzerland is important for result using Nickell Nunziata data (column 2), but not using Schneider. Our data do not contain Switzerland. These are all cross-sectional results. Using Nickell Nunziata data, Davis and Henrekson show that point estimates are similar in a panel, but the statistical significance disappears.
*Significant at 5%.
**Significant at 1%.

hours worked between the United States and Europe. For example, using the −7.5 coefficient on the marginal tax rate in column (1) of this table, which is also reflected in figure 1.5, we find that we can explain about 36 percent of the difference in hours worked between France and the United States, 34 percent of the Italy–United States difference, and 65 percent of the Germany–United States difference.

While this cross-country evidence is suggestive, time series evidence is more mixed. As Davis and Henrekson (2004) also point out, the decline of hours worked in Europe is pretty much monotonic from the mid-1970s to today, while the increase in marginal tax rates were concentrated almost exclusively in the first part of the period, say, up to the late 1980s.[10] The famous 35 hours workweek in France implemented in 2000 is a case in point. This reform, pushed by the union and agreed to by a socialist government, did not occur in a period of increasing tax rates.

Even though the data are scant, the time series or panel evidence seems much weaker than cross-section evidence. Davis and Henrekson report that the coefficient on the marginal tax rate in a panel with country fixed effects is insignificant. In regressions (1) and (2) of table 1.9, we find that when we use a panel of countries and control for country-specific fixed effects, the impact of tax rates on hours worked declines −5.3 to −1.9. The estimated tax rate elasticity declines from −.50 to −.18. This panel estimate is more in line with the within-country estimates discussed above.

The punch line is pretty clear. If one looks at within-country microeconomic evidence on the individual labor supply, one does not come even close to explaining the United States versus Europe difference in hours worked. However, using cross-country evidence, the correlation between aggregate hours worked and tax rates is strong and, if taken as a causal relationship, explains a good portion (roughly one-third to one-half) of the difference in working hours per person. Time series panel evidence raises some red flags, however, about this cross-sectional evidence.

There are roughly two explanations for the divergence between within-country and across-country estimates of the labor supply estimates. One explanation (emphasized also by Davis and Henrekson 2004) stresses omitted variables. High marginal labor tax rates are correlated with generous welfare systems, workplace regulations, unemployment compensation programs, powerful unions, generous

Table 1.9
Effect of Tax Rates and Employment Regulations on Annual Hours Worked: Country-Level Data[a]

	(1) Annual Hours per Person, 15–64 (1995 Cross Section)	(2) Annual Hours per Person, 15–64	(3) Annual Hours per Person, 15–64	(4) Annual Hours per Person, 15–64
Tax rate (Nickell Nunziata)	−5.396	−1.889	−0.682	−0.368
	(2.646)	(0.825)*	(0.814)	(0.764)
	[−0.503]	[−0.176]	[−0.064]	[−0.034]
Union density			−270.625	−383.780
			(47.873)**	(48.044)**
Employment protection measure (Blanchard Wolfers)				−244.392
				(37.216)**
Constant	1,472.929	1,465.960	1,491.721	1,776.665
	(142.020)**	(43.113)**	(41.318)**	(58.147)**
Country dummies?		yes	yes	yes
Year dummies?		yes	yes	yes
Observations	18	358	358	358
R-squared	0.206	0.909	0.918	0.928

Source: The tax rate, union density, and employment protection data are from the Nickell and Nunziata Labor Market Institutions Database. Tax rates are expressed in percentage points (e.g., 50.1) and represent the sum of direct taxes (i.e., income tax), indirect taxes (VAT), and employment taxes (i.e., social security). The mean tax rate for 1995 for Europe is 54.3, and the tax rate for the United States for 1995 is 46.0.

[a] Annual hours are per person age 15–64 and are taken from the OECD. Mean annual hours for the European countries for 1995 is 1,160 with a standard deviation of 134 hours. Annual hours for the United States for 1995 is 1,431. The employment protection measure was created by Blanchard and Wolfers and ranges from 0–2, with 2 being the strictest employment protection. Union density is expressed as a decimal and has a mean of .42. Years covered in the panel are 1960–1995 for up to eighteen OECD countries. Number in square brackets is the implied elasticity of hours wrt the tax rate. We convert dH/dT to the elasticity of hours wrt taxes by dividing by the mean annual hours worked (roughly 1,073 in our data and 1,069 in the Davis et al. data).

*Significant at 5%.

**Significant at 1%.

pay-as-you-go social security systems, etc. All of the above may depress working hours. Therefore, the tax regressions reported above do not capture the real impact of taxes on labor supply, and using macro regressions significantly overstates the true impact of taxes.

A second explanation is that within-country and across-country effects of taxes are different because of the existence of a social multiplier or because higher taxes provide services that are valued by consumers. A social multiplier in this context would exist if the marginal productivity of work (or leisure) increases with the number of one's compatriots who are also working (or relaxing). Those who argue that European culture explains high levels of European leisure are perhaps suggesting a role for a social multiplier. This type of spillover predicts radically different micro and macro elasticities of labor supply (Glaeser, Sacerdote, and Scheinkman 2003) and suggests that macro estimates are indeed appropriate for our purposes here.

4 Unionization and Regulation

At this point, we turn to our first significant omitted variable—the level of unionization. Europe is far more unionized than the United States: the share of the labor force that is covered by collective bargaining agreements ranges from less than 20 percent in the United States to more than 80 percent in Sweden, France, and Germany. The strength of unions owes much to laws and politics. Even within the United States, the 1936 Wagner Act invigorated U.S. unions, and the average unionization rate in states with right-to-work laws is 8 percent, while the unionization rate in states without these laws is 16 percent. Union strength reached a peak in most European countries in the late 1970s and early 1980s, precisely when the reduction in hours worked took off. Afterward, union membership shows a small decline in Europe and a much faster decline in the United States (Boeri et al. 2001).

The large differences in unionization rates between the United States and Europe also reflect political differences between the United States and Europe that have made Europe far friendlier to unions than the United States. Alesina and Glaeser (2004) argue that because of American racial fractionalization and European political instability (which is ultimately the result of two world wars), American politics is far less friendly to the socialist/Marxist left than is European politics. Institutions such as proportional representation have been quite prone to

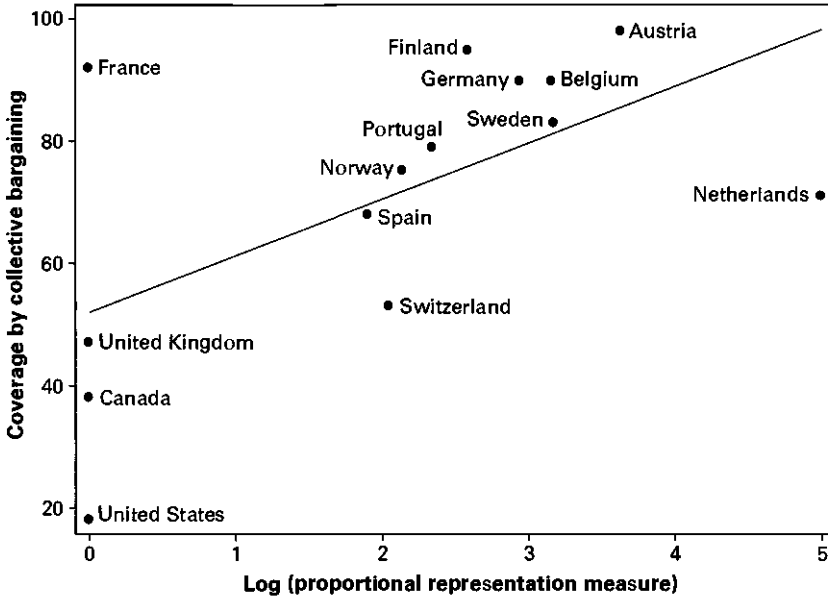

Figure 1.6
Coverage by a Collective Bargaining Agreement Versus Log Proportional Representation Measure
The measure of proportionality is obtained from Milesi-Ferretti, Perotti, and Rostagno (2002).

favor the growth of communist parties and social democratic parties that championed unions. The correlation is clear: figure 1.6 shows the strong positive correlation between proportional representation and the share of the labor force that is covered by collective bargaining agreements. By contrast, American federalism, a majoritarian system which makes it very hard for third parties to enter, separation of powers (especially the Senate and the Supreme Court) have all acted to limit the strength of private-sector unions.

Most classic models of unions and wage setting suggest that unions artificially restrict labor supply in order to raise wages.[11] We might expect unions to impact labor supply in two ways. First, labor unions may keep wages artificially high and restrict employment. Second, labor unions might actively pursue policies of reduction in hours worked, like the (in)famous 35 hours week in France or increased vacation time. We will address the role of labor market regulations in the next section. Before addressing labor market regulations, we will focus on the role that unions have through higher wages.

4.1 Unions, Work Sharing, and Demand Shocks

As noted above, workers maximize $U(Y) + V(1 - l)$, where Y denotes income, and they have one unit of time to divide between work and leisure. We ignore taxes. There is a measure one of firms, all of which have dollar denominated output denoted $Af(ng(l))$, where A is productivity and $f(.)$ is a concave function, where $f(0) = 0$, n reflects the number of workers, and $g(.)$ is a concave function of the number of hours worked by each worker, which equals l, and $g(0) = 0$.

In a free market without unions, a firm will offer workers a (Y, l) pair that maximizes profits and ensures that workers will receive the reservation utility, which is denoted $\underline{U}$. This implies the first order conditions $g'(l)Y/g(l) = V'(1 - l)/U'(Y)$ and $U(Y) + V(1 - l) = \underline{U} > U(0) + V(1)$, which together determine both hours worked and salary. Note that A does not enter into either of these two equations: changes in industry-specific productivity, if this does not impact the reservation wage, will not impact hours worked. The first order condition for the number of workers hired is $g(l)Af'(ng(l)) = Y$. In equilibrium, if N is the total population, and there is measure one of identical firms with identical production technologies, then symmetry ensures that $n = N$. $\underline{U}$ is determined endogenously so that everyone will work.

We let l^* denote the number of hours worked that satisfies the firm's first order conditions so that $n = N$. To consider labor market regulations, we assume that there exists a binding hours worked constraint, denoted $\bar{l}$.

Proposition 1: Output per worker rises with l, and output per hour falls with l. When l is sufficiently close to l^*, worker utility falls with l, but for some higher levels of l worker utility is rising with l. Firm profits fall with l.

Regulations that limit work hours will decrease total productivity per worker but will raise productivity per hour. This follows from the concavity of the production functions. Small impositions of hours regulations will essentially redistribute from firms to workers and will raise worker utility. Large impositions of hours regulations will eventually harm both workers and firms.

Following Blanchard and Wolfers (2000), we now turn to the impact of a sectoral shock to the economy. We do this by assuming that for one-half of the firms, productivity equals $A + \Delta$, and for the other half of the firms, productivity equals $A - \Delta$. As discussed above, hours and wages will continue to be equal across firms, but the more productive

firms will have more workers. We let n^+ denote the employment of the more productive firms and let n^- denote the employment of the two sectors, and $2 - n^+ = n^-$.

Proposition 2: If $f(ng(l)) = (ng(l))^{\alpha}$, then $\partial n^+/\partial\Delta > 0$, $\partial Y/\partial\Delta > 0$ and per-worker productivity also rises with Δ. $\partial l/\partial\Delta > 0$ if and only if $-YU''(Y)/U'(Y) < 1$.

This proposition implies that in a free market where labor is mobile between sectors, a shock that increases the productivity of one sector and decreases the productivity of a second sector by an equal amount will increase total income and per-worker productivity. This result is not surprising; it is the standard LeChatelier principle in action showing that due to optimizing responses, productivity will rise with variance.

This dislocation increases productivity, but it increases hours worked only if $-YU''(Y)/U'(Y) < 1$. This condition is necessary because it guarantees that the labor supply curve slopes up so that increases in productivity will lead to increased hours worked. If this condition doesn't hold, then workers will work shorter hours because of the income effect. The core implication of this model is that shocks will lead to a new allocation of workers, but if these shocks are mean 0, then this will lead to greater productivity and greater hours worked.

We now introduce unions into the model and first assume that productivity is everywhere equal to A. We assume that unions have the ability to set both l and Y, but the firm will then optimally choose the number of workers. This also ensures that the firm will always earn nonnegative profits since setting n to 0 and earning 0 profits is always feasible.

While there are many possible methods of determining the union's maximization problem, we assume that the union has been allocated initially N members and its goal is first to ensure that all N members continue to be employed by the firm and that the welfare of these N members are maximized. If the union maximizes $U(Y) + V(l)$, subject to the constraint that $Ag(1 - l)f'(ng(1 - l)) = Y$, and $n = N$, then:

Proposition 3: Hours worked under unionization will be lower than hours worked under the free market. Productivity per worker will be lower and productivity per hours will be higher. Worker utility will be higher under unionization and firm profits will be lower under unionization.[12]

This result nicely fits with Blanchard's (2004) comparison of France (which he calls Europe) and the United States. In France, productivity per worker went up less than in the United States, while productivity growth per hour rose more in France. This resulted in France reaching the U.S. productivity per hour level by 2000.

One question is whether unions in this case would also lobby for hours restraints. In this model, there would be little reason to do so. However, in a richer model where industries might compete in the product market or where unions might have trouble enforcing labor rules on new entrants, unions would have an incentive to ensure that the rules that come out of collective bargaining applied everywhere throughout the economy.

Finally, we turn to the impact of unions on hours worked in response to sectoral shocks. The core element in our model is that union objectives ensure that the number of workers in each firm will remain fixed at N. To achieve this, unions will treat the firms' first order conditions for hiring workers, $((A+\Delta)g(l^+)f'(ng(l^+)) = Y^+$ and $(A-\Delta)g(l^-)f'(Ng(l^-)) = Y^-)$, as constraints. Unions will ensure there is no unemployment of adults within the union. New workers (from new generations) will generate unemployment among the young, which is after all a feature of the unionized European economies. These assumptions imply:

Proposition 4: Hours worked will fall in the declining industry and rise in the growing industry (i.e., $\partial l^-/\partial\Delta < 0$ and $\partial l^+/\partial\Delta > 0$) if and only if $-YU''(Y)/U'(Y) < 1$. If $f(ng(l)) = (ng(l))^\alpha$, $g(l) = l^\gamma$, $U(Y) = Y^\sigma$, $V(l) = v(1-l)$, and $1 > \sigma(1+\gamma\alpha)$, then $\partial l^+/\partial\Delta + \partial l^-/\partial\Delta < 0$ so that average hours of work declines with Δ.

This proposition gives us the general result that a union that is trying to maintain membership will cut hours when its sector receives a negative shock. While restricting the number of hours does not raise employment at the economy level, at the firm level, there is a truth to "work less—work all." Unions that want to keep the firm from firing workers will indeed reduce the number of hours worked per employee. Again, this result requires the condition $-YU''(Y)/U'(Y) < 1$, which ensures that the labor supply curve slopes up. This stands in contrast to the nonunionized result where sectoral shocks lead to a reallocation of labor, more efficiency, and generally more hours.

To derive a result on average hours worked in the economy, the proposition assumes specific functional forms for the key functions

and then finds that as long as $1 > \sigma(1 + \gamma\alpha)$ overall hours worked will decline with the size of sectoral shock. This condition ensures that labor supply, in the unionized world, is convex with respect to productivity, which in turn implies that the increase of hours worked in the successful sector is smaller than the decrease in hours worked in the unsuccessful sector.

These results do not characterize all unionized economies. Rather, it shows that under reasonable parameter values, the impact of a sectoral shock on hours worked can be completely opposite in unionized and nonunionized economies. In a nonunionized economy, a sectoral shock that helps one sector and hurts another will generally lead to higher average productivity and greater hours worked. In a unionized economy, where labor movements across sectors are much more limited, a sectoral shock can easily lead to a decrease in hours worked because the negative impact on the hurt sector is greater than the positive impact on the strong sector.

4.2 *Union Density, Regulations, and Hours Across Countries*

As our first piece of evidence, we turn to the connection between unionization and hours worked across countries. Figure 1.7 shows the strong negative correlation between hours worked and the percentage of the labor force that is covered by collective bargaining agreements. The raw correlation between these two variables is −54 percent. In fact, this correlation is at least as strong as the one described above for marginal tax rates, and in fact the two variables, marginal tax rates and unionization, are highly correlated 0.72.

Table 1.10 shows regressions and the difficulties of separately identifying a union effect and an hours effect. In the first regression, we repeat the basic finding of a negative connection between tax rates and hours worked. In regression (2), we show that there is also a robust negative relationship between unionization and hours worked across countries. Regression (3) shows that neither variable is significant when both variables are included in the regression. The coefficient on marginal tax rates plummets, but the standard errors are quite high, and we feel that these regressions ultimately tell us little about the true impact of either unionization or tax rates on hours worked.

