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TAXATION AND THE STRUCTURE OF LABOR MARKETS: THE CASE OF CORPORATISM*

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We propose an explanation for the wide variation in rates of taxation across developed economies, based on differences in labor market institutions. In "corporatist" economies, which feature centralized labor markets, taxes on labor input will be less distortionary than when labor supply is determined individually. Since the level of labor supply is set by a small group of decision-makers, these individuals will recognize the linkage between the taxes that workers pay and the benefits that they receive. Labor tax burdens are indeed higher in more corporatist nations, while nonlabor taxes are actually lower. There is also some evidence that the distortionary effects of labor taxes are lower in more corporatist economies.

During the period 1980 to 1984, Sweden's total tax revenues amounted to over 50 percent of its Gross National Product. Over this same period tax revenues in the United States and Japan were less than 30 percent of GNP.[1] This wide variation in rates of taxation across developed economies with market structures that are otherwise similar is striking. Yet, while there have been many studies of the effects of differences in tax rates on economic behavior, there has been relatively little work done in trying to understand the origins of divergences in national tax structures. This paper proposes an economic explanation for these divergences, based on differences in labor market institutions.

In a Robinson Crusoe economy with an all-comprehending Robinson, taxes would not be distortionary. In just the same way, taxes on labor input will not be distortionary (or will be less distortionary) when labor supply is determined collectively rather than individually. If the level of labor supply is set by a small group of decision-makers, then these individuals will recognize the linkage between the taxes that workers pay and the benefits that they receive. We argue therefore that under *corporatism,* defined by Bruno and Sachs [1985] as "a mode of social organization in which functional groups rather than discrete individuals wield

    1. Data on tax revenues are from the OECD's *Revenue Statistics*; GNP is from OECD *National Accounts.*

power and transact affairs," taxes will have a smaller distorting effect than they have in situations where individual workers make labor supply decisions. Because taxes are less distortionary, higher levels of taxation are selected.

Our argument is closely related to Olson's [1982] discussion of encompassing coalitions. Olson argues that, while a proliferation of interest groups is in general likely to retard economic progress, sufficiently large interest groups will internalize the effects of their actions and may actually improve economic performance. Olson draws much of the support for his hypothesis from the Scandinavian countries that play an important role in our empirical analysis as well.

We develop our argument in three steps. Section I highlights the basic empirical regularity that motivates our analysis: more corporatist economies have higher levels of taxation. The relationship between corporatism and taxation is quite robust. Our findings are not sensitive to the choice of different proxies for corporatism, to the measure of tax burdens, to the time period selected, or to controls for the presence of "left-wing" governments. We also note that since savings decisions are not made more collectively in corporatist countries, one would not expect corporatism to reduce the deadweight loss from capital taxation. In fact, while corporatism appears to be associated with higher levels of labor income taxation, corporatist nations have somewhat *lower* levels of capital taxation. This mitigates against the "corporatism-socialism correlation" explanation for our results and suggests the need for a theory explaining why corporatism will be associated with reduced deadweight loss from labor taxation.

Section II considers the role of taxation in union bargaining models and contrasts the impact of taxation in situations where unions are more/less "encompassing," to use Olson's phrase. We model the bargaining game between unions and employers to show that as unions are more encompassing, the distorting effects of labor taxes declines, encouraging their use. Essentially, the argument is that encompassing unions recognize that their members bear the cost of reductions in the size of the tax base and internalize the government budget constraint in choosing wage and labor input levels.

We attempt to test our theory in Section III, by examining the role of corporatism in reducing the distortion from labor taxation. We find that higher tax rates on labor have a less adverse impact on labor supply in more corporatist economies. While it is difficult to

draw strong conclusions from our limited sample of countries, the results suggest that our theory may have some validity for explaining cross-national tax differences. Section IV concludes by discussing a number of implications of the results for future work.

I. CORPORATISM AND NATIONAL TAX STRUCTURES

Measuring Corporatism

While the relationship between corporatism and macroeconomic performance has been extensively studied (by Bruno and Sachs [1985], Calmfors and Driffill [1988], Freeman [1988], and others), to our knowledge the relationship between corporatism and taxation has not been examined. In studying this relationship, we make use of scales of corporatism that have been developed in the context of this earlier work on economic performance. This has the virtue of objectivity: the scales were not developed with our dependent variable in mind.

A number of measures of corporatism have been put forward in recent years: Schmitter [1981], Cameron [1984], Bruno and Sachs [1985], Calmfors and Driffill [1988], and Alvarez et al. [1991]. These measures are quite similar; the lowest cross correlation is 0.69.[2] While we explore other indexes, we rely primarily on the ranking developed by Calmfors and Driffill, for two reasons. First, this index captures the feature of labor market structure that is key to our theory: centralization. Previous discussions of corporatism have highlighted two features of labor markets: centralization and union-employer consensus.[3] For our purposes, only the former is relevant, as our bargaining models require no consensus between the contracting parties. This is an important consideration. While the Calmfors and Driffill index places Switzerland and Japan at the noncorporatist end of the scale, due to very decentralized contract settlements, Bruno and Sachs consider these to be fairly corporatist nations, due to cooperation between unions and employers. In general, the indices developed by Schmitter, Cameron, Alvarez et al., and Calmfors and Driffill attempt to measure centralization, while that of Bruno and Sachs measures

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2. These measures are presented in the Data Appendix. Calmfors and Driffill also refer to an "index" used by Blyth [1979]. However, Blyth does not discuss his method for ranking countries in the schematic diagram that is presented in his article.