In order to shed more light, we follow Davis and Henrekson (2004) and use both time series and cross-sectional information. In table 1.9, we present some suggestive panel regressions. The left-hand side is hours worked per years per country. The years covered are 1960–

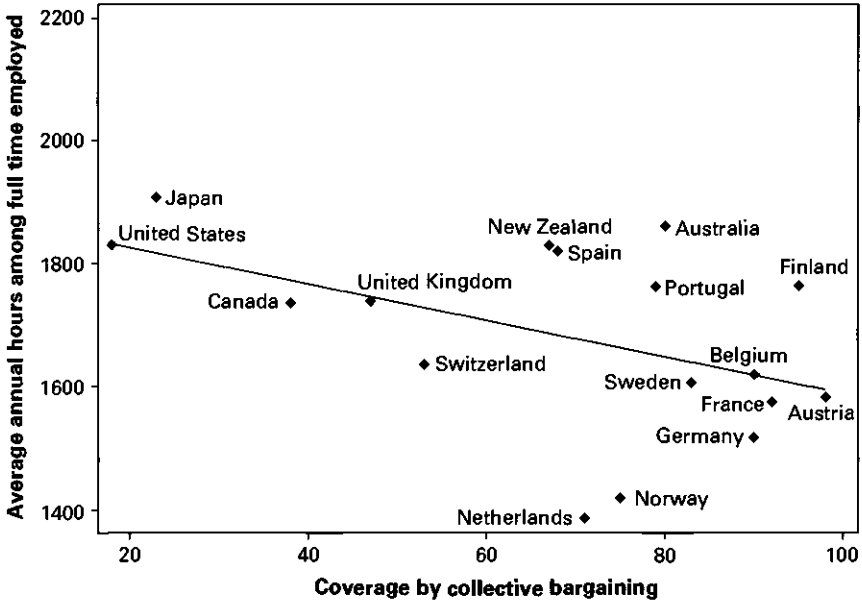

Figure 1.7
Hours Worked Versus Percentage Covered by a Collective Bargaining Agreement
Source: Coverage data are taken from OECD Employment Outlook 1994.

1995 for up to eighteen OECD countries (the panel is not balanced). Column (1) includes the Nickell and Nunziata measure of the tax rate, plus country and year dummies; column (2) adds year and countries dummies. In column (3), we include a measure of union density. This union density variable is significantly negative, and including this variable causes the tax rate variable to become insignificant. In regression (4), we include the Blanchard and Wolfers measure of employment protection. This variable also enters significantly, and now the impact of the tax variable becomes even smaller. If these results are taken at face value, it seems that either unions or labor market regulation is better at explaining United States/Europe differences than the tax rate.

Two important caveats are in order. First, the variable "union density" is different from the more appropriate one that we used above, which is union coverage, that is, the portion of the employed that are covered by union agreements. Union density reflects union membership, and it is less relevant here, but we do not have time series on union coverage. However, cross-country evidence on recent data show

Table 1.10
Cross-Sectional Regressions of Annual Hours on Tax Rates[a]

	(1) Annual Hours (OECD 02)	(2) Annual Hours (OECD 02)	(3) Annual Hours (OECD 02)	(4) Annual Hours (OECD 02)
Marginal tax rate (OECD 02)	−7.705*		−3.572	2.479
	(3.850)		(5.493)	(6.330)
	[−0.718]		[−.333]	[.231]
Union coverage		−3.688	−2.556	−3.620
		(1.656)*	(2.432)	(2.690)
		[−0.344]	[−0.238]	[−0.337]
Log proportionality				−15.749
				(31.476)
Constant	1,434.202	1,329.592	1,419.759	1,217.072
	(189.345)**	(125.336)**	(189.028)**	(217.461)**
Observations	14	14	14	13
R-squared	0.250	0.292	0.319	0.356

[a]Here we regress OECD Annual Hours on OECD Tax Rate Data, an OECD measure of coverage by the union bargaining and the measure of the proportional representation at the national level. We limit the sample to the fourteen countries for which we have the union coverage measure. Union density (members/total employed population) is more widely available but probably less useful since, for example, France has a union density of 10 percent, yet 95 percent of French employees are covered by collective bargaining. When we run the regression in column (1) for our larger sample of twenty-two countries (not restricting the sample by availability of union coverage), we find a similar coefficient on the marginal tax rate. But the coefficient is statistically significant at the 95 percent level. Standard errors in parentheses. Number in square brackets is the implied elasticity of hours wrt the tax rate. We convert dH/dT to the elasticity of hours wrt taxes by dividing by the mean annual hours worked (roughly 1,073 in our data and 1,069 in the Davis et al. data).
*Significant at 5%.
**Significant at 1%.

that union coverage is more closely correlated with hours worked than union density; therefore, we hypothesize that union coverage would have worked even better than union density in the panel regression. The second caveat is that we have panel data on marginal tax rates only from Nickell and Nunziata. Of the three marginal tax rate variables used above in cross sections, this is the one that works least well in terms of correlation with hours worked. Therefore, we hypothesize that had we had the time-varying measures of marginal tax rates, the latter might have performed better in our panel regression.

In order to bring more evidence on this point, we turn to evidence across the U.S. states. Figure 1.8 shows the number of weeks of vaca-

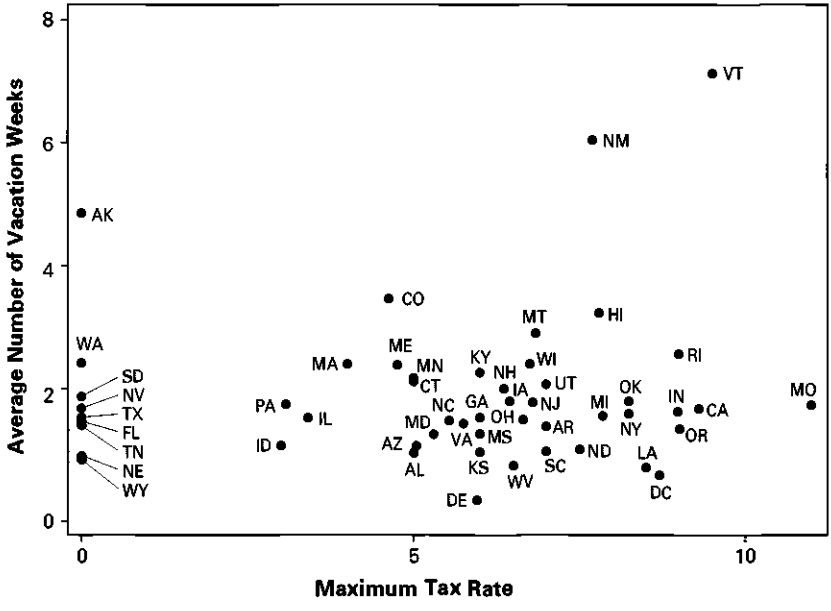

Figure 1.8
State Income Tax Rate Versus Average Weeks of Vacation from Work Reported by Head of Household (PSID)
Note: Tax rate is highest income tax rate levied by the state in 2003.
Source: From state tax department's joint website http://www.taxadmin.org/.

tion reported by respondents of the PSID versus the state income tax.[13] There is no correlation between the two. Figure 1.9 displays the correlation between the average days of vacation and the unionization rate. The correlation is positive.[14] In summary, the cross-state evidence points in the direction of unionization more strongly than in the direction of marginal tax rates.

Table 1.11 shows the impact of different variables on weeks of vacation across the United States in the PSID. In the first regression, we show the impact of state income tax on weeks of vacation. The effect is significant and negative. In the second regression, we control for union membership, which has a comparably large effect. When both variables are included in the third regression, both are significant.

4.3 Institutional History

A few notes on the institutional history of hours worked and labor regulation may help. In France, up to the early 1970s, hours worked of employed people were regulated by law (statutory rules) and not

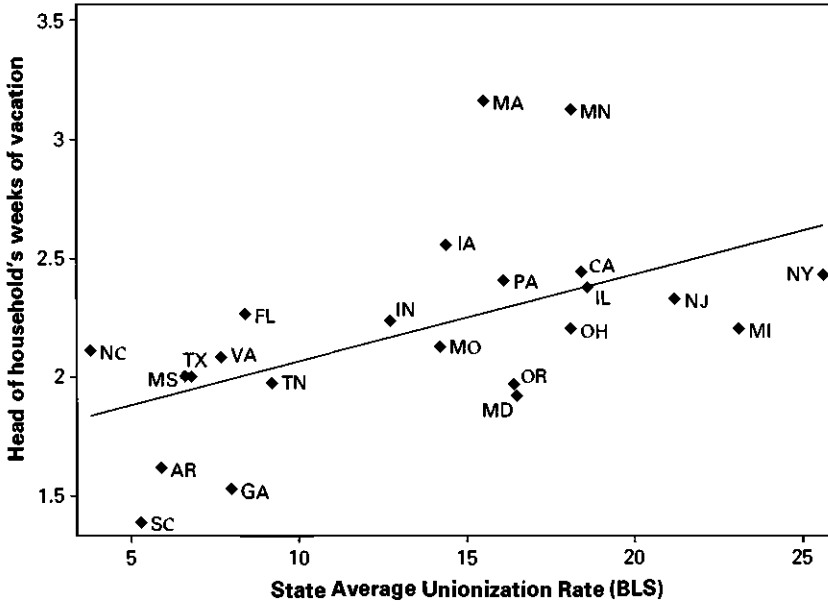

Figure 1.9
Average Days of Vacation Versus Unionization Rate
Source: Bureau of Labor Statistics.

subject to negotiation between employers' organizations and labor unions.[15] The key piece of legislation was the 1936 law that fixed the 40-hour week. From World War II until the mid-1960s, the relatively weak unions focused on improving labor conditions. Starting in the mid-1960s and especially from the mid-1970s onward, the reinforced union movement focused heavily on the reduction of hours worked. In the late 1970s, lengthy rounds of negotiation on hours reduction between unions and employers' organizations finally came to a January 1981 agreement that reduced the working week to 39 hours. Until then the government had been relatively neutral with respect to these negotiations, but the new socialist government in 1982 clearly took the side of the unions. In a series of laws (1982, 1986, 1987), the government issued regulations that either forced or created strong incentives for employers to reduce working hours by increasing mandatory vacations, making it harder to use overtime, etc. Note how figure 1.1 shows a sharp drop of work hours per person around 1982. At the same time, the pressure for a 35-hour week was mounting, and the 35-hour week was indeed introduced in 2000.

Table 1.11
Effects of Protestant, Union Membership, State Tax Rates, Age on Weeks of Vacation: PSID[a]

	(1) Head's Weeks of Vacation	(2) Head's Weeks of Vacation	(3) Head's Weeks of Vacation	(4) Head's Weeks of Vacation	(5) Head's Weeks of Vacation
State maximum income tax rate	−0.033 (0.016)*		−0.036 (0.015)*	−0.045 (0.016)**	−0.038 (0.021)
Union member		0.821 (0.110)**	0.830 (0.110)**	0.764 (0.098)**	0.810 (0.197)**
Union right-to-work state				−0.146 (0.362)	−0.765 (0.368)*
Non-union right-to-work state				−0.232 (0.090)*	−0.172 (0.157)
Protestant					0.126 (0.101)
Age 30–39	0.197 (0.136)	0.158 (0.139)	0.167 (0.138)	0.172 (0.139)	0.143 (0.153)
Age 40–49	0.426 (0.106)**	0.352 (0.108)**	0.359 (0.107)**	0.363 (0.109)**	0.289 (0.159)
Age 50–59	0.657 (0.150)**	0.583 (0.146)**	0.585 (0.146)**	0.588 (0.148)**	0.434 (0.184)*
Age 60+	1.247 (0.302)**	1.182 (0.297)**	1.193 (0.295)**	1.198 (0.296)**	0.812 (0.339)*
Log (wage)	0.650 (0.086)**	0.601 (0.084)**	0.600 (0.085)**	0.578 (0.084)**	0.587 (0.110)**
Has 4+ years college	0.509 (0.117)**	0.594 (0.114)**	0.589 (0.112)**	0.580 (0.112)**	0.522 (0.135)**
Has 4+ years high school	0.310 (0.113)**	0.267 (0.113)*	0.268 (0.111)*	0.280 (0.113)*	0.149 (0.144)
Constant	−0.368 (0.237)	−0.470 (0.201)*	−0.279 (0.237)	−0.075 (0.265)	−0.187 (0.300)
Observations	4941	4941	4941	4941	1791
R-squared	0.075	0.086	0.087	0.089	0.070

[a] Full-Time Employed Heads of Household in the PSID. 2001 data from the PSID. Robust standard errors in parentheses.
*Significant at 5%.
**Significant at 1%.

In Germany, the reduction in hours worked started right after World War II and continued in a pretty stable trend. Hours worked fell from 2,315 per person in 1950 to about 1,750 in 1975 (Bosch et al. 1993). Note, however, how the starting point was higher than in France; in Germany, the 1938 statutory law fixed at 48 the maximum number of weekly hours. Up until 1975, the reduction in working hours was accompanied by a rapid increase in productivity per hour, but this changed with the first oil shock. At the time of the large increase in unemployment that followed the first oil crisis of 1973, unions pursued a policy of "work less—work all," that is, a policy of reduced work hours at the same total wage or even higher wage per hour to compensate for lower total hours worked. An aggressive union movement (more than 11 million days of strikes in the ten years following 1975) focused very heavily on the reduction of work hours while holding total pay constant (Hunt 1998, 1999). The unions' implicit view was that the total amount of work to be performed was somehow fixed, and therefore sharing it amongst more individuals would increase employment.

The slogan "work less—work all" in different languages echoed in the unions' marches in most of Europe. Hunt (1998) reviews in detail the labor literature that examined the effects of a reduction of standard hours and actual working hours and concludes that the effect was basically one for one in Germany and France; that is, the reduction in standard hours did not translate to more overtime. She also shows that the reduction in the hours worked of the male worker reduced the hours worked by the spouse, an indication of a family multiplier effect.[16] A household production model would instead imply an inverse relationship between hours worked in the market and at home between the two members of the family.

Reduced work hours at given total wages obviously increases the cost of labor input per hour, leading to input substitution. In fact, we observed a reduction of employment in sectors that adopted work sharing rules.

In Italy, the working hours regulations that led to an increase in vacation days were the result of negotiation among Confindustria (the association of manufacturers), the unions, and the government in an active role of mediator. Following the Autunno Caldo (Hot Fall) of 1969, unions were galvanized and reached their maximum strength in the postwar period. At the same time a surge in the vote share of socialist and communist parties led to a shift of the political balance

toward the left. The fifteen years that followed 1969 saw a constant reduction of working time through a series of labor agreements (Garonna and Reboni 1993). Contrary to these European experiences, no significant regulations in the United States dictate anything about work hours for individuals older than 16 and, as discussed above, the coverage of labor union agreement is much less than in Europe.

The effect of unions on working hours goes above and beyond the direct negotiations on the work week and vacations. In Europe, labor unions have a major political role in promoting and defending the welfare state in general and public pension systems in particular (Alesina and Glaeser 2004; Boeri et al. 2001). Because of the large influence of older workers in the union movements, the latter have been especially keen on promoting more and more generous pension schemes from the 1960s onward and more recently have strenuously defended them against reform geared toward reestablishing fiscal balance. In 1995 in both France and Italy, union opposition to pension reforms led to a withdrawal of the reform in the former and the collapse of the government in the latter. Recently France went through a month of heavy social unrest in opposition to a relatively minor pension reform geared toward eliminating privileges for public employees. There is indeed a strong correlation between welfare spending in general and pension spending as a share of gross domestic product (GDP) and measure of union density (Boeri et al. 2001). In many European countries, unions are directly involved in the management of pension systems and unemployment compensation schemes.

The generosity of the retirement system obviously affects labor participation of the elderly, which is one factor that explains lower work hours per person on the two sides of the Atlantic. As Boeri et al. (2001) put it, "today more than every second older man between the age of 54 and 65 has already retired from the labor force."

A related factor is the unions' tendency to favor preretirement schemes to avoid unemployment. If a large plant has to close, unions often negotiate preretirement for older workers. Management and unions often find this agreement easy to achieve since those paying the bills (the taxpayers) are not sitting at the negotiating table.

The preference of unions for generous, publicly provided pension schemes has to do with the political bias in union organization toward the older members of the unions, a bias that also makes unions relatively uninterested in the problem of youth unemployment. Boeri et al. (2001) present a strong correlation between union density and youth

unemployment. In fact, in Italy, households composed of relatively young retirees and unemployed youth in their late twenties are common. The presence of youth unemployment also leads to an extension of time spent in school.

Other union policies might have indirectly affected hours worked. For instance, think of rigidity in the use of labor and the use of overtime. Firing costs may have led entrepreneurs to switch to capital-intensive technologies. The use of early retirement to allow for plant closings is a policy that may directly or indirectly reduce work hours and/or employment.[17]

Labor unions have also fought hard for increasing unemployment compensation, which in turn raises wage pressure and may reduce employment (Nickell 1998). We cannot even begin to review the literature of the employment effect of unemployment insurance; the magnitude and even the sign of it is debated and politically charged.