3. See Bruno and Sachs [1985] and Francesco Giavazzi's discussion of Calmfors and Driffill [1988].
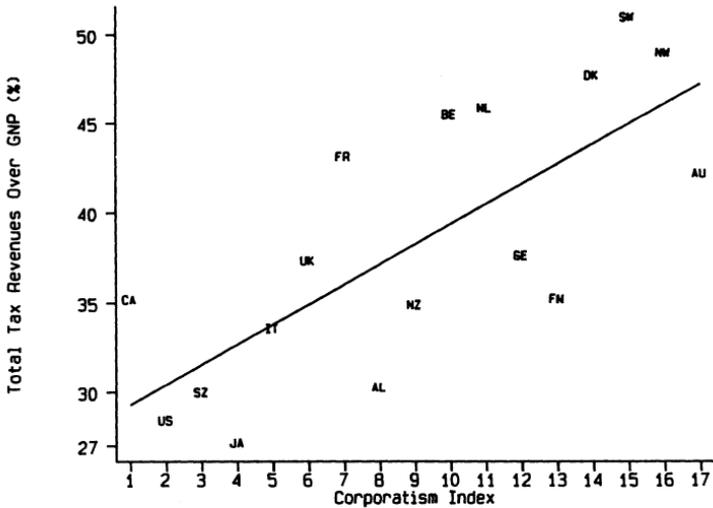
FIGURE I
Taxation and Corporatism

consensus as well. In our sensitivity analysis below, we shall therefore rely on the alternative centralization indices.[4]

Second, Calmfors and Driffill are concerned specifically with the "extent of inter-union and inter-employer cooperation in wage bargaining with the other side. . . This definition differs from others that are concerned more with the formal than the behavioural content of wage setting" [p. 17]. While we are not concerned with cooperation across bargaining parties, *intra-party* cooperation is key. For our purposes, the level at which bargaining takes place (establishment/industry/federal) is not the only consideration; internal coordination is equally important, and Calmfors and Driffill account for this, while the other centralization indices do not.

Corporatism and the Level of Taxation

Figure I illustrates the strong relationship between corporatism and national levels of taxation. It plots the ratio of total tax revenues to GNP for seventeen countries, averaged over the 1980–1984 period, against the Calmfors and Driffill index, which appears to have been devised to apply to approximately the same

4. The results using the Bruno and Sachs index without Japan and Switzerland are similar to those for the other indices.

TABLE I
CORPORATISM AND LEVEL OF TAXATION

Column	(1)	(2)	(3)	(4)	(5)
Dependent variable	Tax revenue (% of GNP)	Marginal rate on labor inc	Average rate on labor inc	Marginal rate on labor inc	Marginal rate on labor inc
Constant	28.168	39.669	25.647	43.481	41.088
	(2.651)	(3.369)	(4.496)	(9.003)	(3.653)
Corporatism	1.122	1.818	1.528	1.965	1.680
	(0.259)	(0.329)	(0.439)	(0.367)	(0.769)
Inequality				−0.718	
				(1.202)	
Leftist index					−0.207
					(0.842)
Adjusted R^2	0.53	0.65	0.41	0.66	0.65
Rank corr	0.765	0.836	0.684		
# of countries	17	17	17	16	16

Notes. Standard errors are in parentheses. Tax variables are defined in the text, and are presented in the Data Appendix. Corporatism is measured by the Calmfors-Driffill [1988] index. Inequality is the share of income accruing to the top quintile divided by the share to the bottom quintile, from World Bank [1989]. Leftist index is the fraction of time a "left-wing" government was in power over the 1965–1982 period [Cameron, 1984].

period. The relationship is heavily influenced by the high tax and corporatist Scandinavian economies, as well as the low tax and noncorporatist United States, Japan, and Switzerland. However, the results are not sensitive to the exclusion of any one country.

   The first three columns of Table I demonstrates that the corporatism-taxation relationship is robust to several definitions of the tax burden. We employ three different measures of taxation: total tax revenue over GNP, and the marginal and average tax rates on labor income.[5] In all cases there is a striking positive correlation. Since the Calmfors-Driffill index is a ranking of the countries in our sample, we also present a Spearman rank correlation coefficient for all bivariate regressions; they confirm the conclusions drawn in each case. In results not reported, we have also considered the sensitivity of this finding to the three alterna-

   5. The revenue measure is from the OECD's *Revenue Statistics* and is an average over the 1980–1984 period. The marginal and average effective tax rates on labor are from McKee et al. [1986]. The marginal rate is the wedge between the gross labor cost to the employer and the consumption available to the employee from increasing labor input by one unit. Both rates account for payroll, social security, income, and indirect taxes, and are calculated for a married couple with a single earner and two children. The marginal rate is an average over 1979, 1981, and 1983, and the average rate is for 1983. All tax variables are presented in the Data Appendix.

tive indices of centralization discussed above. As would be expected by the high cross correlation, the results are quite similar across the other measures and are not sensitive to the sample selection rules used by the different rankings.

"Left-Wing" Ideology and the Composition of Taxes

One interpretation of these results is that corporatism and the extent of taxation are both consequences of a country's social attitudes. That is, "leftist" countries may have both higher taxes and a corporatist economic structure, and all Table I may be capturing is this correlation. This view could be supported by noting that the high tax countries include the traditionally "left" Scandinavian countries, and that the low tax countries include traditionally conservative countries such as Japan and Switzerland.

We attempt to address this hypothesis in two ways. In columns (4) and (5) of Table I, we include two proxies for "left-wing" political ideology. First, we use the level of income inequality, which should help to proxy for "egalitarian" attitudes that may lead to both higher taxation and more corporatism.[6] In column (5) we use an index that ranks countries according to the fraction of time a left-wing government was in power over the 1965–1982 period, from Cameron [1984]. In both cases the correlation between taxation and corporatism remains strong; this result is robust to alternative definitions of tax rates as well. The leftist controls are never significant.[7]

This left-wing ideology hypothesis also differs from our theory in an important, and testable, way. While both theories predict higher levels of total taxation in corporatist economies, our argument implying that taxes are "cheaper" in collectively organized labor markets applies only to labor taxes. Although *labor* decisions are made more collectively in corporatist economies than in noncorporatist ones, there is no clear pattern of more collective *savings* decisions in these types of economies. Savings decisions could be made more collectively in corporatist nations if the majority of savings were done by pensions, and if pensions were also collectively bargained over. However, private pensions are subject to widespread collective bargaining only in corporatist Sweden and (relatively) noncorporatist France. Furthermore, pensions cover more than 70 percent of the population in both

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6. The inequality measure, which is the share of income accruing to the top quintile divided by the share accruing to the bottom quintile, is from the World Bank [1989].
7. The results are also robust to including the two leftist indices in the regression simultaneously.