Finally, note that the unionization story may also encompass the argument put forward by Bell and Freeman (1995). They argue that Americans work more because wages are less compressed in the United States relative to Europe and therefore the incentive to work harder and being promoted are stronger. One of the key explanations of different degrees of wage compression is certainly union polices and the degree of unionization.[18] More generally, Bell and Freeman (1995, 1999) highlight the role of inequality as an explanation of work hours. In figure 1.10, we plot a correlation between inequality and work hours; we emphasize correlation because causality could go either way if longer hours are associated with more variance of working time across families. Osberg (2002), however, convincingly questions Bell and Freeman's explanation with reference to Germany.

This correlation highlights once gain one basic theme of this paper. Hours worked have fallen, especially in continental European countries characterized by strong unions, extensive welfare coverage, high taxation, and prevalence of social democratic governments, all factors that also reduce inequality (see Alesina and Glaeser 2004). Hours worked have not fallen in the United States and (to a lesser extent in the United Kingdom and Ireland) because these are countries with less extensive welfare, less intrusive regulations, less powerful union movements, and more inequality. The bottom line is that hours worked fell in countries that can be characterized by the continental European model and did not fall in the countries with the American model (with Britain and Ireland in between).

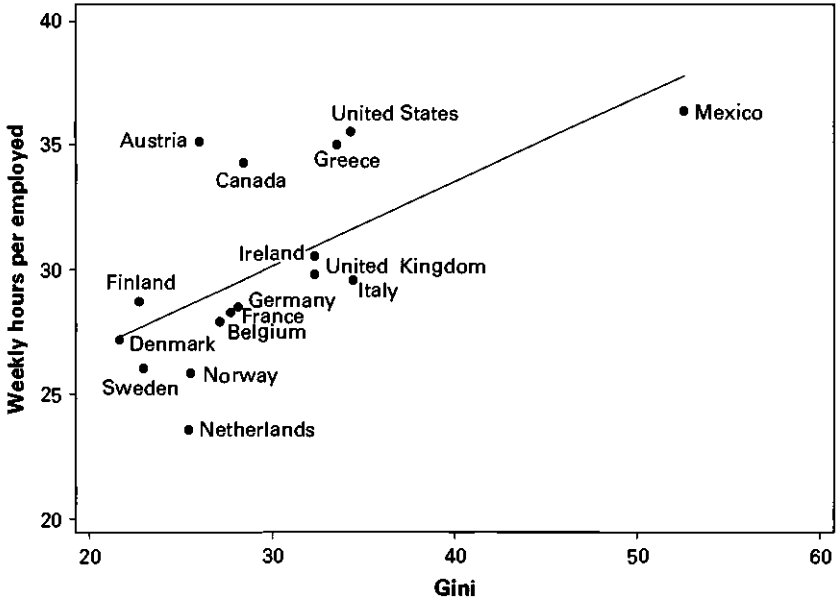

Figure 1.10
Weekly Hours per Person Versus Gini
Source for Gini: Deninger and Squire Database.

4.4 But Why?

Why did unions in Europe choose to fight for lower work hours? Our model implies that when faced with sectoral shocks, unions will cut hours worked to maintain membership. Unions care about maintaining size because size drives their political power or because union dues are a function of the number of workers or because unions are under political pressure from their members not to allow days off. This explanation fits well with the openly stated policy of work sharing. Had the unions accepted a constant hourly wage, that might have worked, but union members tried to have their cake and eat it too: unions in Germany and France managed to impose lower hours with equal or increasing pay, leading to an increase in salary per hour. That led to a reduction in employment.

There are certainly other explanations for the unions' policies that are also worth addressing here. One answer in line with the taxation story is that union members pressed the union to lower work hours in response to the increase in marginal tax rates, an argument in line with Prescott (2004). Even though in the union rhetoric it is hard to find any

explicit reference for this motivation to demands for reduction in hours worked, certainly increases in taxes and reduction of take-home pay may affect wage demands (Alesina and Perotti 1997, Daveri and Tabellini 2000, Boeri et al. 2001), leading to higher pre-tax wages and lower employment levels.

Another explanation is that the unions helped coordinate a demand for lower hours due to an income effect, an argument in line with Blanchard (2004). That is, the unions simply responded to the increasing income level of their members who demanded more leisure. In this sense, the unions served the purpose of overcoming the transaction costs associated with individual bargaining and provided a voice for workers, an argument in line with the view of unions' role by Freeman and Medoff (1984). This role particularly makes sense if there are positive complementarities in the enjoyment of leisure activity. In that case, private decisions about work and leisure will lead to too much work.

A final explanation is that in a period of inflation (the 1970s and 1980s) and increasing unemployment, demands for increases in real wages might have been politically unpalatable. Given the heavy government intervention and politically salient nature of union negotiations in Europe, political packaging of union demands is very important. Asking for large wage increases with unemployment and inflation might have been impossible, but asking for higher hourly wages by holding constant total wages and reducing hours worked was more politically feasible, especially using the powerful rhetoric of "work less since there are so many unemployed."

Given the potential adverse effects of shorter work hours on employment, Booth and Schiantarelli (1986) concluded that it is a puzzle why in the 1970s and 1980s labor unions pushed for lower hours.

5 Social Multipliers and Culture

In this section, we review the possibility that the macro estimates are more appropriate than the micro estimates. There are two principal reasons why this might be true. First, higher taxes might not have the negative income effects that we would normally associate with lower wages. As we have discussed above, even the supposedly compensated labor supply estimates are not large enough for this to explain the United States/Europe differences. Second, there might be comple-

mentarities across people in leisure or production that create a social multiplier.

5.1 *The Social Multiplier*

In this section, we present a simple social multiplier argument and discuss whether the available evidence on the magnitude of the social multiplier in the context of labor supply could explain the discrepancy between micro and macro estimates of labor supply.

The basic starting point of a social multiplier model is to assume that the marginal productivity of either work or leisure is increasing in the amount of leisure consumed by one's peers. We will assume that utility is separable between income and leisure, so that individuals maximize $U((1-l)(1-t)w) + V(1-l, 1-\hat{l})$ where the notation is as above, except that $\hat{l}$ is the average amount of hours worked within the community. The presence of a social multiplier implies that $V_{12}(1-l, 1-\hat{l}) > 0$. This cross-partial might reflect social interactions during leisure activities, or it might reflect a decreased stigma from relaxing. We assume that $U(.)$ is concave and $V_{11}(1-l, 1-\hat{l}) < 0$.

If the wage rate is common to the entire community and if the community is homogeneous, then the impact of a wage change on the labor supply of the entire community will equal $(-(1-t)^2 wU''((1-l)(1-t)w) - V_{11}(1-l, 1-\hat{l}))/(-(1-t)^2 wU''((1-l)(1-t)w)) - V_{11}(1-l, 1-\hat{l}) - V_{12}(1-l, 1-\hat{l}))$ times the impact of a wage change on the labor supply of the individual. If $U(.)$ is linear and $V(1-l, 1-\hat{l}) = v_0(1-l) - v_1(1-l)^2 + v_2(1-l)(1-\hat{l})$, then this social multiplier equals $2v_1/(2v_1 - v_2)$. For an interior solution to be a social optimum, $v_1 > v_2$ so in this case, the social multiplier must be less than 2.

There are two issues raised by the existence of a social multiplier. First, it can potentially justify the use of macro rather than micro elasticities. Of course, the micro elasticities are themselves often produced by the use of aggregate variables, such as changes in the tax rates. Estimates based on national tax supply changes will include some impact of the social multiplier. To get from the estimated micro elasticities of .2 to the macro elasticity of .8, the social multiplier would have to be about 4. Second, the existence of a social multiplier might mean that government regulations (or higher taxes) that reduced working hours are socially efficient. If $V_2(1-l, 1-\hat{l}) > 0$, then private labor supply decisions will lead to too much work relative to the social optimum.

5.2 *The Social Multiplier and the Culture of Leisure in the United States and Europe*

Some observers of the U.S. and European situations have suggested that differences in hours of work reflect the difference between a European culture of leisure and American workaholism. One variant of this view is that these differences reflect long-standing cultural differences, which are perhaps rooted in America's puritan Calvinist heritage. It is certainly true that New England's Puritan settlers avidly struck long-standing religious holidays off the calendar (including Christmas) and thereby increased their total work days significantly.

But while this theory has a certain charm, it has much trouble with the labor histories of the United States and Europe. As late as the 1960s, Europeans worked longer hours than Americans. Working Saturdays was more common in Europe, and even long summer vacations were not particularly more common in Europe than in the United States. Indeed, the August vacation cannot be a long-standing part of mainstream European culture because, after all, August is a prime working month in every agricultural community in the northern hemisphere. Figure 1.11 shows the lack of correlation between the percentage of Protestants and hours of work across countries. While it may seem today that differences in work patterns are eternal aspects of European and American lifestyles, these differences are modern in origin.

Using data from the PSID, we tested whether cultural measures (being Protestant) were important within the United States. Table 1.11 shows that being Protestant does not influence hours worked, while being a union member does. The state maximum income tax rate is insignificant. Data from Germany, shown in table 1.12, using the GSOEP are similar: while being Protestant is irrelevant, being a union member is very important in explaining weeks of vacation.

Although it is a mistake to think that Europe/U.S. labor supply differences reflect long-standing cultural differences, there may be some truth to those who argue for the importance of a culture of leisure in Europe. The essence of the cultural view is that because everyone takes long vacations in Europe, it is more pleasurable to take those vacations. In part, this is because one's friends and relatives are also on vacation and it is enjoyable to relax with one's friends. In part, increasing returns to provide leisure infrastructure may mean that Europe has developed better infrastructure for enjoying a month-long August holiday.

Of course, these arguments are essentially variants on the social multiplier view—one person's leisure increases the returns to other peo-

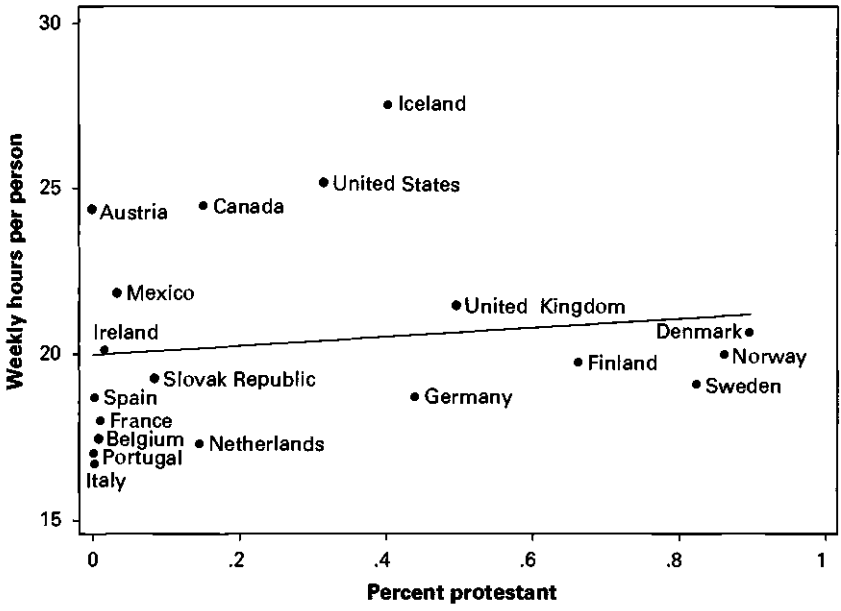

Figure 1.11
Average Hours Worked Versus Percentage Protestant
Source: Hours worked data are from OECD data. Protestant share is calculated from World Value Survey data.

ple's leisure. The European anecdote is hardly unique; there is a great deal of anecdotal evidence supporting the idea that there are positive complementarities across people in the enjoyment of leisure time. At this point, we consider three different examples of these complementarities which support the idea of a significant social multiplier: the weekend and work timing more generally, the literature on agglomeration economies, and labor force participation decisions among subgroups of the population.

One of the strongest pieces of evidence in favor of complementarities across either leisure or work is the extent that an overwhelming share of the population takes its two days of leisure during Saturday and Sunday. There are extremely good reasons—saving commuting, for example, or spreading capital over more workers—why there would be advantages from staggering work so different people take different days off during the week. Nonetheless, in both Europe and the United States, there is a remarkable consensus on taking Saturday and Sunday off. Taking Sunday off may be seen as part of a long-standing Christian

Table 1.12
Effects of Protestant, Union Membership, and Age on Weeks of Vacation: GSOEP[a]

	(1) Head of Household's Weeks of Vacation	(2) Head of Household's Weeks of Vacation	(3) Head of Household's Weeks of Vacation
Protestant	−0.024		
	(0.064)		
Union member		0.595	0.560
		(0.049)**	(0.048)**
Age 30–39			0.388
			(0.063)**
Age 40–49			0.482
			(0.064)**
Age 50–59			0.582
			(0.070)**
Age 60–64			0.851
			(0.114)**
Constant	5.233	5.102	4.706
	(0.033)**	(0.024)**	(0.051)**
Observations	3258	5945	5945
R-squared	0.000	0.025	0.041

[a] Full-Time Employed Heads of Household in the GSOEP. 2001 data from the GSOEP. Standard errors in parentheses.
*Significant at 5%.
**Significant at 1%.

religious observance, but as rising incomes lead to more leisure time, it was not obvious what the second day would be and for a while it seemed just as likely that Monday would represent the second day of vacation (Rybczynski 1992). Surely, it would have been quite possible for one-half of the population to take Monday and Sunday off and one-half of the population to take Saturday and Sunday off. Nonetheless, there was a strong convergence to a common two-day weekend despite the many disadvantages of crowding commutes and infrastructure usage more generally during five days and leaving this infrastructure underutilized during the other two days. In European countries with small amounts of religious observance, it is hard to think that Sunday remains as a leisure day except for its role as a focal point, and it would not have power as a focal point unless there were complementarities in leisure (or work) across individuals.

Similar comments could be made about work hours and vacation days more generally. The share of the population that works between 9 and 5 in the United States is extremely high relative to the benefits that would be gained from staggering commuting more evenly over the day. Likewise, people tend to group holiday times together both during the winter and summer holidays. These anecdotes do suggest that people like to rest at the same time that others are resting or, conversely, to work when others are working. This is certainly one form of evidence supporting the existence of a social multiplier either in work or in leisure.

A second form of evidence is the work that has been done on agglomeration economies in productivity (e.g., Ciccone and Hall 1996). This work has tried to document that productivity increases when people are surrounded by others who are productive. This sort of effect has been used by Hall and others to explain business cycle fluctuations. In the previous framework, this type of effect would be included by assuming that $W(.)$ is a function of aggregate labor supply and this would also produce a social multiplier, without any complementarities in leisure.

A third piece of evidence which appears to support the significance of social multipliers is the remarkable difference on labor force participation rates across demographic subgroups within areas. For example, table 1.13 shows the labor force participation rates for adult males age 30–50, adult females 30–50, and young males 20–30 in a set of fifteen different countries. The differences across these populations are quite striking. Among young males, the labor force participation rate ranges from .37 in Belgium to .72 in the Netherlands and United Kingdom. Among adult females, the labor force participation rate ranges from .48 in Italy to .77 in Sweden.

Tax rates and labor market regulations explain some of these differences, but another possible reason is the complementarities across work or leisure within these subgroups. One fact that suggests that labor market regulation is not the only explanation of these differences is the lack of correlation across the subgroups. For example, the correlation between labor force participation rates of young men and adult women is only 74 percent. Leisure complementarities are also a plausible explanation. It is less unpleasant to be an unemployed youth if your friends are similarly unemployed. Adult women working outside the formal labor market find it easier to function when they have peers who are in a similar situation. Glaeser, Sacerdote, and Scheinkman

Table 1.13
Labor Force Participation, by Country Age-Group Cells

Country	LFP Men 15–64	LFP Women 15–64	LFP Men 15–24
Australia	0.815	0.660	0.696
Belgium	0.726	0.554	0.373
Denmark	0.838	0.758	0.705
Germany	0.787	0.642	0.524
Ireland	0.783	0.573	0.531
Italy	0.745	0.479	0.414
Luxembourg	0.765	0.534	0.400
Netherlands	0.839	0.671	0.720
Norway	0.839	0.766	0.651
Portugal	0.793	0.650	0.524
Spain	0.804	0.537	0.524
Sweden	0.809	0.770	0.529
Switzerland	0.887	0.739	0.707
United Kingdom	0.837	0.694	0.722
United States	0.830	0.701	0.655

Source: OECD.

(1996) show that excess variance is one piece of evidence that supports the existence of positive complementarities across people. There is indeed high variance across subgroups across space in labor force participation, which also supports the existence of such complementarities in the labor supply decision.

A fourth piece of evidence is shown in table 1.11. Here we compare nonunion workers in right-to-work states and non-right-to-work states. Right-to-work states have much lower unionizations and as a result fewer union workers who take longer vacations. If the social multiplier view is right, then nonunionized workers in right-to-work states will take shorter vacations because they work around more nonunionized workers who are taking shorter vacations. This is exactly what the table shows. Even nonunion workers in right-to-work states take shorter vacations.