TABLE II
CORPORATISM AND THE COMPOSITION OF TAXES

Column	(1)	(2)	(3)	(4)	(5)
	Labor inc tax revs (% GNP)	Nonlabor inc tax revs (% GNP)	Corp inc tax revs (% GNP)	Wealth tax revs (% GNP)	Labor inc tax revs (% tax revs)
Dependent variable					
Constant	21.760	6.408	3.102	3.261	0.784
	(2.656)	(1.061)	(0.959)	(0.449)	(0.029)
Corporatism	1.274	−0.153	−0.008	−0.142	0.009
	(0.266)	(0.104)	(0.094)	(0.044)	(0.003)
Adjusted R^2	0.58	0.07	−0.07	0.37	0.35
Rank correlation	0.797	−0.520	−0.422	−0.740	0.637
Number of countries	17	17	17	17	17

Notes. Standard errors are in parentheses. Corporatism is measured by the Calmfors-Driffill index. Tax variables are defined in the text and are presented in the Data Appendix.

corporatist countries such as Sweden and Finland and noncorporatist ones such as Switzerland and the United Kingdom; they are legally mandated in both Finland and Switzerland [Presidents Commission on Pension Policy, 1980, pp. 24–27]. And pension saving as a fraction of gross household saving is uncorrelated with the degree of corporatism across our sample of OECD countries.[8]

Thus, it appears that there is no correlation between collective savings decision-making and the degree of corporatism, so that high levels of corporate and wealth taxes will be as distorting in corporatist economies as elsewhere. Therefore, while we predict higher levels of the "cheaper" labor income taxes in these economies, we would not expect to see a positive relationship between corporatism and other forms of taxation. On the other hand, the leftist government view would predict higher levels of all taxes. In fact, given the strong redistributional bent of leftist governments, the relation between corporatism and capital/wealth taxation should be even stronger than the relation between corporatism and labor taxation under this view.

Table II, and the accompanying Figures IIa through IIc, investigate the relation between corporatism and several different categories of taxation: labor income taxation, nonlabor income

8. Pension saving as a fraction of gross personal saving over the 1980–1984 period is calculated using data from OECD [1989]; it is only available for seven countries (Canada, United States, Japan, Italy, United Kingdom, France, and Sweden). We attempted to expand the sample by using data on pension saving for Belgium and Germany, from the OECD's *National Accounts*; it did not affect the result.
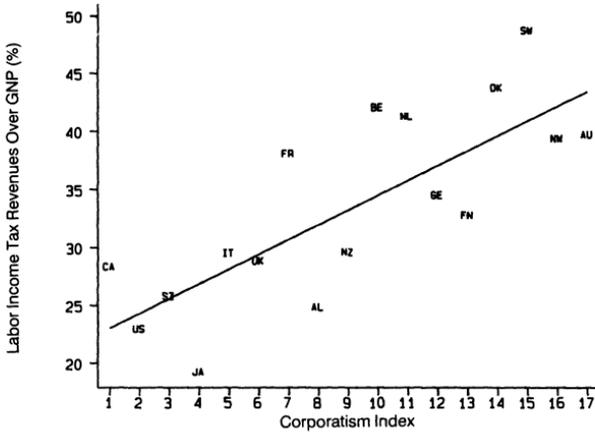
FIGURE IIa
Labor Income Taxation and Corporatism
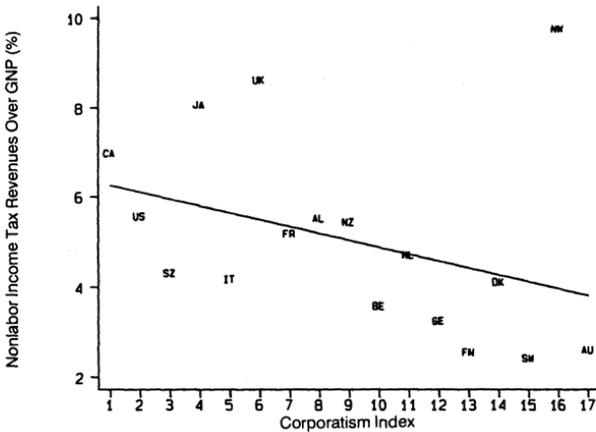
FIGURE IIb
Nonlabor Income Taxation and Corporatism

taxation, corporate taxation, and property and wealth taxation. Each measure is defined as the revenues from that form of taxation over GNP.[9] The first column reveals the basic positive relationship between corporatism and labor income taxation that was demon-

9. Averaged over 1980–1984. All revenue data are from OECD's *Revenue Statistics:* corporate tax revenue is category 1200 (plus other taxes paid solely by business, category 6100, and excise taxes on investment goods, category 5125); wealth tax revenue is category 4000 (plus individual capital gains, category 1120); and labor tax revenue is total minus these two (and minus excise taxes on exports, category 5124). None of the results are sensitive to the use of Gross Domestic Product as the denominator.
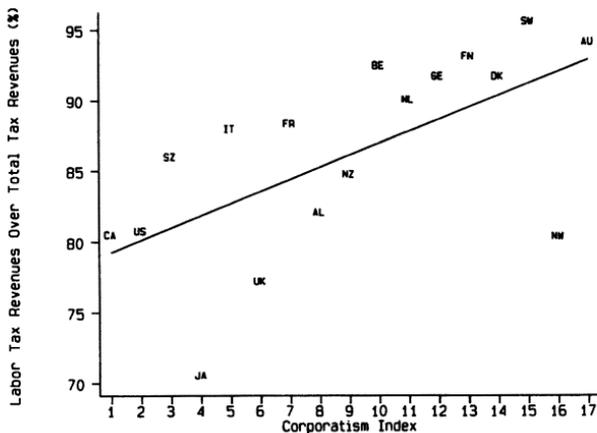
FIGURE IIc
Taxation Structure and Corporatism

strated in Table I; the relation is plotted in Figure IIa, which is quite similar to Figure I. Our measure of labor income taxation includes income taxes, payroll taxes, and indirect (consumption) taxes, under the assumption that the second and third categories are shifted backward to wages. To test the robustness of this shifting assumption, we have excluded indirect taxes from our measure of labor income taxation. The correlation remains strong and significant.