Thus, there is a small body of evidence that shows that there may well be social multipliers in the context of taxes. This may mean that macro elasticities are appropriate. However, the cross-national evidence given above still suggests elasticities that are too small to explain the United States/Europe differences. Our preferred specifi-

cations, which examine a country panel and control for unions and labor market regulation, show very modest effects. These estimated elasticities, which should presumably include any social multiplier effects, still explain only a small amount of the United States/Europe differences.

6 Are Europeans Really Taking More Vacation or Just Working at Home?

Several authors, including Freeman and Schettkat (2005) and Rogerson in his verbal comments at the conference, have used time diary data to argue that Europeans use their nonworking time to engage in more home production (not more leisure) and that tax rates may be responsible for this effect. In particular, lower tax rates in the United States may lead to more market work to provide services like food provision and childcare. Indeed Freeman and Schettkat provide data showing that the restaurant market is far larger in the United States than in Europe.

However, our analysis of the time diary data finds little support overall for the notion that Europeans engage in extra home production while Americans engage in extra market work. In table 1.14, we show our calculations of average hours per week spent on various activities. The data are from the most recent wave of the Multinational Time Use Survey (MTUS) data. In keeping with our hours worked analysis, we use all persons age 15–64 as the relevant population.

While Americans spend 1.5 fewer hours per week on food preparation relative to the French, they spend 2.4 hours more on childcare and .9 hours more on housework.[19] This is not surprising given that Americans have more children and bigger houses to clean! When we add home production categories, we see that Americans engage in just as much if not more home production overall. They do sleep less. Also what is leisure and what is work at home is unclear. Olivier Blanchard pointed out (correctly) that cooking is leisure for French men and women and childcare is, at least in part, fun.

We know from tables 1.3 and 1.4 that employed Europeans have an additional 20–24 vacation and holiday days relative to employed persons in the United States. The notion that Europeans take their nonworking time as home production would imply that these additional weeks of vacation are spent cleaning and repairing the house. This idea seems quite contrary to the European notion of an August vacation, as anybody who has visited Europe in August can verify.

Table 1.14
Hours per Week Allocated to Major Activities[a]

Country	Working	Leisure	Food Preparation and Cleanup	Child Care	Housework	Sleep
France	22.159	28.495	5.743	2.234	6.367	61.463
Netherlands	19.072	40.727	5.827	3.428	4.629	58.451
United Kingdom	25.220	39.242	5.573	4.312	5.457	58.409
Germany	25.961	33.382	6.327	3.625	5.548	56.605
Austria	27.676	30.917	6.674	2.813	7.078	59.516
United States	30.623	33.028	4.224	4.646	7.305	55.760

[a] Data are from the Multinational Time Use Survey Data. All persons 15–64. Years are 1992–1999. Raw data are expressed in minutes per day, and we convert to hours per week. Working is paid hours spent on primary job. (The "second job" numbers appear to be not comparable across countries.)

Leisure category includes the sum of: time spent during travel for leisure; time spent on excursions; time spent actively participating in sports; time spent passively participating in sports; time spent walking; time participating in religious activities; time at the cinema or theater; time at dances or parties; time at social clubs; time at pubs; time visiting friends; time listening to the radio; time watching television or videos; time listening to records, tapes, CDs; time reading books; time reading newspapers and magazines; time relaxing; time in conversation; time entertaining friends; time knitting, sewing, etc.; time in other hobbies or pastimes.

The leisure numbers highlight one of the many problems of comparing the time use numbers across countries. For example, the French data are collected only in February, which would seem to understate greatly the amount of leisure travel taken throughout the year as a whole.

The time diary data on hours of leisure time spent per week are all over the map. The French report 30 percent less leisure than the Dutch and 14 percent less than the Americans. This actually indicates a major problem with comparing the MTUS data across countries. Different countries collect these data during different months, and the French data are collected during February when few people are away on holiday. For this reason we believe that the claim that the time spent by Europeans not at working in the market is largely spent working at home is not substantiated by the available evidence.

7 Aren't Vacations a Great Thing?

Assume for a moment that unionization and regulation were indeed a major cause of the drop in hours worked in Europe. As economists, we tend to view departure from perfect competition as producing inferior

Table 1.15
Relationship Between Happiness and Weeks of Vacation in the GSOEP[a]

	(1) Life Satisfaction (1990 Cross Section)	(2) Life Satisfaction (2000 Cross Section)	(3) Life Satisfaction (Panel with Individual f.e.)
Head's weeks of vacation	0.050	0.088	0.037
	(0.021)*	(0.011)**	(0.022)
Age 20–29	−0.499	−0.196	−0.396
	(0.207)*	(0.122)	(0.218)
Age 30–39	−0.697	−0.340	−0.683
	(0.206)**	(0.118)**	(0.233)**
Age 40–49	−0.668	−0.477	−1.018
	(0.208)**	(0.118)**	(0.245)**
Age 50–59	−0.594	−0.396	−1.367
	(0.216)**	(0.121)**	(0.261)**
Age 60–64	0.000	−0.293	−1.744
	(0.000)	(0.145)*	(0.310)**
Constant	7.742	7.167	7.975
	(0.212)**	(0.122)**	(0.246)**
Observations	1779	7003	8782
R-squared	0.010	0.012	0.914

[a]Full-Time Employed Heads of Household in the GSOEP. Dependent variable is a life satisfaction question that ranges from 0–10, with 10 being the highest level of satisfaction. The mean of the dependent variable is 7.16 with a standard deviation of 1.77. Columns (1) and (2) are cross-sectional regressions for 1990 and 2000. Column (3) is a panel regression with individual fixed effects. Standard errors in parentheses.
*Significant at 5%.
**Significant at 1%.

equilibria, and generally we are right. Thus, we should see unions and regulations as infringing on the ability of people to work more and enforcing a suboptimal low hour's equilibrium. However, it may be the case that these regulations serve as a coordination device to achieve a low work hour's equilibrium that is desirable because of a social multiplier effect but difficult to reach individually. It is hard to obtain more vacation for yourself from your employer and even harder, if you do, to coordinate with all your friends to get the same deal and go on vacation together. Needless to say it is very difficult to assess which of the two is right. As a first pass, we looked at measures of life satisfaction and hours worked for European countries.[20]

Table 1.15 uses data from GSOEP (a German survey) in which the left-hand side is a measure of life satisfaction. Column (1) shows a significant effect of hours worked on happiness in the 1990 survey: fewer

Table 1.16
Relationship Between Happiness and Annual Hours of Work Across Countries[a]

	(1) Life Satisfaction (Cross Section)	(2) Life Satisfaction (Cross Section IV) Instrument with Collectively Agreed Vacation Days	(3) Life Satisfaction (Country Panel with Year Dummies)
Annual hours per person 15–64	−0.00128 (0.00046)*	−0.00126 (0.00061)	−0.00054 (0.00018)**
Constant	4.20131 (0.77456)**	4.15603 (1.02109)**	2.94359 (0.31369)**
Country dummies?			yes
Year dummies?			yes
Observations	12	10	129
R-squared	0.43	0.43	0.95

[a] Annual hours worked are per person age 15–64 and are from the OECD. Life satisfaction numbers are means taken from Eurobarometers data. At the person level, life satisfaction took on values of 0, 1, 2, and 3 corresponding to not at all satisfied, somewhat satisfied, satisfied, and very satisfied, respectively. At the country level, the dependent variable has a mean of 2.00 and a standard deviation of .26. Years included are 1995–1972. Countries included are Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, and the United Kingdom. Column (1) is the cross-section for 1992. Column (2) is the cross-section in which we instrument for hours worked with the level of vacation days collectively agreed to (via collective bargaining) at the country level, and column (3) is the panel with country and year effects. Standard errors in parentheses.
*Significant at 5%.
**Significant at 1%.

hours worked is associated with more life satisfaction. Note that we *never* include a measure of income of the respondent; everybody should be happier working less holding income constant! Column (2) shows very similar results for 2000. In column (3), we include individual fixed effects. The value of the parameter on hours worked drop to about three-quarters of what it was in 1990, and it is borderline insignificant (t stat about 1.7). This evidence taken together is at least suggestive that working less makes Germans happier.

In table 1.16 we use data from Eurobarometer on country members of the European Union. The first regression shows a negative relationship between hours worked across countries and life satisfaction. This shows the same negative effect as seen in the country data, but reverse causality might still be at work. To address this possibility, in regression (2), we instrument for hours worked using collective bargaining agreements. In this regression, we continue to find a negative relation-

ship between hours worked and life satisfaction across countries. In the third regression, we repeat this procedure for a panel of countries and find a similar negative relationship, even with country and year fixed effects.

Europeans seem to be happy to work less and less. Whether they internalize the macroeconomic effects of working less, like relative shrinking of the size of their economies relative to emerging countries, or a decline in the relative prominence of Europe as an economic superpower, is of course a different matter.

8 Conclusions

Our punch line is that Europeans today work much less than Americans because of the policies of the unions in the 1970s, 1980s, and part of the 1990s and because of labor market regulations. Marginal tax rates may have also played a role, especially for women's labor force participation, but our view is that in a hypothetical competitive labor market without unions and with limited regulation, these tax increases would not have affected hours worked as much. Certainly micro evidence on the elasticity of labor supply is inconsistent with a mainly tax-based explanation of this phenomenon, even though social multiplier effects may help in this respect.

A very hard question to answer is whether labor unions and labor regulation introduce distortions that reduce welfare or whether they are a way of coordinating on a more desirable equilibrium with fewer hours worked. Since answering this question is difficult and the question is politically charged, we won't be surprised if the debate will continue for a long time with heated tones.

9 Appendix 1: Data Sources

9.1 Labor Force Participation and Hours and Weeks Worked Statistics

Our data on hours worked, usual weekly hours, and vacation days come from the OECD database, available at http://www1.oecd.org/scripts/cde/members/LFSDATAAuthenticate.asp. These statistics are by country and year. Full documentation is also available at this site. The data are reported by individual member countries and are drawn from the standard labor force surveys in place for each country (e.g., the CPS for the United States).

Dr. Giuseppe Nicoletti at the OECD statistical office (Giuseppe .NICOLETTI@oecd.org) generously provided us with detailed breakdowns of labor force participation by country-year-age cells. He also provided us with the decomposition of 52 weeks per year into weeks worked, holiday and vacation weeks, absences due to nonholiday/vacation, absences due to sickness, and maternity leave (see table 1.3).

Data on federally mandated and collectively agreed days of vacation are from the European Industrial Relations Observatory On-Line and their report called *Working Time Developments*. This report is available at http://www.eiro.eurofound.ie/2004/03/feature/tn0403108f.html.

9.2 *The Tax Data*

Our OECD tax data come from the OECD Tax Database, available at http://www.oecd.org/document/60/0,2340,en_2649_34533_1942460_1_1_1_1,00.html. Full documentation is available at this site. The data are described by the OECD as follows: "This is the income tax and social security contribution rates for a single person without dependents, at various multiples (67 percent, 100 percent, 133 percent, and 167 percent) of the APW [average production wage]. The results, derived from the OECD Taxing Wages framework (elaborated in the annual publication Taxing Wages), use tax rates applicable to the tax year beginning in calendar year 2001. The results take into account basic/standard income tax allowances and tax credits, but exclude universal family cash transfers (included in Taxing Wages). The marginal tax rates are derived on the basis of a unit increase in gross wages, with the exception of the marginal total tax wedge calculation, which considers an increase in gross labor costs (gross wages + employer SSC) resulting from a unit increase in gross wage earnings. The sub-central personal tax rates correspond to those used in Taxing Wages (rates applicable in a typical manufacturing area or a weighted average of sub-central rates for the country as a whole)." We used the marginal tax rate at 100 percent of the average production wage.

We obtained the Schneider (2002b) and Nickell and Nunziata (2001) tax data from Davis and Henrekson (2004). The Nickell and Nunziata (2001) tax rate is computed using the London School of Economics CEP-OECD database, which draws on OECD and other sources. Their tax wedge number is the sum of three components: (1) an "employment tax wedge," which is equal to employer contributions to social security welfare plans and private pensions divided by total employers' compensations; (2) a direct tax wedge, which is equal to employees'

contribution to social security plus household income taxes divided by current receipts of households; and (3) an indirect tax rate equal to indirect taxes less subsidies divided by private final consumption expenditures. Nickell and Nunziata have a panel of twenty OECD countries and cover the years 1960–1995. Their data are available in the Labor Market Institutions Database (Nickell and Nunziata 2001).

The Schneider (2002) tax data are the sum of household income tax rates, sales/VAT tax rates, and employer plus employee social security tax rates. The data appendix in Davis and Henrekson (2004) provides extensive discussion of both data sources.

9.3 Other Data Items

The proportional representation measure comes from Milesi-Ferretti, Perotti, and Rostagno (2003) and was generously provided by the authors.

Union coverage by country is from the *OECD Employment Outlook*, chapter 5, http://www.oecd.org/dataoecd/3/52/2409993.pdf.

Data for the Blanchard and Wolfers (2000) employment protection measure is contained in the Nickell and Nunziata Labor Market Insitutions Database. Percentage Protestant by country is calculated from the World Values Survey Data.

U.S. state unionization rates are from the Bureau of Labor Statistics (BLS) web site. Right-to-work states are coded from the data at http://www.nrtw.org/rtws.htm. State tax rates are from the states joint tax center at http://www.taxadmin.org/ and are cross-checked with data from the Tax Policy Center run by The Brookings Institution and the Urban Institute. Data are available at http://www.taxpolicycenter.org/TaxFacts/tfdb/TFTemplate.cfm?topic2id=90.

Individual-level regressions use data from the German Socio-Economic Panel and the Panel Study of Income Dynamics. GSOEP data are from the 1984–2002 data assembled by the Department of Policy Analysis and Management at Cornell University. Data for the PSID are pulled from their online web site at http://simba.isr.umich.edu/. For both data sets, we use data for male heads of household age 18–64 for the most recent year available.

10 Appendix 2

Proof of Proposition 1: If l is fixed at l, then the relevant first order conditions is $Ag(l)f'(Ng(l)) = Y$. Per-worker productivity equals $Af(Ng(l))/N$, and the derivative of this with respect to l is positive.

Per-hour productivity equals $Af(Ng(l))/lN$, and the derivative of this with respect to l equals $A(lNg'(l)f'(Ng(l)) - f(Ng(l))/l^2N$, which is negative if and only if $1 > (lg'(l)/g(l))(Ng(l)f'(Ng(l))/f(Ng(l)))$, which follows from concavity of $g(.)$ and $f(.)$, and $g(0) = 0$ and $f(0) = 0$. The derivative of total worker utility with respect to l is $Ag'(l)(f'(Ng(l)) + g(l)Nf''(Ng(l)))U'(Y) - V'(1-l)$. When $l = l^*$, this expression simplifies to $Ag'(l)g(l)Nf''(Ng(l))U'(Y)$, which is strictly negative. So in a region around l^*, the derivative will remain negative. For $l = 0$, utility equals $U(0) + V(1)$, which is worse than the no-regulation outcome, so at some point, utility must rise with l. The derivative of profits with respect to l is $-N^2Ag'(l)g(l)Nf''(Ng(l)) > 0$.

Proposition 2: If $f(ng(1-l)) = (ng(1-l))^\alpha$, then $\partial n^+/\partial\Delta > 0$, $\partial Y/\partial\Delta > 0$, and $\partial l/\partial\Delta < 0$ if and only if $-YU''(Y)/U'(Y) < 1$. Per-worker productivity also rises with Δ.

Proof of Proposition 2: The following conditions specify the economy $g'(l)Y/g(l) = V'(1-l)/U'(Y)$ and $(A+\Delta)g(l)f'(n^+g(l)) = (A-\Delta)\cdot g(l)f'(n^-g(l)) = Y$. If $f(ng(l)) = (ng(l))^\alpha$, then the two first order conditions for labor imply that $n^+ = 2(A+\Delta)^{1/(1-\alpha)}/((A+\Delta)^{1/(1-\alpha)} + (A-\Delta)^{1/(1-\alpha)})$ and differentiating this with respect to Δ yields $\partial n^+/\partial\Delta = 4A(A+\Delta)^{\alpha/(1-\alpha)}(A-\Delta)^{\alpha/(1-\alpha)}/(1-\alpha)((A+\Delta)^{1/(1-\alpha)} + (A-\Delta)^{1/(1-\alpha)})^2 > 0$. Using this result, differentiation then produces $\partial Y/\partial\Delta = ((g'(l)V'(1-l) - g(l)V''(1-l) - g''(l)YU'(Y))/g'(l)(U'(Y) + YU''(Y)))(\partial l/\partial\Delta)$. Differentiation of $2\alpha((A+\Delta)^{1/(1-\alpha)} + (A-\Delta)^{1/(1-\alpha)})^{1-\alpha} = Y(g(l))^{-\alpha}$ implies $((A+\Delta)^{\alpha/(1-\alpha)} - (A-\Delta)^{\alpha/(1-\alpha)})/((A+\Delta)^{1/(1-\alpha)} + (A-\Delta)^{1/(1-\alpha)}) + (\alpha g'(l)/g(l))(\partial l/\partial\Delta) = (1/Y)(\partial Y/\partial\Delta)$.