The second column looks at the correlation between corporatism and all other (nonlabor) tax revenues over GNP, which is plotted in Figure IIb. While it is not significant, there is in fact a *negative* relationship between corporatism and nonlabor taxation.[10] We explore this relationship further in columns (3) and (4), where we break nonlabor income taxation into corporate taxation and property/wealth taxation. Here we see that there is no relation between corporatism and corporate taxation, and a strong *negative* relation between corporatism and property/wealth taxation.

However, our measure of corporate taxation is problematic in two respects. First, we count dividend taxation as labor income taxation, since we are unable to separate dividend tax revenues from other personal tax revenues using the OECD data. Second, governments in more corporatist economies may own a higher

10. Norway is a large outlier in this regression due to the growth in their reliance on corporate tax revenues from North Sea oil. Over earlier periods, and for the rate of wealth taxation, Norway looks much more similar to its corporatist counterparts.

TABLE III
CORPORATISM AND CORPORATE INCOME TAXES

Column	(1)	(2)	(3)	(4)
Dependent variable	Corp tax revs (% of GNP)	Corp tax revs (% of op surp)	Marginal rate on equip	Marginal rate on structures
Constant	0.111	13.651	−7.922	5.614
	(2.322)	(3.356)	(15.089)	(12.452)
Corporatism	−0.072	−0.104	0.081	0.259
	(0.101)	(0.327)	(1.472)	(1.215)
Gov investment/total investment	0.257 (0.183)			
Adjusted R^2	−0.001	−0.06	−0.07	−0.06
Number of countries	17	17	17	17

Notes. Standard errors are in parentheses. Corporatism measure is Calmfors-Driffill index. Government investment over total investment is 1970–1985 average, from Barro [1991]. Operating Surplus is for corporate sector, from OECD *National Accounts*: Marginal tax rate on equipment and structures are from McKee et al. [1986]; see text for description.

fraction of the capital stock of the country; this would lead to lower corporate tax revenues as a fraction of GNP.[11]

We address these criticisms in three ways in Table III. In column (1) we proxy for government ownership of the capital stock by including the fraction of investment that was done by the government over the 1970–1985 period [Barro, 1991]. This measure actually enters positively, indicating an increase in corporate tax revenues where a larger fraction of investment is done by the government, but it is not significant. There is no effect on our coefficient of interest; the relation remains negative and insignificant. In column (2) we use corporate tax revenues over corporate profits, rather than GNP, as the dependent variable.[12] This should also help to account for the problem of government ownership of the capital stock. Once again, there is no relation between corporatism and corporate tax revenues.

Finally, we use measures of the marginal effective tax rates on equipment and structures, from McKee et al. [1986].[13] While the coefficient on corporatism does become positive in these regres-

11. The latter criticism may apply to wealth taxation as well. However, the results for wealth taxation are the same when we control for government investment (parallel to column (1) of Table 3).
12. Profits are defined as operating surplus of the corporate sector, from OECD *National Accounts*.
13. These rates are the average of those on debt, new shares, and retained earnings. They account for the interaction between corporate and individual tax systems (i.e., dividend taxation at the individual level).

sions, it is both statistically and substantively insignificant. We have also tried adding country size (population) to these regressions, on the theory that corporatist countries are small and cannot afford deviant capital tax structures. It entered insignificantly and did not affect the main result.[14]

Thus, we have found little evidence to support the leftist government hypothesis. Not only do corporatist economies not have higher levels of nonlabor taxes, they actually have lower levels of property/wealth taxes, a finding that is distinctly at odds with the idea that these governments are simply serving redistributional goals. Figure IIc, and the final column of Table II, which compare the ratio of labor income tax revenues to total tax revenues, summarize the point: that more corporatist countries rely relatively heavily on labor taxes in financing government expenditure.

Our study has thus far focused on the period 1980 to 1984, both due to the fact that this is the period over which the effective tax rate data are available and the fact that the Calmfors and Driffill index was designed based on current descriptions of labor market structure.[15] In results not reported, we have also run the tax structure regressions over several subperiods: 1965 to 1973, 1974 to 1979, 1965 to 1984, and 1985 to 1988. The results are quite consistent with those from Tables I and II. For both total tax revenues and labor tax revenues, there is a very strong positive correlation with corporatism. For nonlabor tax revenues, the relationship is negative, and even stronger than the one that existed over the 1980 to 1984 period.

To summarize, not only does the existence of cheap labor taxes lead to higher levels of total taxation in corporatist economies, it also leads to a shift in the structure of taxes toward the cheapest form of revenue raising. This does not appear to be a consequence of these countries being smaller, having more leftist government, or having differing degrees of inequality. Nor is it a consequence of capital mobility's forcing equalization of capital tax rates across countries; capital tax rates vary as much as labor tax rates in our sample.[16] And this finding is not solely a product of the Calmfors-Driffill ranking. In results not reported, we have estimated the relation between the composition of taxes and the alternative

14. Country size could also affect the level of labor taxation if labor is highly mobile; its inclusion had no effect on our labor tax results either.
15. Furthermore, the total hours data, used in Section III, end in 1984.
16. Indeed, the coefficient of variation for corporate tax revenues over GNP is over twice that of labor tax revenues over GNP.

corporatism indices. The results are quite similar; in all cases there was a relatively high reliance on labor taxation.

II. TAXES AND UNION LABOR SUPPLY SETTING

In this section we present a simple exposition of the theory described above. As the review by Oswald [1985] points out, there are primarily two competing models of the union wage bargaining process: the efficient bargaining model and the monopoly union model. The distinguishing feature of the efficient bargaining model is that employers and unions bargain over both wages and labor supply (hours of work and employment). This stands in contrast to the monopoly union model, where the union sets the level of wages and the level of labor input is set unilaterally by the employer. Our theory is one of union bosses in corporatist nations who set hours of work for their members to reflect the linkage that they perceive between taxes and benefits. The efficient bargaining model seems a more natural framework for expressing this idea, but our results can be obtained through the monopoly union model as well, since the union can set the wage to obtain its desired level of labor supply.[17]

Our model features three types of agents: unions, employers, and the government. The government sets taxes, and the unions and employers then bargain over wages and labor supply. We assume a linear utility function for the union. This allows a clear exposition of our key result: that the more corporatist the economy, the smaller the deadweight loss from taxation. We model the extent of corporatism through a variable "g," the degree of encompassment. Increases in g represent increases in centralization through increases in the coordination of the union bargaining parties. The higher is g, the greater is the extent to which a few individuals (union bosses) determine the level of labor supply. Thus, according to our theory, higher g will lead to a greater perception of the link between taxes paid and benefits received.

In an economy with decentralized bargaining between many unions and many employers, g approaches zero, and there is no perceived link between the taxes that the members of a given union pay and the benefits that they receive. When there is one encompassing union that negotiates with employers, g approaches one, and

17. The proof is available on request.

there is full perception by the union leaders that the taxes paid by their workers will come back to these same workers as the benefits of government spending. In other words, while the United States autoworkers in Detroit cannot be sure whether their federal taxes will go to build a bridge in Detroit or a tunnel in New Jersey, the encompassing workers union of Austria can be certain that the taxes that their workers pay will ultimately benefit those same workers.

The Distortionary Effects of Taxation: The Efficient Bargaining Case

Assume a representative union with the following utility function:

(1) $V = w(1 - \tau)L + (N - L)b + g\tau wL,$

where

> w = wage rate
> L = labor supply
> τ = tax rate
> N = members of the union
> g = degree of encompassment, $0 < g < 1$
> b = value of leisure.

Assume also a representative firm with profits: $\pi = F[L] - wL$. The locus of points of tangency between the unions' indifference curves and the firms' isoprofit curves is the "contract curve," along which efficient bargains are struck. This condition yields the equation,

(2) $F'[L] = b/[1 - \tau(1 - g)].$

Equation (2) describes a vertical contract curve. For $\tau = 0$, this equation yields the condition $F' = b$. This represents an efficient outcome, since people are working until the point where the marginal product of labor equals the marginal utility of leisure. Given the linear utility function of the union, the intuition behind (2) is clear: the union wants to set labor supply at the level that maximizes social surplus and then garner its portion of that surplus by setting the wage appropriately. Regardless of union bargaining power, the level of labor input is set as above; the relative strength of the union at the bargaining table simply serves to determine the wage.

From (2) it is easy to prove that

$$\frac{dL}{d\tau} = \frac{(1-g)F'}{1 - \tau(1-g))^2 F''} < 0 \quad \text{and} \quad \frac{\partial(dL/d\tau)}{\partial g} > 0.$$

When taxes increase, the contract curve shifts leftward, so labor supply drops. However, the more encompassing the union, the smaller the leftward shift (supply decreases by less).

We can define the total surplus of this economy as $W = V + \pi + REV$, where $REV = wL\tau(1 - g) =$ government revenue.[18] The deadweight loss due to taxes is the difference between the surplus with taxes and the surplus without taxes, which can be shown to equal

$$(3) \qquad DWL = F[L_0] - F[L_1] - b(L_0 - L_1),$$

where L_0 is the level of labor supplied at $\tau = 0$, and L_1 is supplied at $\tau_1 > 0$. Intuitively, the deadweight loss from taxes will be equal to the loss in production due to the decline in labor supply, less the value of the additional leisure. Using a Taylor expansion and the fact that $F'[L_0] = b$, and starting from $\tau = 0$, we get

$$(4) \qquad DWL = -\frac{1}{2} \frac{b^2(1-g)^2\tau^2}{1 - \tau(1-g))^2 F''} ; \qquad \frac{\partial DWL}{\partial g} < 0.$$

This result has the usual feature that the deadweight loss rises with the square of the tax rate, and that the deadweight loss at $\tau = 0$ is zero. However, it has the additional feature that the deadweight loss falls with g. At $g = 0$, we obtain the traditional result; at $g = 1$, however, the deadweight loss is zero. If individuals fully perceive the benefits of taxation, then there is no deadweight loss from that taxation; the "net" (of benefits) tax rate has fallen to zero.

It can also be shown that the marginal deadweight loss from taxation is

$$(5)$$
$$MDWL = \frac{\partial W}{\partial \tau} = -(F' - b)\frac{(1-g)F'}{1 - \tau(1-g))F''}; \qquad \frac{\partial MDWL}{\partial g} < 0.$$

The marginal deadweight loss therefore declines with g as well. This is important in considering the implications of corporatism for the optimal size of the government.

18. In practice, we are assuming that unions receive back $g\tau wL$, so we have to subtract that amount from the government's revenue.

Optimal Size of the Government

The first section of this paper noted the strong correlation between the degree of encompassment (corporatism) and the level of taxation. In this subsection we complete the theoretical argument, by showing that, given that the cost of taxes is smaller in more corporatist economies, these economies will have larger governments.[19]

Let $H[G]$ be the production function of the government, where $G = wL\tau$. To simplify matters, we assume that the government's production function is linear. We also assume that $(1 - gH') > 0$.[20] The unions' utility function becomes

(6) $$V = w(1 - \tau)L + gH[wL\tau] + (N - L)b.$$

Thus, the more encompassing unions are, the more they see the link between their taxes and government production. Once again, we obtain $\partial L/\partial \tau < 0$ from (6).