Substitute this in $\partial l/\partial\Delta = (((A+\Delta)^{\alpha/(1-\alpha)} - (A-\Delta)^{\alpha/(1-\alpha)})/((A+\Delta)^{1/(1-\alpha)} + (A-\Delta)^{1/(1-\alpha)}))(g'(l)Y(U'(Y) + YU''(Y))/(g'(l)(1-\alpha)V'(1-l) - g(l)V''(1-l) - g''(l)YU'(Y) - \alpha g'(l)(V'(1-l)YU''(Y)/U'(Y))))$, which is positive if and only if $-YU''(Y)/U'(Y) > 1$ and $\partial Y/\partial\Delta = (((A+\Delta)^{\alpha/(1-\alpha)} - (A-\Delta)^{\alpha/(1-\alpha)})/((A+\Delta)^{1/(1-\alpha)} + (A-\Delta)^{1/(1-\alpha)}))(Y(g'(l)V'(1-l) - g(l)V''(1-l) - g''(l)YU'(Y))/(g'(l)\cdot(1-\alpha)V'(1-l) - g(l)V''(1-l) - g''(l)YU'(Y) - \alpha g'(l)(V'(1-l)YU''(Y)/U'(Y))))$ which is always positive.

Per-worker productivity is equal to Y/α so that it is rising with Δ as Y is rising with Δ.

Proof of Proposition 3: The hours worked under the free market is characterized by the equation: $\phi(l) = V'(1-l)/U'(Ag(l)f'(Ng(l)))$

$Af'(Ng(l))g'(l) = 1$, and the hours worked under the unionized scenario is characterized by $\phi(l) = V'(1-l)/Af'(Ng(l))g'(l)U'(Ag(l)f' \cdot (Ng(l))) = 1 - ng(l)(f''(ng(l))/f'(ng(l))) > 1$. Differentiation gives us $\phi'(l) < 0$, so l must be lower in the unionized economy than in the non-unionized economy. If l is lower, then it must be true that productivity per worker is lower in the unionized economy. Productivity per hour is $Af(Ng(l))/N(l)$, and we have already shown that concavity ensures that this is rising with l. Worker utility must be higher because the union could have chosen the (Y,l) combination chosen by the free market, but in maximizing worker utility, it chose not to. Firm profits must be lower since the firm could have chosen the (Y,l) combination chosen by the union but it preferred not to.

$\partial l^-/\partial\Delta > 0$ and $\partial l^+/\partial\Delta < 0$ if and only if $-YU''(Y)/U'(Y) < 1$. If $f(ng(1-l)) = (ng(1-l))^\alpha$, $g(1-l) = (1-l)^\gamma$, $U(Y) = Y^\sigma$, and $V(l) = vl$, then $1 > \sigma(1+\gamma\alpha)$, $\partial l^+/\partial\Delta + \partial l^-/\partial\Delta > 0$ so that average hours of work declines with Δ.

Proof of Proposition 4: Define the unions' objective function as $W(l,\Delta) = V(1-l) + U((A-\Delta)g(l)f(Ng(l)))$. Differentiation and using the implicit function theorem to define $l(\Delta)$ then yields $W_l(l(\Delta),\Delta) = 0$, and differentiating again gives us $\partial l^-/\partial\Delta = -g'(l^-)(f(Ng(l^-)) + Ng(l^-)f'(Ng(l^-)))(U'(Y^-) + YU''(Y^-))/-W_{ll}$, which is negative if and only if $U'(Y^-) + YU''(Y^-) > 0$, since $W_{ll} < 0$ for second order conditions to hold. The situation is exactly symmetric for the case of $\partial l^+/\partial\Delta > 0$.

If $f(ng(l)) = (ng(l))^\alpha$, $g(l) = l^\gamma$, $U(Y) = Y^\sigma$, and $V(l) = v(1-l)$, then the unions' first order condition becomes $v = \alpha^{1+\sigma}\gamma\sigma A^\sigma l^{\alpha\gamma\sigma-1}N^{\sigma\alpha-\sigma}$, or $l = (v^{-1}\alpha^{1+\sigma}\gamma\sigma A^\sigma N^{\sigma\alpha-\sigma})^{1/(1-\alpha\gamma\sigma)}$. In this case, average leisure in the economy equals $1 - (v^{-1}\alpha^{1+\sigma}\gamma\sigma N^{\sigma\alpha-\sigma})^{1/(1-\alpha\gamma\sigma)}((A+\Delta)^{\sigma/(1-\alpha\gamma\sigma)} + (A-\Delta)^{\sigma/(1-\alpha\gamma\sigma)})$ and the derivative of this with respect to Δ equals $(\sigma/(1-\alpha\gamma\sigma))(v^{-1}\alpha^{1+\sigma}\gamma\sigma N^{\sigma\alpha-\sigma})^{1/(1-\alpha\gamma\sigma)}((A-\Delta)^{\sigma/(1-\alpha\gamma\sigma)-1} - (A+\Delta)^{\sigma/(1-\alpha\gamma\sigma)-1})$, which is positive because $(A+\Delta)^{1-\sigma/(1-\alpha\gamma\sigma)} > (A-\Delta)^{1-\sigma/(1-\alpha\gamma\sigma)}$ when $1 > \sigma(1+\gamma\alpha)$.

Endnotes

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1. See Blanchard (2004) for a recent discussion of the European economy, with a special emphasis on France. For a long-term perspective on growth in Europe versus the United States, see Gordon (2004).

2. Note how the leisure/work choice of individuals may affect the role of certain sectors in the economy. For instance, if people choose to work more and not cook, there will be a high demand for restaurant services. On the other hand, an efficient end network of restaurants will make it easier for people to choose not to cook at home.

3. Genre, Salvador, and Lamo (2005) argue that recent reductions in unionization in Europe (the last ten years) and in changes in unemployment benefits can explain the rising labor force participation of European women.

4. Olovsson (2004) argues that income taxes can explain the difference in hours worked between the United States and Sweden, but he also needs a high labor supply of elasticity.

5. Note that Davis and Henrekson (2004) interpret their tax rate estimates as including direct and indirect effects of taxation and including effects that come through government spending.

6. A detailed description of data sources is in the appendix.

7. Note that the tax increases which occurred in Europe were certainly expected to be permanent when introduced and we are looking at the steady state effect on the aggregate labor supply, not at intertemporal labor elasticity.

8. Of course, if $w'(l) > 0$, as is the case in some agglomeration economies, then this will cause the tax impact on hours worked to rise.

9. The estimates of elasticities found by regressing the logarithm of hours worked on the tax rate are almost the same as the estimates found by regressing the level of hours worked on the tax rate and then dividing by average hours worked.

10. An exception is Italy, where significant tax increases occurred in the 1990s.

11. For a broad review of the literature on this point, see Boeri et al. (2001).

12. Marimon and Zilibotti's (2000) union model delivers a similar result. However, they emphasize the importance of capital mobility. An assumption of less-than-perfect capital mobility is necessary to obtain this result. Needless to say, our model implicitly satisfies this condition since we do not have capital.

13. Note that hours worked per capita at the state level are not available.

14. This discussion is based on Boal and Pencavel (1994) who, in a careful study of the mining industry in West Virginia, conclude that in the 1920s, days of work were 25 percent higher in the nonunion sector relative to the union sector.

15. For a discussion of the institutional history of hours worked in France, see Gauvin (1993).

16. Interestingly she finds that this effect is smaller for women with a university degree, consistent with the view that in these cases, the woman's career goal may take precedence over the family multiplier effect.

17. An enormous literature that we cannot even begin to summarize discusses the effect on European employment level of various labor market rigidities. Of course, this is a po-

litically charged topic, but it would be hard to find a mainstream economist who would argue that labor market rigidity has no effect on employment levels in Europe.

18. For a broad review of the literature on unions in general and on the effect of unions on wage compression, see Boeri et al. (2001) and also Card (2001).

19. Several commentators have told us that the Germans are highly likely to engage in their own home construction and repair, allegedly to avoid the taxes incurred by using market labor. Again, we can't find any evidence of this effect in the data.

20. The pros and cons of using data on life satisfaction have been widely debated in the literature; for instance, see Blanchflower and Oswald (2004).

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Comment

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Alesina, Glaeser, and Sacerdote (AGS) address a most puzzling observation on American and European employment outcomes: "In the early 1970s, hours worked per person were about the same in the United States and in Western Europe" but today "Americans average 25.1 working hours per person of working age; Italians, 16.7; the French, 18.0; and Germans, 18.7." The thesis advanced by AGS is that these different developments are due to trade union policies and labor market regulations in Europe. They contrast their explanation to an alternative theory by Prescott (2004) who attributes the diverging labor market outcomes to increasing tax wedges in Europe. I will compare and discuss some of the merits of these two competing theories, and then contrast them to an alternative view of the American-European labor market divide that focuses on the role of social insurance in a changing economic environment.

Prescott's Misunderstood Tax Story...

AGS's criticism of the tax story takes as a starting point that Prescott's theory relies on a high elasticity of labor supply that is hard to reconcile with empirical estimates. After an extensive review of the labor supply elasticity literature, AGS fault Prescott for offering "little explanation of why the micro elasticities are wrong." But AGS don't adequately explain the mapping between the estimates in the micro literature and Prescott's theoretial macro elasticity of labor supply.[1]

It is true that Prescott (2004) is silent on the justification of the high elasticity of labor supply in his analysis, and we have to consult Prescott (2002, p. 4) for an answer: "The aggregate production function is

the stand-in for technology, and there is some well-known aggregation theory behind it... There is some not-so-well-known aggregation theory behind the stand-in household utility function (see Hansen 1985, Rogerson 1988, Hornstein and Prescott 1993)."[2] That aggregation theory for the stand-in household yields a high elasticity of labor supply.

Prescott's abstraction of a stand-in household is based on Rogerson's (1988) analysis of an economy where labor is indivisible and markets are complete. In this environment, households can attain a higher expected utility by holding lotteries over employment to determine which households should supply labor. Households insure themselves against the income risk from stochastic labor supply by trading commodities contingent on the outcome of those household-specific lotteries. Rogerson's analysis shows that the aggregate general-equilibrium behavior of such an economy is dramatically different than a corresponding economy without the nonconvexities in labor supply. In particular, such an economy behaves as if populated by a *single* stand-in household whose preferences do not match the preferences of any individual household living in the economy. The preferences of the stand-in household are characterized by a high elasticity of labor supply because the fraction of households optimally assigned to work by the employment lottery responds sensitively to the after-tax return to work. Using Rogerson's framework in a growth model with shocks to technology, Hansen (1985) demonstrates that, unlike real business cycle models with divisible labor, such an economy displays large fluctuations in hours worked in response to relatively small fluctuations in productivity. This surprising outcome is attributed to the difference between the utility function of an individual household and the implied utility function of the stand-in household.

So for those who profess the aggregation theory behind the stand-in household utility function espoused by Prescott, the estimated micro elasticities of labor supply are irrelevant for understanding the effects of taxation. Instead, the theory predicts general equilibrium outcomes that are characterized by a high macro labor supply elasticity. Individual households exit employment in response to small tax increases because they have won the employment lottery and because their holdings of contingent claims shield their consumption from any adverse consequences from not working.

... and Precott's Time Series Evidence Is Not Only About Tax Wedges

As emphasized by both Prescott (2002) and AGS, a critical assumption in Prescott's analysis is that tax revenues are handed back to households either as transfers or as goods and services. This neutralizes the income effect of taxation and makes the substitution effect the predominant force, ensuring that a tax increase has the maximal negative effect on labor supply. The neutralization of the income effect means that the consumption-to-output ratio is largely unaffected by tax increases—what was earlier consumption bought by households out of their labor income is then financed with increased transfers from the government or replaced by government goods and services that yield the same utility to households as the foregone private consumption. Prescott's (2004, equation 8) equilibrium expression for hours worked, reproduced by AGS, reveals clearly the importance of the income effect being neutralized. If instead the government's use of the extra tax revenues were not a perfect substitute for the crowded-out private expenditures, the consumption-to-output ratio would fall, and the expression shows how the substitution effect of the higher tax wedge would be undone. Given how important the consumption-to-output ratio is for the labor supply predictions, it is surprising that Prescott does not discuss its contribution to the model's success in explaining the American-European labor market divide. AGS claim that "changes in this variable do not drive [Prescott's] result." But this claim is not completely accurate.

Prescott (2004) is especially pleased with the model's ability to explain the diverging labor market outcomes of Germany and France when compared to that of the United States. Table 1.17 reproduces Prescott's time series evidence and model predictions for these three countries. The first two columns show actual tax rates and labor supplies in the periods 1970–1974 and 1993–1996, where the labor supplies are expressed as hours worked for the period 1970–1974 and the percentage change for the latter period 1993–1996. The remaining part of the table contains the model's predicted labor supplies. Specifically, the reported number for hours worked is the model's prediction for the labor supply in the period 1970–1974. Those numbers are displayed in subcolumns that reflect Prescott's empirical estimate of each country's consumption-to-output ratio in 1970–1974. Next, the model's predicted percentage changes for the period 1993–1996 are reported in circles,

Table 1.17
Prescott's empirical estimates of tax rates and labor supplies (hours worked per person of working age) for the United States, Germany, and France in 1970–1974 and 1993–1996; and his model's predicted labor supplies, where a number of absolute hours worked refers to the period 1970–1974, and a percentage change in circle refers to the change in 1993–1996, while other numbers of percentage change without circles represent various counterfactual experiments with respect to unchanged values of either the tax rate or the consumption-to-output ratio. The calculations are based on Prescott's (2004) table 2.

			Predicted Labor Supply for a Given Consumption-to-Output Ratio of:		
	Tax Rate	Actual Labor	0.66	.74	.81
United States					
1970–1974	.40	23.5 hours		26.4 hours	−6.8%
1993–1996	.40	+10.2%		0%	(−6.8%)
Germany					
1970–1974	.52	24.6 hours	24.6 hours	−9.8%	
1993–1996	.59	−21.5%	−12.6%	(−20.7%)	
France					
1970–1974	.49	24.4 hours	25.4 hours	−8.3%	
1993–1996	.59	−28.3%	−15.4%	(−23.2%)	

and once again they are placed in subcolumns that now reflect Prescott's empirical estimate of each country's consumption-to-output ratio in 1993–1996. As can be seen, the model does an excellent job of predicting the time series evidence for Germany and France, but the model somewhat overpredicts the American labor supply in 1970–1974.

While Prescott attributes the model's time series success to movements in tax rates, I will decompose that success as driven by movements in tax rates and movements in the consumption-to-output ratio. (Note that Germany and France experienced an increase in the consumption-to-output ratio from 0.66 to 0.74 between 1970–1974 and 1993–1996.) For each country, table 1.17 contains two additional predicted percentage changes in the 1993–1996 labor supply. First, the additional predicted percentage change that is reported in the same subcolumn as the number of hours worked in 1970–1974 represents what would have happened to the country's labor supply in response to the tax increase if the country's consumption-to-output ratio had remained unchanged. Second, the additional predicted percentage change in the 1993–1996 labor supply reported on the same line as

the number of hours worked in 1970–1974 represents what would have happened to the country's labor supply if the tax rate had not increased but only the country's consumption-to-output ratio had changed to its empirically estimated value in 1993–1996. As can be seen, more than one-third of the model's predicted changes in labor supplies between 1970–1974 and 1993–1996 are due to movements in the consumption-to-output ratio rather than movements in tax rates.

This kind of detailed scrutiny and assessment of the tax story are possible because Prescott has presented both an explicit model and a quantitative implementation of it. Those virtues of Prescott's work will later prompt me to revisit the theoretical importance of the consumption-to-output ratio for confronting the facts that Germany and France both had significantly higher tax rates than the United States already in 1970–1974 but that hours worked were then similar across the Atlantic.

AGS's Trade Union Story: Exploitation of Capital...

AGS point out that union strength reached a peak in most European countries in the late 1970s and early 1980s just when the reduction in hours worked took off. They present a simple model that highlights two channels for how unionization can affect the hours worked in an economy, which I will label as (1) the unions' exploitation of capital, and (2) the unions' response to sectoral shocks.

Given a production function that is concave in the number of hours worked by each worker, AGS show that workers' welfare increases with a binding hours worked constraint that is sufficiently close to the laissez-faire outcome. This result is reminiscent of Marimon and Zilibotti's (2000) analysis of the effects of regulating working hours. The details of the two analyses differ; e.g., Marimon and Zilibotti consider a matching model, while AGS envision a frictionless labor market, but the underlying rationale is the same: workers prefer a reduction in working time in order to increase the marginal product of labor—just as oligopolists facing a downward-sloping demand curve can increase their profits by colluding to reduce output. The critical assumption for this result is that the marginal product of labor is indeed falling in the equilibrium level of labor. For example, with a constant-returns-to-scale production function, Marimon and Zilibotti guarantee a diminishing marginal product of labor by assuming that capital is "a firm-specific productive factor which [a firm] is endowed with, and its

supply is fixed." This assumption is retained throughout their paper except in a short subsection where they consider adjustable capital. If firms can adjust capital without cost, Marimon and Zilibotti show that restrictions on working hours cannot increase workers' welfare.

For the same reason that I would have liked Marimon and Zilibotti to have emphasized the case of adjustable capital, I believe that AGS would be wise to tread carefully in their conclusions about how trade unions can exploit the owners of firms. Otherwise, there is a hazard that their analysis will be used to support the notion that the economy is a pie of constant supply waiting to be split—a view that is surprisingly common in Europe and that has proven to be a formidable obstacle to reform initiatives. Hence, it is very important to set forth the empirical evidence about the fixed inputs that would enable unions to exploit firm owners. Presumably such evidence for a diminishing marginal product of labor would differ for the short run and the long run. Incidentally, not long ago macroeconomists were debating the opposite idea: that the aggregate production function exhibits increasing returns to scale. See Burnside, Eichenbaum, and Rebelo (1995) for a discussion of the controversy and how data on capital utilization suggest that constant returns to scale still seems to be the best characterization of the production function.

...and the Unions' Response to Sectoral Shocks

Next, AGS use their model to examine the effects on hours worked when there are sectoral shocks in the economy. A key postulate is that union objectives ensure that the number of workers in each firm remains fixed. Given some parameter restrictions, AGS show that aggregate hours worked go down in a trade-union economy in response to a mean-preserving spread in firms' productivities. The parameter restrictions guarantee that a union's labor supply is convex with respect to a firm's productivity, which in turn implies that the increase in hours worked in successful firms is smaller than the decrease in hours worked in the unsuccessful firms. In contrast, the same parameter restrictions ensure that aggregate hours in a laissez-faire economy would rise in response to the same sectoral shocks as a result of workers reallocating from unsuccessful to successful firms.

The driving force—shocks to firms' productivities—is the same one studied by Bertola and Ichino (1995) in their study of the American-European labor market divide. But the mechanism is different in the

two models. Bertola and Ichino postulate an exogenously fixed wage rate and assume that firms cannot fire workers but can only shed labor at an exogenous labor attrition rate. In constrast to AGS's static model, Bertola and Ichino undertake a dynamic analysis of firms' hiring decisions that highlights the role of expectations about future productivity shocks. In a symmetric steady state in which employment is the same across successful and unsuccessful firms (in the limit case of a zero attrition rate), they show that aggregate employment is weakly decreasing in the transition probability that firms switch between two levels of productivity. A higher transition probability means that successful firms expect to retain the higher productivity level for a shorter period of time and hence, successful firms are less inclined to expand employment at the exogenously fixed wage rate.

The point is well taken that rigidities caused by trade unions can, in combination with firm-specific shocks, lead to fewer average hours worked per employee, as emphasized by AGS, or lower aggregate employment, as analyzed by Bertola and Ichino. The next step should be to construct general-equilibrium versions of these models that would enable us to explore all of their implications and subject the mechanisms to quantitative analyses.

So What Happened in Europe but Not in the United States?

The American-European labor market divide has now been with us for almost three decades. Lower employment in Europe as compared to that in the United States has become the norm, and as time goes by it is getting more difficult to conjure up the astonishment expressed by early observers of this development. At the time, researchers were puzzled because they did not see any major changes in institutions or otherwise, as succinctly expressed by Krugman (1987, p. 68): "Although details can be debated, no strong case exists that Europe's welfare states were much more extensive or intrusive in the 1970s than in the 1960s, and no case at all exists that there was more interference in markets in the 1980s than in the 1970s. Why did a social system that seemed to work extremely well in the 1960s work increasingly badly thereafter?"

Prescott's explanation is that, in fact, there were important policy changes in Europe. As shown in table 1.17, the tax rates in Germany and France ratcheted up by 7 and 10 percentage points, respectively, between 1970–1974 and 1993–1996. And even though the German and

French tax rates in 1970–1974 were already higher than the American tax rate by around 10 percentage points, the employment effects of those higher tax rates were mitigated by the fact that consumption-to-output ratios were then 8 percentage points lower in Germany and France as compared to the United States. The lower consumption-to-output ratios meant that the income effect of taxation was stronger, and hence the relatively impoverished Germans and French chose to work *per capita* hours similar to those chosen by the Americans, despite facing significantly higher tax wedges in the early 1970s.

Instead of taxes, AGS's theoretical framework advocates two other changes that could have caused the American-European labor market divide—an institutional change where trade unions gained strength in Europe, and a change in the economic environment that was common on both sides of the Atlantic. As described above, mean-preserving sectoral shocks can explain why hours worked went up in the laissez-faire economy of the United States but fell in the trade-union economies of Europe. Specifically, AGS's model predicts that entrenched trade unions in the unsuccessful firms would reduce hours worked for each worker and set compensation levels such that firms choose to retain their work force; i.e., the unions would adhere to the slogan "work less—work all." In the successful firms, trade unions would effectively block new hirings by increasing both hours worked and compensation levels so that firms would find it optimal just to retain their current work forces.

Since AGS do not assemble empirical support for many implications of the sectoral-shock story, except for a lower average hours worked per worker, I am not sure what is their assessment of the relative importance of a changing stochastic environment versus a change in institutions. It seems that AGS might be leaning toward the strengthening of trade unions as a change on its own that can explain the development in Europe. That is, if European trade unions were not sufficiently strong until the 1970s, they would earlier not have been in a position to exploit firm owners and capital as they since then, presumably, have so ably done. In particular, the unions' policies of reducing hours worked have caused the marginal product of labor, and therefore the hourly wage, to increase and, as a result, workers have experienced welfare gains at the expense of firm owners. AGS further enrich the scenario by discussing the possibility of a social multiplier through which individuals' enjoyment of leisure is enhanced when others increase their leisure. In such a world, AGS suggest that trade unions

might have served as a coordination mechanism to cope with the social multiplier, which has further contributed to the decline in hours worked.

Who Is Not Working in Europe?

In Prescott's tax story, hours worked per person of working age is the relevant summary measure that he reports about countries' labor supplies. AGS go beyond this measurement and also show employment-to-population ratios, the annual number of weeks worked per employee, and the usual weekly hours. The picture that emerges for France and Germany is that one-third of their deficiency in hours worked as compared to the United States is explained by lower employment-to-population ratios and the rest is attributed to the employed working fewer weeks and less weekly hours.

Such a decomposition of hours worked does not pose any problem per se for Prescott's tax story. Fewer weekly hours and longer vacations can be taken to reflect a relaxation of the postulated labor supply indivisibilities, and as far as these constraints can be relaxed, one would expect that higher tax wedges would cause substitution toward leisure along all margins, including this one. Furthermore, the lower employment-to-population ratios can be regarded as outcomes of Prescott's mechanism that makes the people added to the ranks of the nonemployed the winners of employment lotteries who do not have to work.

In AGS's trade union story, it is not the employed people who are working less that causes a problem for the theory but rather the declining employment-to-population ratios. The whole point of AGS's model is that trade unions reduce the hours worked of their members without causing employment to fall, and these developments are driven by capital-exploitation motives, the unions' policy of "workless—work all" in response to sectoral shocks, and social multipliers. To confront the observation of falling labor market participation in Europe, AGS single out the declining participation of older workers, 55–64 years of age, and point at generous retirement systems in Europe. Here, AGS also argue for a trade union connection by emphasizing "the unions' tendency to favor preretirement schemes to avoid unemployment," and that "the preference of unions for generous publicly provided pension schemes has to do with the political bias in union organization toward the older members of the unions."

I believe that Prescott's stand-in household analysis and AGS's trade union analysis commit a serious omission by not considering worker heterogeneity. As discussed next, an alternative theory of the European employment experience brings out the importance of studying who enter the ranks of the nonemployed.

Big-Happy-Family Versus Solitary-Household Models

There is some surprising common ground between AGS's discussion of trade unions and a social multiplier on the one hand, and Prescott's model of a stand-in household and employment lotteries on the other hand. Both abstractions have a common good (social or private) being achieved through a centralized mechanism (trade union or complete markets with employment lotteries) that nicely aggregates households' preferences over leisure. Such abstractions with a big-happy-family outcome stand in stark contrast to analyses based on matching and search models that focus on *individual* households' optimization behavior in economies with frictions and incomplete markets. In particular, the equilibria of the trade-union and employment-lottery frameworks attain a level of coordinated actions and a cohesion of the collective that are absent from the matching and search models in which individual households live in relative solitude and must fend for themselves. Without the benign attention of trade unions, the households in the latter models seek their own fortunes in labor markets (or government welfare programs) and they trade in a limited array of financial assets that cannot replicate the outcomes of transactions in employment lotteries and consumption claims contingent on the outcomes of those household-specific lotteries.

Whether we use a big-happy-family model or a solitary-household model has major implications for our views on the American-European labor market divide. As an illustration, consider the question about whether the economy's elasticity of labor supply is high or low. For the employment lottery model, we have already discussed how indivisibilities in the labor supply make the aggregate of households respond sensitively to small tax increases by smoothly changing the fraction of workers who are furloughed into leisure. In contrast, the equilibrium response to a small tax increase in a solitary-household abstraction is likely to be very different. A household that is modeled as a single worker or maybe two workers faces a discrete choice set where either

one or two workers can be sent to work, and perhaps the work choice stands between full-time and part-time jobs. Notwithstanding some possibility for adjusting hours of overtime, such a lumpy choice set puts restrictions on the household's ability to adjust hours worked in response to tax increases. Before furloughing one of its two members into leisure, a critical threshold in the tradeoff between the household's consumption and leisure must be passed. Hence, a solitary-household model is likely to exhibit a lower elasticity of labor supply than the employment lottery model, and that elasticity would more closely approximate the magnitude of the empirical micro elasticities that are reviewed by AGS.

So how can solitary-household models explain falling hours worked in Europe, even though they lack the magnification mechanisms of employment lotteries in Prescott's stand-in household model and the social multiplier in AGS's trade union analysis? One example of such a solitary-household model is provided by Ljungqvist and Sargent (1998, 2005a), who study an extension of the McCall search model that includes skill accumulation. In their analysis, it is not policies and institutions that changed in the 1970s but rather the economic environment that became more turbulent. Turbulence is modeled as negative shocks to individual workers' skills at the time of involuntary layoffs (in contrast to AGS's notion of shocks that impinge on firms' productivities but leave workers identical and homogeneous). Ljungqvist and Sargent's calibration reproduces changes in earnings volatilities that were first documented by Gottschalk and Moffitt (1994) and confirmed by later studies.[3] The model predicts that turbulence causes employment to fall in Europe because workers who experience skill losses in a welfare state with generous benefits based on past earnings set reservation earnings that are high compared to their current earnings potential. Since such jobs are hard to find, these workers optimally choose low search intensities and hence they become discouraged and are likely to fall into long-term unemployment or end up in other government programs, such as disability insurance and early retirement.[4]

Concluding Remarks

AGS have presented several interesting ideas that, when supplemented by pertinent empirical evidence, could be the start of an ambitious research agenda on the role and effects of European trade unions. It is

important to learn what is the actual scope for unions to institute redistributions from firm owners and capital to workers. It is a challenge to shed light on how union dynamics are affected by a more turbulent economic environment. Earlier insider-outsider models could be enriched by acknowledging conflicts of interest within unions, as AGS allude to in the case of older workers. To make progress on these issues, we need explicit and quantitative models that can be taken to the data.

I concur with AGS that we are in for a long debate on the European employment experience. Do European trade union policies increase welfare or are they part of the problem? Would a reversal of European tax increases restore employment to earlier levels? Is government-provided social insurance irrelevant for understanding European employment outcomes, or is fundamental reform of such entitlement programs key to any solution? Many Europeans would like to know the answers to these questions.

Endnotes

My comments reflect the thinking and findings of a joint project with Thomas Sargent on the European employment experience.

1. AGS did take a stand on this mapping in the conference version of their paper. After characterizing Prescott (2004) as treating hours of work as a continuous measure and ignoring the extensive margin, AGS then argued that Prescott's theoretical elasticity should be thought of as "being primarily focused on the labor supply decisions of men who are in the labor force." But as I describe below, this is a misunderstanding of Prescott's framework.

2. Ljungqvist and Sargent (2004) offer a critical evaluation of the aggregation theory behind the stand-in household utility function and argue that it is fundamentally different from the aggregation theory behind the aggregate production function.

3. For a survey of the empirical evidence on increased earnings volatility, see Katz and Autor (1999).

4. Note that the stand-in household model with employment lotteries does not include government-provided benefits, and Prescott (2004, p. 8) credits his tax story as follows: "I am surprised that virtually all the large differences between the U.S. labor supply and those of Germany and France are due to differences in tax systems. I expected institutional constraints on the operation of labor markets and the nature of unemployment benefit system to be of major importance." But Ljungqvist and Sargent (2005b) question this modeling success by showing that it is virtually impossible to introduce European-style social insurance in the employment lottery framework because the stand-in household, with its high labor supply elasticity, would furlough far too many workers into leisure as compared to any empirical observation on the American-European labor market divide.

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Comment

Richard Rogerson, Arizona State University and NBER

Introduction

The authors are to be applauded for writing an ambitious paper that touches on many aspects of an important research program. The paper presents a wealth of information and asks some provocative questions that will fuel discussions for many years to come. Given my limited space, I will focus my comments on the substantive conclusions that the authors draw. In their conclusion, the authors state, "Our punch line is that Europeans today work much less than Americans because of the policies of the unions in the 1970s, 1980s, and part of the 1990s and because of labor market regulations." I make three points regarding this punch line. First, I argue that a simple look at the data suggests that changes in union density, union coverage, and employment protection are unlikely to have been major driving forces in shaping the differing evolutions of hours worked across countries. Second, taking the methodology of the authors as given, I will argue that their results actually contradict the findings stated in the conclusion. Third, I argue that the methodology employed by the authors is probably ill-suited to delivering reliable conclusions about the driving forces behind cross-country changes in hours of work.

Qualitative Analysis

While the ultimate objective is to assess the extent to which various factors can quantitatively account for changes in hours of work, a useful first step is to assess the qualitative relation between various factors and hours worked. In this section I examine the qualitative patterns in the data and draw three conclusions. First, it is unlikely that a single factor can account for the changes over the period 1956–2003. Second,

neither changes in unionization nor changes in employment protection seem promising candidates to account for the key patterns in the changes in hours of work. Third, changes in both technology and government tax and spending programs do seem like promising candidates.

I begin by noting the major qualitative patterns in the evolution of the cross-country hours worked distribution. The analysis that follows is based on measures of annual hours of work per person of working age over the period 1956–2003 for twenty-one pre-1990 OECD countries (I exclude Iceland and Luxembourg). The hours measure is a product of the employment to population ratio taken from the OECD and the annual hours worked per person in employment series taken from the Groningen Growth and Development Center (GGDC). Fluctuations at business cycle frequencies comprise a very small amount of the variation in these data and hence are of little importance, but it is useful to abstract from them in any case to better focus attention on lower frequency changes. Hence, I focus on the trend component of hours for each country, defined by applying the Hodrick-Prescott filter to the raw annual data with a smoothing parameter of 100.

Figure 1.12 shows the time series for the cross-country average of hours worked. The key pattern in this figure is the large decrease in hours of work that occurs at a fairly steady pace until leveling off in the mid-1980s. The decline in average hours is roughly 20 percent.

Space limitations prevent me from displaying the time series for all twenty-one countries, but figure 1.13 shows the time series for averages of four different groups of four countries. The four groups are chosen based on their hours of work in 2003. A key source of variation across countries is the rate at which this decline takes place. At one extreme, the group with the United States experiences a modest increase over time, whereas the Belgium, France, Germany, and Italy group declines by more than 30 percent. Out of twenty-one countries, thirteen of them experience a decrease of more than 15 percent, and only three experience an increase.