For the social planner the problem is to choose the optimum tax rate so as to maximize total surplus. However, the planner sees all the benefits derived from government production, not just the fraction perceived by workers.[21] Thus, the planner faces the following problem:

(7) $$\max_{wrt\tau} W = w(1 - \tau)L + H[w\tau L] + (N - L)b + F[L] - wL.$$

Maximizing social welfare, given the union's response to taxes, the following condition is obtained:

(8) $$H' = 1 + \frac{\partial L/\partial \tau(b - F')}{\partial (REV)/\partial \tau}.$$

Expression (8) says that, at the optimum, the marginal productivity of a unit of revenue is set equal to one plus the marginal deadweight loss from raising that unit of revenue. The marginal deadweight loss is equal to the difference between the

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19. This model would be more complex, but would reach the same conclusions, if the encompassing union sought to offset "rat race effects" by restricting labor supply. In that case, taxes would not be distortionary because labor supply would be so far below its desired level ex ante. It seems unlikely to us that rat race effects are as large as those of marginal labor tax rates in excess of 60 percent, and therefore rat race effects alone cannot explain the higher tax rates chosen by corporatist economies.

20. If $gH' \geq 1$, then individuals would desire an infinitely large government.

21. This is not a necessary assumption. However, if the planner only perceived the benefits to the same extent as workers, then with a linear government production function, we would get either zero or infinite production. In this case, we would need to introduce a nonlinear production function.

value of leisure and the marginal productivity of labor, times the decrease in labor supply due to taxes; this is what the economy loses as supply drops due to higher taxes. This is divided by marginal revenue, leaving us with an expression for the marginal deadweight loss in terms of revenue. As we demonstrated above (equation (5)), the marginal deadweight loss decreases with the degree of encompassment. Therefore, the optimal size of the government increases as corporatism increases.[22]

III. TESTING THE MODEL

In this section we use data on our sample of OECD nations to test the key prediction of the theoretical model derived above: that more corporatist economies have a lower deadweight loss from taxation. We conduct this test within a very simple empirical framework. Note that another way to phrase this prediction is that, for a given level of taxes, a tax increase will reduce labor supply by less in a more corporatist economy.[23] Since unions in these economies perceive that some portion of their taxes is coming back to them, the disincentive to work is reduced. When they bargain with employers, they take into account this effect, making it implicit in the contracts that are negotiated. We thus estimate equations of the form,

(9) $\log(\text{LABOR SUPPLY}) = \alpha\text{TAXES} + \beta\text{CORPORATISM}$
$$+ \gamma\text{TAXES*CORP.}$$

We focus on the interaction term γ, which captures the *differential* effect of taxes on labor supply as corporatism changes. Our theory predicts that the coefficient on the interaction term should be positive; for a given level of taxes, taxation is less distortionary the more corporatist is the economy.

The ideal measure of labor supply for testing this theory is total hours worked as a fraction of potential hours of work, for contracts written in the union sector. Total hours should be used

22. Proving explicitly that the optimal size of the government increases with the degree of encompassment $(d\tau^*/dg > 0)$ also requires the assumption that the elasticity of labor demand with respect to wages is greater than one. As individuals perceive more fully the link between taxes and benefits (g rises), their wages will fall more for a given rise in taxes, and labor supply will fall less. For the optimal tax rate to rise with g, the incremental *fall* in wages must be less than the incremental *rise* in supply, so that the total wage bill rises. This is true if the elasticity of labor demand is greater (in absolute value) than one.

23. In our theoretical model the deadweight loss from taxes is directly related to the reduction in labor supply, so we use the terms interchangeably.

because the theory does not offer strong predictions about the tradeoff between hours per worker and the level of employment in setting total union labor input. Contractually negotiated labor input should be used because, in reality, it is not the individual workers who are perceiving the benefits of taxation but their union bosses. For the individual worker, the typical "free rider" problem remains; they do not see that more labor input from them raises the tax base upon which the public goods that they use is financed. However, the linkage is seen by the union bosses, who establish the level of employment and hours of work in the negotiation of the union contract. To the extent that individuals can circumvent contractual obligations, actual hours of work may deviate from their negotiated level. Finally, union hours should be used because the nonunion sector is not centralized, and we would not expect the nonunion workers to perceive tax-benefit linkages.

Unfortunately, this ideal measure is not available; we do not have data on either actual or "potential" union hours of work. In its place we use total economywide hours over total potential hours.[24] We have attempted to address the problem of noncontractual hours deviating from their negotiated level, by using data on contractual hours of work in manufacturing [Weiss, 1987]; the results were very similar.[25] However, we are not able to address the problem of including nonunion labor supply in our dependent variable, so we assume that total labor supply is a proxy for union labor supply. This will bias the coefficient if either union density or labor supply in the nonunion sector is correlated with corporatism or taxation.[26]

Table IV runs regressions of the form of equation (9), where corporatism is measured by the Calmfors-Driffill index.[27] There is a positive and statistically significant interaction term in column (1),

24. This is calculated as hours per worker times the employment to population ratio. The data are from Gordon [1987] and are primarily derived from published OECD data, together with a "crucial unpublished series on aggregate hours per employee" that was provided to Gordon by the OECD [p. 696].

25. The contractual hours data was for 1985. It was from a survey by a German Employers Association.

26. That is, we measure a weighted average of union and nonunion labor supply: $L_t^s = dL_u^s + (1 - d)L_{nu}^s$, where L^s is labor supply for t (total economy), u (union), and nu (nonunion); d is union density. This mismeasurement will bias the coefficient of interest if either d or L_{nu}^s is correlated with corporatism or taxation. We attempt to control for this below.

27. Missing data for Australia, New Zealand, and Finland reduce the sample size to fourteen countries. None of the labor supply results that follow are sensitive to the sample selection induced by missing values. In all cases, the corporatism index is renumbered so that the ranking does not skip values where data on labor supply are missing.