It is of interest to be somewhat more formal about the importance of this pattern. As a way of summarizing the data, I ran a panel regression of log hours on a common constant term and a country-specific time trend:

$$\log h_{it} = a + b_i t + \varepsilon_{it}$$

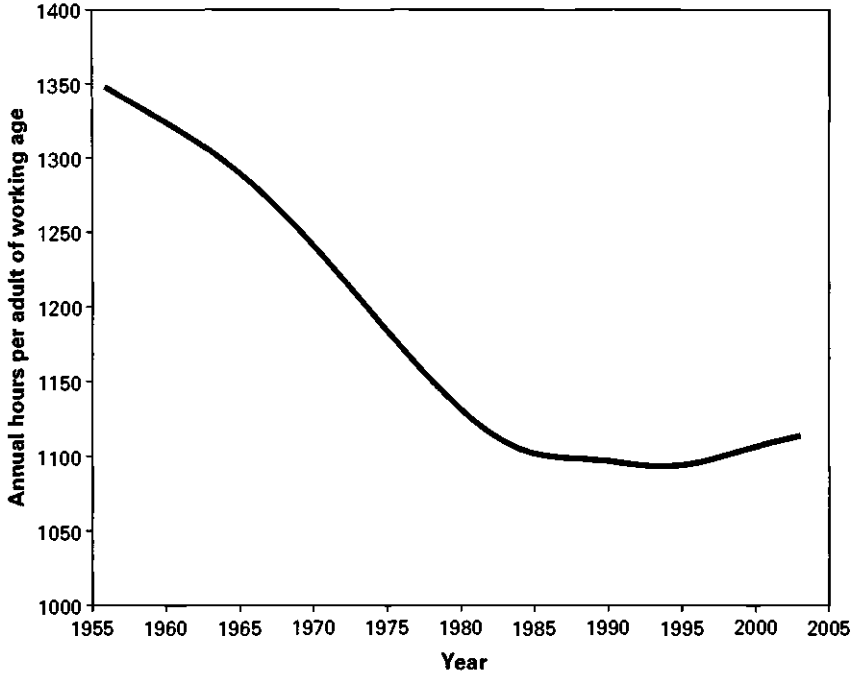

Figure 1.12
Average Hours Worked

This regression yields an R-squared of .78. In other words, if we can find the factor(s) and propagation mechanism that can account for this pattern of differences in linear time trends, we would account for the vast majority of the variation in the data. I conclude that any attempt to isolate the key factors shaping the evolution of the hours worked distribution should be able to account for this pattern of cross-country variation in rates of decline that are relatively constant over time. Without very extreme propagation mechanisms, this suggests to me that we should be looking for factors that influence work hours and that experience slow and steady changes over time that are both pervasive across countries and display important variation in growth rates across countries.

How Many Factors?

While it may be that many such factors play a role, with different factors being important for different countries at different times, it seems that a reasonable starting point is to look for a small set of factors that

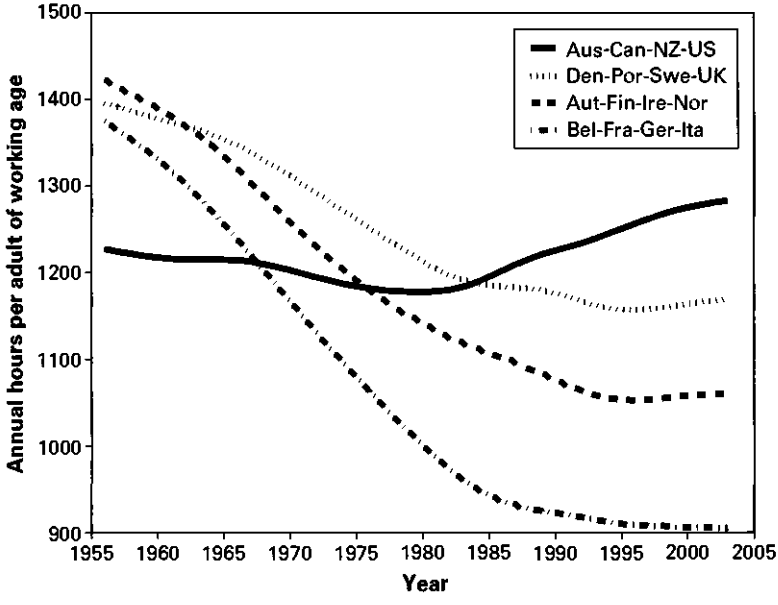

Figure 1.13
Hours Worked over Time

account for the bulk of the changes. The extreme version of this view is that there is a single factor which accounts for the bulk of the changes. Given figure 1.13, such a view would require finding a factor that reverses in relative magnitude between the group that includes the United States and the other groups (which include most countries in continental Europe) between 1956 and 2003. In 1956 (and 1960 for that matter) hours of work in many European countries are more than 10 percent higher than they are in the United States, a difference that cannot be written off as quantitatively insignificant. I know of no candidate factors that exhibit such a reversal. Certainly the commonly discussed factors, such as measures of tax rates/government spending, union density/concentration or employment protection, do not display this reversal. It follows that unless one identifies such a factor, one must proceed under the assumption that multiple factors play a significant role in shaping the evolution of hours worked.

The Authors' Factors

In this subsection I examine the qualitative properties of changes in unionization and employment protection vis-à-vis the above-mentioned patterns in the changes in hours worked.

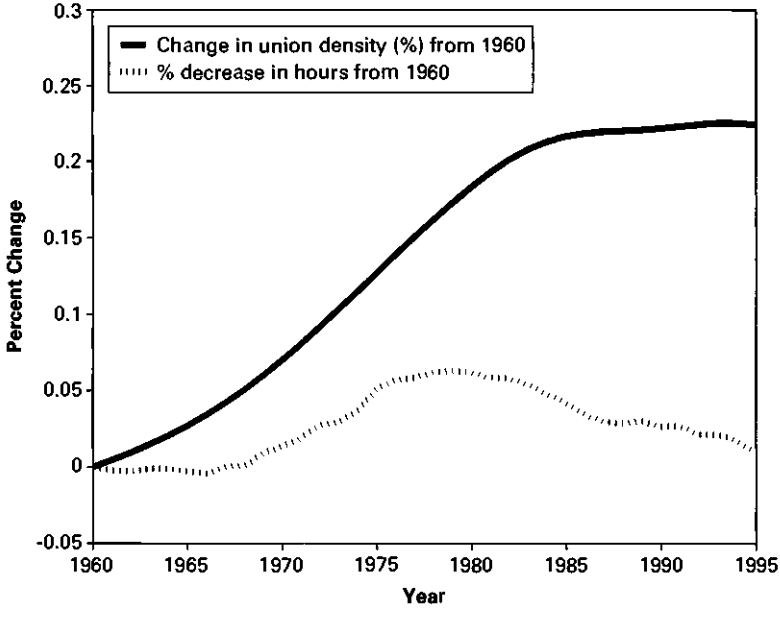

Figure 1.14
Union Density and Hours Worked: All Countries

Unions The authors have data on union density for nineteen countries between 1960 and 1995, with data on Portugal only for the period 1975–1995. In what follows I simply exclude Portugal, though adding it with an allowance for some missing observations does not change the picture at all. Figure 1.14 shows the evolution of the average value of union density over this time period with the percentage decrease in average hours worked for the same nineteen countries.

This simple picture leads me to be very skeptical of any story claiming that increases in unionization as proxied by changes in union density are a key driving force behind the changes in the hours worked distribution. While there is an increase in union density from 1960 to 1980, it is reversed thereafter, so that at the end of the period it is basically the same as it was at the beginning. Moreover, it is important to note that union density actually decreases between 1960 and 1995 for ten of the nineteen countries. Figure 1.15, which provides a comparison of the evolution of union density across the two extreme groups represented in figure 1.13, is also revealing. The average levels are basically identical across the two groups in both 1970 and 1990. The proposition that union forces, as proxied by union density, were an important force

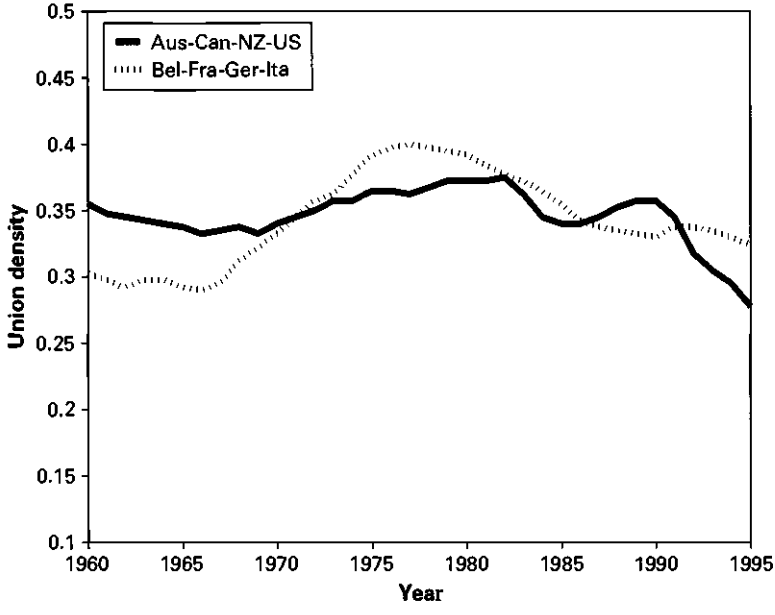

Figure 1.15
Union Density in Two Groups

in accounting for the different evolutions across countries seems to be a nonstarter.

While data on union density is used by the authors in their main panel regressions, they do note that union density is likely to be a poor measure of the importance of unions and that union coverage would be a more appropriate measure. The authors claim that they use union density because of the unavailability of time series data for the coverage measure for a large set of countries. However, Nickell, Nunziata, and Ochel (2002) do report data on union coverage for a small set of countries at several points between 1960 and 1995, based on work by Ochel (2000). This sample consists of eleven countries. This set of countries exhibits the same pervasive decrease in hours worked—a drop in average hours of 18.2 percent between 1960 and 1995 (versus 17.8 percent for the sample of twenty-one countries over this period). The following table reports the time series changes in average union coverage for the sample of eleven countries:

Year	1960	1970	1980	1990	1995
Union Concentration	73.1	71.8	72.3	70.0	68.7

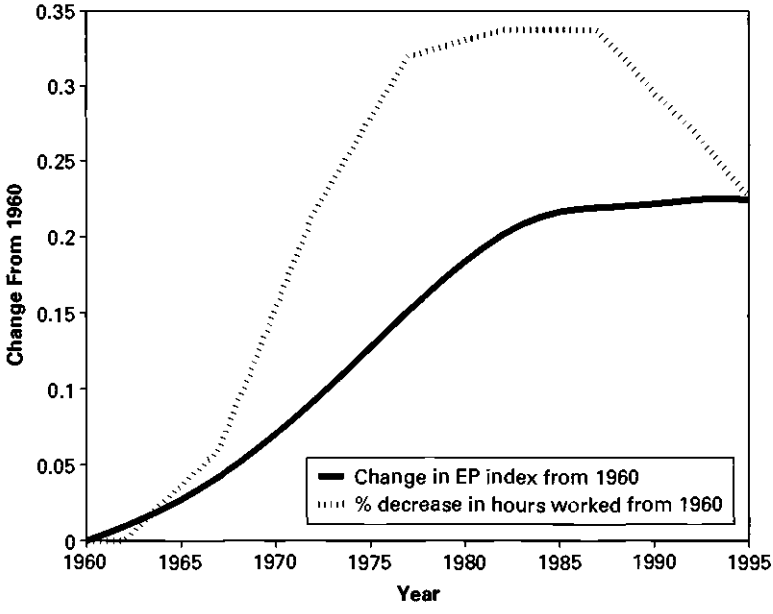

Figure 1.16
EP and Hours Worked: All Countries

The conclusion remains unchanged: I see no evidence, based on this observable measure, that changes in unionization have played a major role in shaping the evolution of the distribution of hours worked across countries.

Employment Protection Next we turn to the issue of employment protection. The data availability here is the same as that for the case of unions. Figure 1.16 shows the movements in the average index of employment protection and hours worked from 1960 to 1995. The pattern in this picture looks promising. There is a slow and steady increase in this index from around 1960 to 1985. But there are two key additional issues to address. First, is the increase pervasive, in the sense that all countries (or at least all countries that experienced large decreases in hours) experience large increases in this measure? And second, does the increase occur at a slow and steady rate within countries? Here the patterns are not very promising. Regarding the first issue, of the twelve countries that experience declines of more than 15 percent in hours worked between 1960 and 1995, only seven of them have increases in the employment protection index.

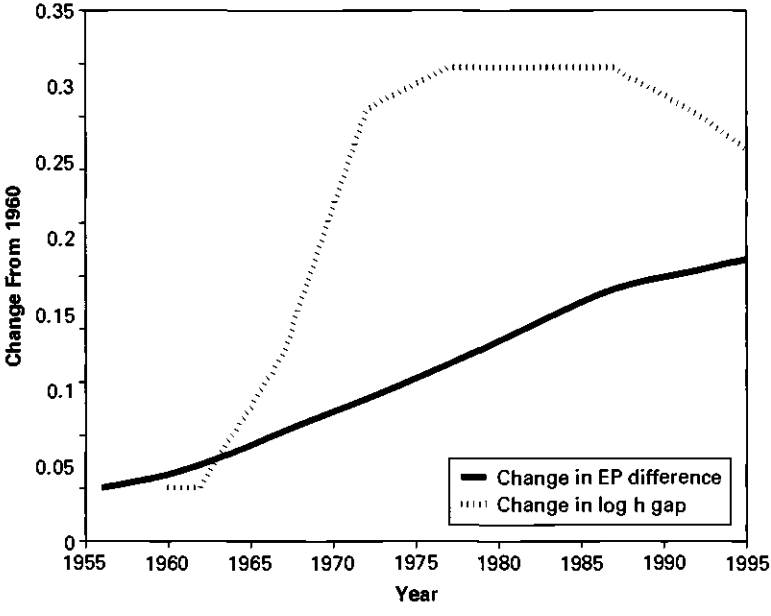

Figure 1.17
EP and Hours Worked in Two Groups

Regarding the second issue, we begin with figure 1.17, which examines the two extreme groups from figure 1.13. The dashed line in this group shows the change from 1960 in the employment protection index in the European group minus the same index for the non-European group. This line shows that employment protection in the European group is becoming increasingly stringent relative to the non-European group. The solid line shows the extent to which hours in the European group are decreasing relative to the other group, with 1956 normalized to zero. Although both lines increase over time, it is noteworthy that the hours gap increases at roughly a constant rate, whereas the employment protection line experiences virtually all of its increase in the pre-1975 period and actually decreases over the final ten years.

This same behavior shows up in the time series for some individual countries. Figures 1.18 and 1.19 show the time series for changes in hours worked and employment protection for two of the countries (Sweden and Austria, respectively) that showed large increases in employment protection combined with large decreases in hours worked between 1960 and 1995, i.e., that seem to fit well by the first criterion.

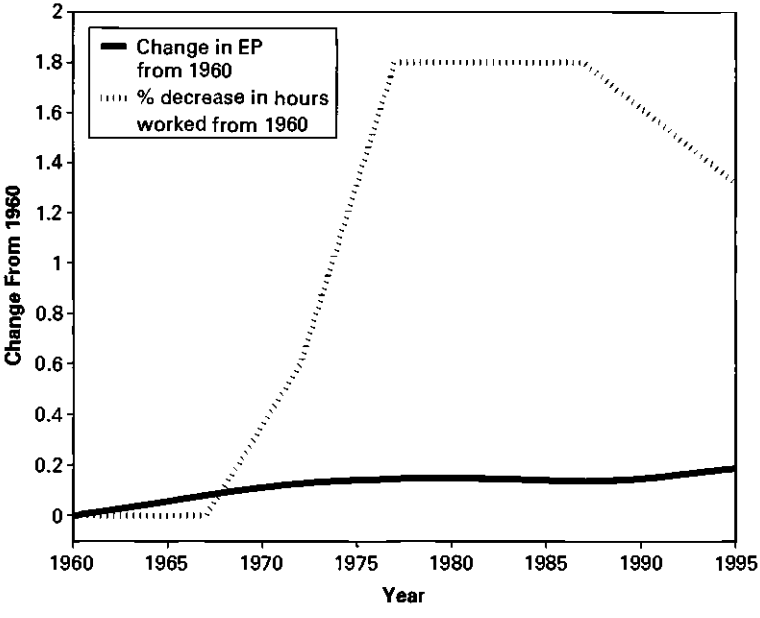

Figure 1.18
EP and Hours Worked: Sweden

While the preceding analysis certainly does not rule out the possibility that changes in employment protection may play some role in some countries, it suggests that any attempt to argue that employment protection is a key driving force behind the large changes in hours worked across countries faces some large challenges in reconciling the timing patterns found in the data for changes in hours worked and employment protection.

Other Factors

The previous subsection argued that the authors' two preferred factors do not seem to pass a simple qualitative test in terms of lining up with the key changes in hours of work. In this subsection I briefly describe three factors that do pass this qualitative test.