TABLE IV
CORPORATISM AND THE DEADWEIGHT LOSS FROM LABOR TAXATION

Column	(1)	(2)	(3)	(4)	(5)	(6)
Years	1980–1984	1980–1984	1980–1984	1965–1984	1965–1984	1965–1984
Constant	8.223	8.240	8.073	7.773	7.423	7.480
	(0.246)	(0.279)	(0.293)	(0.268)	(0.341)	(0.044)
Labor inc tax revs (% GNP)	−0.044	−0.044	−0.044	−0.030	−0.023	−0.017
	(0.009)	(0.009)	(0.010)	(0.010)	(0.003)	(0.002)
Corporatism	−0.126	−0.128	−0.095	−0.047		
	(0.040)	(0.042)	(0.048)	(0.046)		
Corporatism* revs/GNP	0.0042	0.0043	0.0036	0.0022	0.00054	
	(0.0011)	(0.0012)	(0.0013)	(0.0014)	(0.00027)	
High/low dummy* revs/GNP						0.0050
						(0.0021)
Union density		−0.062				
		(0.251)				
% government employment			0.493			
			(0.700)			
GNP GAP					−0.042	−0.018
					(0.076)	(0.075)
Adjusted R^2	0.64	0.60	0.63	0.34	0.86	0.88
Country fixed effects	No	No	No	No	Yes	Yes
# Observations	14	14	12	14	280	160

Notes. Standard errors are in parentheses. Dependent variable is log of hours worked/person. Corporatism is measured by the Calmfors-Driffill index. Union density is for the 1965–1980 period, from Cameron [1984]. Percent government employment is employment in production of government services over total employment. Each regression is run over the period indicated at the top of the column. Regression in column (5) is a pooled cross section for fourteen countries over twenty years; it includes thirteen country dummies. Regression in column (6) replaces the Calmfors-Driffill index with a dummy for high/low corporatism, which is one for Austria, Sweden, Norway, and Denmark (high corporatism) and zero for Canada, United States, Switzerland, and Japan (low corporatism); it is pooled over twenty years and includes country fixed effects.

where taxation is measured by total labor tax revenues over GNP. This interaction is large enough so that, for the most corporatist nation, there is no distortionary effect of taxation on aggregate labor supply. This result is quite similar if the marginal or average effective labor tax rate measures are used instead.

As discussed above, there may be systematic measurement error in the dependent variable that is correlated with union density and that will thus be correlated with the degree of corporatism. We attempt to control for this spurious correlation in the second column of Table IV, where we include average union density over the 1965–1980 period [Cameron, 1984]. Density does not enter significantly, nor does it affect our result of interest.

Thus far, we have assumed that the positive interaction of corporatism and taxation indicates reduced deadweight loss from

taxation. An alternative interpretation, however, would be that the corporatist nations in our sample have stronger preferences for public sector employment, which would both necessitate higher levels of taxation and lead to an overall increase in labor supply. To control for this possibility, we have used data on the fraction of employment that was represented by "producers of government services" over the 1980–1984 period, from the OECD's *National Accounts*. As column (3) shows, this measure does enter positively into the labor supply regressions, although it is not significant. It has little effect on the coefficient of interest.

As was mentioned above, the 1980–1984 period was chosen for these regressions due to both the timing of the analysis of Calmfors and Driffill and the availability of the effective tax rate data. However, this was a period of worldwide recession, and the effects of this recession may be correlated with corporatism in ways that affect our results. Thus, in column (4) of Table IV we rerun this regression over the entire 1965–1984 period. The interaction is now only significant at the 14 percent level.

This weak result over the twenty-year sample period highlights the difficulty of drawing causal inferences from aggregate labor supply data for a sample of fourteen countries. At a minimum it is important to account for time-invariant factors in more corporatist countries that are correlated with both higher levels of taxation and higher levels of labor supply. This is a truer test of the underlying theory, which posits smaller effects of tax *changes* in more corporatist economies. In column (5) of Table IV we pool the data for each of the fourteen countries in the sample across all twenty years, and include thirteen country fixed effects. We also include a cyclical indicator, the "GNP gap," to control for cyclical correlation between hours worked and taxes collected.[28] The interaction is positive and significant; deviations in tax rates from their average level in more corporatist countries are found to lead to higher than average levels of labor supply.

The results reported here are quite similar when the alternative centralization indices are used. However, each of these measures suffers from the problem of assigning relative rankings to countries that have fairly similar labor market structures. As a further specification check, we have therefore grouped some of the countries into two categories: "high corporatism" (Austria, Norway, Sweden, and Denmark) and "low corporatism" (Canada,

28. The GNP gap is created by taking the residual from a regression of log real GNP on a time trend. The result is not sensitive to the use of the level of GDP, or to the use of nominal GNP.

United States, Switzerland, and Japan). This allows us to create a corporatism "dummy," which equaled one for the high corporatist countries and zero for the low corporatist countries. In column (8) we show that the interaction between this dummy and labor tax revenues over GNP is significant over the 1965–1984 period in a regression which includes country fixed effects.

To summarize, we have found some evidence in support of our hypothesis that the deadweight loss from taxation is reduced in more corporatist economies. However, there are many other unmeasured differences across this small sample of countries that could be driving the cross-sectional results. While the inclusion of fixed effects should help to account for these, it is still not certain that the source of within-country variation in labor income tax revenues is distinct from the source of within-country variation in labor supply changes. A more definitive test of our theory would be an examination of the correlation between changes in taxation and changes in corporatism. Unfortunately, none of the authors who have classified corporatism have attempted to quantify changes in their measures. Given our goal of using objective indices of corporatism for this paper, we feel reticent to make such an attempt on our own.

Case Studies: Sweden and Austria

We have, however, been able to undertake case studies of the changes in taxation and labor market institutions in two of our sample nations. The point that there is variance in the growth of taxation to be explained is highlighted by Figures IIIa and IIIb. Figure IIIa shows the growth in tax revenues over GNP in Sweden and the United States over the 1955 to 1988 period. The interesting fact which emerges is that levels of taxation in the two nations were similar until 1960 and have diverged only in the last 30 years. The source of this divergence has been the growth of labor taxation in Sweden; nonlabor taxes have actually fallen over this period (both absolutely and relative to the United States).[29] Figure IIIb shows a different path for the most corporatist nation in our sample, Austria. Austria's level of taxation has been much higher than that of the United States since 1955, and taxes have risen at approximately the same rate as those in the United States.[30]