Technology There is little need to document the fact that improvements in technology are pervasive and proceed at a slow and relatively steady pace or that these improvements have proceeded at different rates across countries. The issue is to what extent these changes are relevant for changes in hours worked across countries. I emphasize two

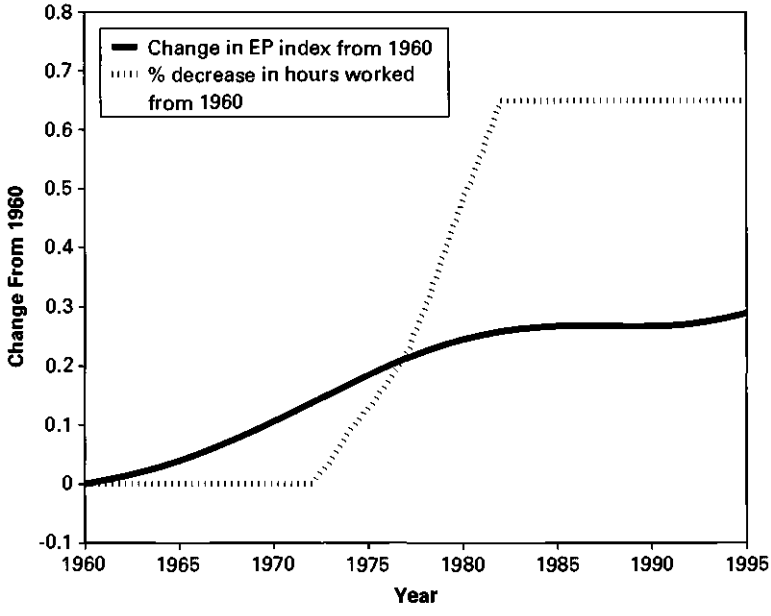

Figure 1.19
EP and Hours Worked: Austria

channels. The first is standard material in any first-year graduate class in macroeconomics and involves intertemporal substitution effects. During a period of catchup in Total Factor Productivity (TFP), hours worked will be temporarily high because the incentive to accumulate capital is higher. Since European countries lagged the United States in TFP in the mid-1950s but largely caught up during the subsequent forty years, this effect could be relevant for partly explaining why hours in Europe were initially higher and decreased over time. A second channel through which technology may affect hours of work is nonstandard from the perspective of standard textbook models and involves income and substitution effects that may be linked to the overall level of consumption. While it is common to impose balanced growth preferences that require that income and substitution effects are offsetting, it is well-known that workweeks in poorer countries are systematically higher and that they decrease fairly dramatically for some time during the process of development before stabilizing. The fact that annual hours of work per person in employment decreased between 1956 and 2003 for all countries in our sample is related to this

fact. Again, since Europe initially lags the United States in productivity, this channel would also potentially explain why hours of work in Europe would be initially higher and then decrease relative to the United States. Since differences in productivity across countries are decreasing over time, it is important to note that at a qualitative level, the above arguments suggest that differences in technology should be greatest early in the period and should be of decreasing importance over time.

Government There is probably little need for me to spend much time on this factor since it is the factor emphasized by Prescott (2004) and is much discussed by the authors in the present paper. It is important, however, to note a common error. The channel emphasized by Prescott is not simply one of taxes but rather the combination of tax and spending programs. Whether taxes have an effect on hours worked in the Prescott framework depends critically on how governments use their tax revenues. In view of this, I think that a broad measure of the size of government, such as current receipts of government as a fraction of gross domestic product (GDP), are probably the most appropriate measure for simple qualitative analyses. For the twenty-one countries studied, the average value of current government receipts to GDP increases from about 25 percent in 1960 to about 45 percent in 2000 and increases in all countries. Moreover, the differences across countries increase over time.

An Opposing Force: Women and Market Work The above analysis of technology and government leads one to expect a downward movement in hours of work in all countries, though of varying magnitude. If these effects are sizeable, it suggests that there must be some third factor that partially offsets these effects in at least some countries. Employment protection and unionization do not appear to play this role. A closer look at the data suggests another pervasive factor that does operate in the direction of increasing hours of work. A trend common to all countries is that a greater fraction of women of working age are engaging in market work at the same time that fewer men are doing so. The pervasiveness of this trend suggests a common underlying economic force is at work. Available evidence for the United States shows that this is not a simple substitution of home versus market work among family members of working age (see Aguiar and Hurst [2005] and Francis and Ramey [2005]). Any analysis of changes in time

devoted to market work must recognize that this force is present and may have important quantitative implications for the total amount of market work being done.

The Authors' Evidence

The previous section concluded that a qualitative look at the data does not support changes in either unionization or employment protection, as measured by the authors, as being the dominant forces behind the evolution of the cross-country hours distribution. This is in sharp contrast to the statements made by the authors in their conclusion. The quantitative support for these conclusions must be the evidence presented in their table 1.9, which reports the results of a cross-country panel regression. In this section I argue that their quantitative results are virtually completely driven by time and country dummies, and not unionization or employment protection, and therefore do not support the statements in the conclusion.

While an important and relevant question is whether running the authors' regression is a useful way to extract information about the driving forces behind hours worked, I postpone this discussion until the next section. For the purposes of this section, I assume that running a cross-country panel regression is a useful way to learn about which factors are playing a dominant role in shaping changes in hours worked and ask what we would conclude from the regression results presented to us by the authors.

On the surface, the results reported in column (4) of their table 1.9 seem persuasive. Running a regression with marginal tax rates, employment protection, and union density as explanatory variables, we get an R-squared of .92 and statistically significant coefficients on both employment protection and union density but not on marginal tax rates. The naive practitioner might be inclined to interpret these results as supporting the conclusion that employment protection and unions are the dominant factors in accounting for hours of work. But such a conclusion is not at all what these results support because the authors also include year and country dummies in their regression. The motivation for including these dummies in this context escapes me and none is offered by the authors. The inclusion of year dummies suggests that in each period, there are one or more unnamed factors that affect hours equally in all countries. The reader is left to wonder what these factors might be. The inclusion of country dummies suggests that there

are some additional unnamed factors that differ permanently across countries.

How important are these unnamed factors relative to the named factors? If one runs a regression with only time dummies and country dummies for the nineteen countries with all observations for the period 1960–1995, one obtains an R-squared of .81. Subject to viewing this sort of exercise as meaningful, I conclude that the authors are telling us that unnamed factors are accounting for over 80 percent of the variation in hours worked across countries and time, while their two dominant factors are accounting for around 10 percent. Obviously, the message that we take from this is that unions and employment protection are of relatively minor importance in accounting for differences in hours worked.

If we run the regressions without allowing for the unnamed factors represented by country and year dummies and simply focus on the two factors that the authors claim their results show to be dominant, we find that the coefficient on union density is not statistically significant, the coefficient on employment protection is statistically significant, and the R-squared is slightly above .2. I note that these results are basically those suggested by the simple qualitative analysis of the previous section and hence should lead to conclusions similar to those reached earlier: changes in union density and employment protection do not seem to play a major role in accounting for variation in hours worked across countries.

The Authors' Methodology

I think there is widespread agreement that to understand the changes in hours worked across countries means isolating the quantitatively important driving forces behind the changes and articulating the quantitatively important economic mechanisms through which these driving forces operate. In other words, much as in the business cycle context, the goal is to isolate the quantitatively important impulse and propagation mechanisms. One way to make progress toward this goal is to construct explicit models and then use the models to quantitatively assess the impact of various driving forces. Prescott (2004) is one example of this. The authors pursue a different strategy. They run an ordinary least squares (OLS) regression of hours worked on a constant and current values of potential driving forces for a panel of countries (plus time and country dummies, as mentioned earlier). The appeal of

this method is clear: it is easy to implement and appears to offer clear answers to important questions that do not need to be qualified as subject to a host of auxiliary assumptions that must be made in any explicit modeling exercise. But I raise the following question: are such regressions a reliable way to generate information about the quantitative importance of various impulses and propagation mechanisms?

While I acknowledge that not all economists share my perspective on this matter, I would argue that the answer to this question should be no. These regressions could generate reliable information about the quantitative effects of various driving forces and propagation mechanisms only if they actually represent the mechanisms that connect the driving forces with the outcomes. But I can think of no interesting or reasonable model that suggests that taxes, unions, and employment protection have only contemporaneous effects. First, at a very basic level, any model that allows for some dynamics of capital accumulation surely violates this. Basic economic logic therefore dictates that capital be on the right-hand side. Second, all the theories of employment protection that I am aware of imply that there will be important transition dynamics in the adjustment of aggregate hours, stemming from the fact that lagged employment becomes an important factor in determining today's employment. Any attempt to assess the quantitative effect of changes in employment protection on aggregate hours of work would have to incorporate this feature.

I could continue to list issues that arise either in the specific context of the regressions run by these authors or about the methodology more generally. But the key point is a simple one. Badly misspecified equations cannot deliver a reliable answer to the question that this literature seeks to answer: what are the quantitatively important driving forces and economic mechanisms that have shaped the evolution of the cross-country hours worked distribution over the last fifty years? Estimates from badly misspecified equations can be interpreted only as presenting information on some conditional correlations, but correlations alone cannot tell us that a given mechanism is quantitatively important.

Alternative Propagation Mechanisms

While the cross-country regressions carried out by the authors focus on the effect of changes in unionization over time, the paper also discusses some alternative propagation mechanisms that involve unions. Specifi-

cally, the authors show that economies with differing degrees of unionization will potentially propagate sectoral productivity shocks in very different ways. Since this propagation mechanism does not rely on changes in unionization over time, the earlier qualitative analysis does not necessarily shed light on the potential importance of unions operating through this mechanism. While this is a novel channel through which unionization may influence aggregate outcomes, we must note that the authors provide no assessment of the quantitative importance of such a channel. While they emphasize that a competitive labor market will give the complete opposite result to a unionized labor market, it is important to note that the term *complete opposite* has a very different meaning when used in a qualitative sense rather than a quantitative sense. Specifically, a positive response and a negative response are opposite in the qualitative sense, but if one is trying to understand a 30 percent difference in hours worked, then −.1 percent and +.1 percent are effectively the same.

However, let me describe why the specific impulse and propagation mechanism mentioned by the authors does not seem likely to be important based on an analysis of its qualitative predictions. The key result of the analysis is that, in response to a sectoral shock, the model with unions predicts that employment levels remain the same across the two sectors, while hours worked per worker increase in one sector and decrease in the other. When I look at the data, I cannot see any reasonable definition of *sector* that would generate support for this prediction. In the data for continental Europe, we see that employment in industry goes down, employment in services goes up, and hours worked per worker is going down everywhere. Perhaps other incarnations of this mechanism will lead to predictions that are more palatable empirically, but the actual mechanism studied by the authors does not seem promising.

Micro and Macro Elasticities

The authors devote considerable time to critiquing the argument of Prescott on the basis that the implied labor supply elasticity is not consistent with the estimates from micro data. The authors then note that elasticities estimated from micro data may not be appropriate for assessing responses to aggregate changes. In micro data, the vast majority of the variation in wages is individual specific, and hence these exercises are estimating the response in hours of work for a given

individual when his or her wage changes and the wages of all other individuals stay the same. When looking at responses to aggregate changes, we are asking what happens to the hours of work of a given individual when the wages of all individuals change. The authors mention one reason that these two responses may differ. Specifically, they argue that if there are complementarities in the consumption of leisure, then responses to idiosyncratic changes in wages will be systematically less than the response to aggregate wage changes. I think the authors raise an important issue in noting that these two responses may well be different, and the mechanism that they describe is novel and interesting. However, I think the need to coordinate work activity within a given establishment is likely to be a much more powerful force in generating differences in micro and macro elasticities.

Consider a simple example in which a given establishment operates a production line with 100 workers, so that all 100 workers need to work the same number of hours. If one of them receives a wage increase (perhaps because he becomes more proficient and may make fewer mistakes or plays a larger role in dealing with problems that arise, etc.), I would not expect this worker's hours to change. Even though this individual worker might prefer to work a different number of hours at his new wage rate, given that the desired hours of the other workers have not changed, we can imagine that the firm will not change the hours of work. Put somewhat differently, the worker's choice problem is characterized by an hours constraint imposed by the firm, and the estimated response of hours to wages is compounding the change in desired hours and the presence of the hours constraint. Without careful work to disentangle these effects, we cannot interpret this response as providing direct information on preferences. Disentangling these two effects is an important topic of research, and recent work by Chang and Kim (2005a, 2005b) is making some important headway. Their analysis shows that hours constraints can lead to large discrepancies between the elasticities estimated using micro and aggregate data, even when all of the data is generated by the same model.

Conclusion

Understanding the evolution of hours worked across countries is an important issue. It will increase our knowledge of the key forces that shape labor market outcomes and may have significant implications for welfare. Systematic quantitative assessment of potential driving

forces in explicit, well-articulated models is central to making progress toward this goal. While the authors conclude that unions and employment protection are important driving forces, I have argued that the paper presents no compelling quantitative evidence in support of this conclusion. Moreover, I have argued that the qualitative patterns in the data lead one to be skeptical of the importance of the channels emphasized by the authors in their quantitative work. The fact that the channels emphasized in this paper do not appear to be important ones should not be construed to imply that unions and employment protection do not exert important effects through some other channels. For those who believe that unions and employment protection are key forces, the challenge is to offer a well-articulated model in which measured differences in these factors do play a quantitatively important role. Whether this challenge can be met remains to be seen.

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Discussion

Several participants offered alternative theories of European labor markets.

Olivier Blanchard first clarified his "pure preference view" and the notion that it requires "crazy" European preferences to explain much of the difference between European and U.S. work hours. He noted that over the last thirty years, European productivity increased by 80 percent while hours worked decreased by 20 percent. This implies that Europeans have used the productivity increase to attain a 60 percent increase in consumption income and a 20 percent increase in leisure. To generate these results in a pure preference model, European preferences have to be different from those in the United States, but those preferences do not have to be "crazy." Blanchard then suggested the authors use aggregate, rather than sectoral, shocks in their model. He theorized that if the economy is hit by an adverse aggregate shock in an environment where unions are powerful and governments tend to be on the left, there will be a strong incentive to keep employment high by reducing hours worked. Blanchard noted that this was the motivation for France's 35-hour work week law. However, Blanchard cautioned that you would then expect to see correlation between the evolution of hours worked and the evolution of unemployment. At high frequencies, this correlation is not seen in the data. The downward trend in hours worked begins in the 1960s, at a time when European unemployment is very low.

Robert Gordon cited additional statistics from his research on Europe's productivity catchup. Ten years ago, he noted, the fifteen countries of the European Union had reached 97 percent of U.S. productivity but only 72–74 percent of U.S. per capita income. The cause of this is the reduction of work hours per capita. Gordon suggested two extreme views of this data: either Europe is enjoying its leisure,

and the 72 percent of U.S. per capita income number is underestimating European welfare, or the 72 percent number is correct in terms of welfare because very little of this is voluntarily chosen leisure and is instead the result of institutions, regulations, and unions. Decompositions of the reduction in hours per capita show that more of it can be attributed to a reduction in employment per capita (low labor force participation and high unemployment rates) than to a reduction in hours per employee (vacations). Gordon concluded from this that it is hard to make the case for Europeans enjoying themselves. However, he emphasized that Europe is buying medical care and pensions with its high tax rates. And it is therefore able to avoid some of the U.S. problems of competitiveness by paying for a uniform blanketing of pension and medical costs.

Robert Hall objected to the authors' distinction between unions and the government. Hall remarked that in left-leaning European countries, there should be no distinction between the theory of the union and the theory of the government. In effect, unions are the government, acting on behalf of the people and with complete power to articulate what happens in the economy in important ways. Hall concluded that powerful unions are nothing more than social optimizers, and it is a great puzzle why unions pursue policies with high deadweight burdens when they ought to be maximizing welfare.

Stephanie Schmitt-Grohé and Andrew Levin countered that perhaps European governments are not so crazy after all. Schmitt-Grohé reminded participants that up to the mid-1980s, the United States and Japan had relatively high rates of capital taxation, whereas Europe had relatively high rates of labor income taxation. One lesson from optimal taxation is that it is far better to have low capital income taxes than labor income taxes. And Andrew Levin questioned whether it is correct to interpret high rates of taxation and unionization as large deadweight losses when these policies have been consistently chosen in a democratic, parliamentary system over a forty- to fifty-year period. Levin instead suggested a return to Olivier Blanchard's preference view embedded within an overlapping-generations model to explain why Europeans enter the workforce late and retire early.

And finally, Greg Mankiw questioned whether these different preferences were intrinsic or created. He noted that hard-working Europeans had a tendency to come to the United States, and perhaps this self-selection caused Americans to have a different set of preferences. But Robert Gordon reminded participants that despite this immigra-

tion, at the turn of the last century, Europeans worked harder than Americans. And as Alesina, Glaeser, and Sacerdote document, the reversal of work hours is a relatively recent phenomenon.

There were also several comments specific to the data used in the paper. Justin Wolfers thought the authors' strategy of using happiness data to assess the welfare implications of leisure, household production, and unemployment was very promising. Diego Comin cautioned that the measurement of European hours worked is complicated, giving as an example a typical Spaniard's day, which begins with coffee, proceeds to tapas, and ends with lunch. Olivier Blanchard suggested that comparison with the United States would be clearer if the authors used only hours worked per full-time employee as the basis for analysis, rather than hours worked per person. This would eliminate some of the distortion caused by the European subsidy of early retirement. And Ken Rogoff noted that the comparison of hours worked between Europe and the United States was hugely distorted because the official statistics do not include the underground economy, estimated at 20 percent in Germany and 25 percent in Italy.