29. The figure would be similar if a different noncorporatist nation had been used as the baseline.

30. Austria and Sweden were chosen because they provided the most interesting contrast over this period, and because there is a large literature discussing the development of their labor market institutions.
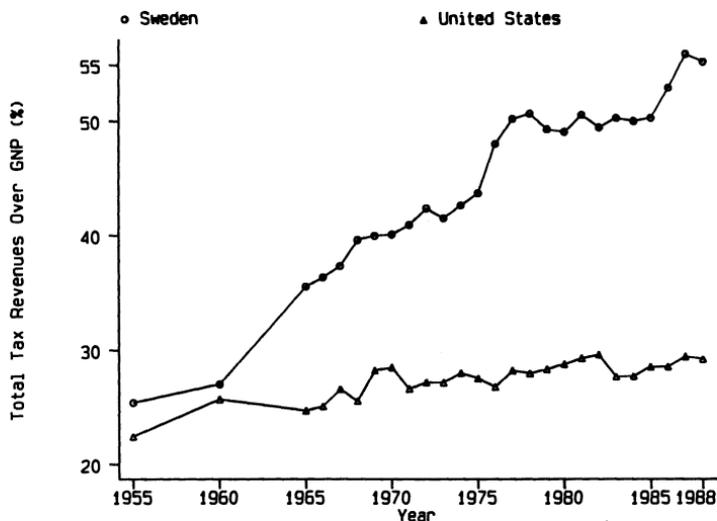
FIGURE IIIa
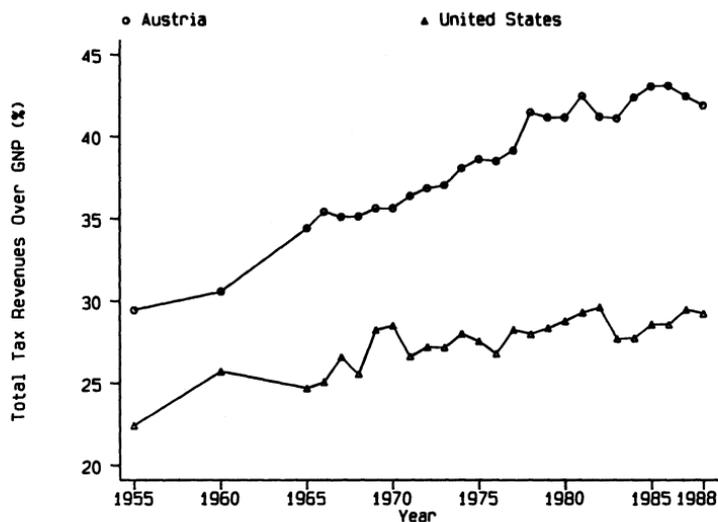The Growth of Taxes: Sweden Versus United States

FIGURE IIIb
The Growth of Taxes: Austria Versus United States

These divergent pictures point to a possible test of our theory, which draws a causal link between labor market centralization and levels of taxation. Under this hypothesis, the data would imply that Austria had featured a centralized labor market throughout the

post-World War II period, while Sweden's was a development of the 1950s. In fact, this is the inference that emerges from a study of the development of labor market institutions in these countries. As Johnston [1962] points out, Sweden's national union confedera- tion (the LO) did not begin centralized wage negotiations until 1956; as he states: "It is too early to judge how permanent a change has taken place *since 1956,* but it does seem that, with the centrally co-ordinated two-year agreement for 1957–8 between LO and SAF [the employer federation], central bargaining is now looked upon as a desirable and promising, not an emergency, approach" [p. 284]. Prior to that year, individual unions had control over their own bargaining, under little central control from the confederation.

In contrast, the ILO [1986] writes of Austria that "the OeGB [the Austrian union confederation] has been the only major Austrian union since the end of the Second World War" [p. 26]. Unlike other countries, where a federal body oversees a set of member unions, "the OeGB is so centralized that it is no longer a 'confederation' properly speaking"; the fifteen "member unions" are actually subdivisions of the central union, which alone has legal authority to bargain.

If the central union body does not have control over the negotiating process, then it cannot impose its perception of tax- benefit linkages on the resulting agreement. Thus, while we would have expected relatively high labor taxes in Austria in 1955, when that nation had the highest level of labor taxes in our sample, we would not have expected especially high taxes in Sweden, which was only the sixth highest at that point. By contrast, Sweden had the highest level of labor taxation in our sample in 1988. While these case studies are only casual, they do suggest that the evolution of centralized bargaining in Sweden may have been an important factor in the growth of labor taxation in that country.[31]

IV. CONCLUSIONS

The results in this paper suggest that consideration of the level at which labor supply decisions are made may have substantial

31. Given the alternative leftist government hypothesis, it is interesting to note that, as Weaver [1987] points out, the Social Democrats have held power "almost continuously from 1932" [p. 294]. Thus, there does not seem to be a political reason for the growth in taxes starting only in the 1960s. Furthermore, the move toward lower taxes in Sweden in the late 1980s may also correspond to a breakdown of centralized bargaining in the earlier part of the decade [Lundberg, 1985].

relevance for interpreting national differences in tax policies. At a minimum they highlight the need to move beyond the standard assumption of a competitive labor market in assessing the efficiency consequences of labor income taxation.

While it is tempting to draw the inference from our results and some of Olson's [1982] discussion that corporatism is in some sense good, because it reduces the cost of raising taxes, this would be premature without a firmer understanding of what lies behind differences in the extent of corporatism. Part of the logic of socialism was the idea that a wise government could internalize everything and so generate efficient economic outcomes. This has proved wrong, and should give pause about excessively benign views of negotiated alternatives to market resolutions.

In future research the ideas put forward here could be tested in several ways. First, it would be useful to extend the mechanism of Section III, by looking at changes in effective tax rates, rather than tax revenues, over time. Second, it would be valuable to examine further case study evidence on individual countries. This would permit an assessment of the realism of our premise that encompassing unions recognize and internalize the fiscal consequences of their actions. Third, it would be interesting to explore time series variations in political conditions and their relation to tax decisions. Finally, the arguments made here have implications for union-nonunion differences in the intensity of work in different countries, which could be examined. Further work could help to confirm our basic conclusion that differences in national choices about taxation reflect both differences in the benefits and the costs of taxation, and that realistic analysis of the effects of labor taxes require taking account of labor market institutions.

DATA APPENDIX

		I. Corporatism indices				
Country	Label	Calmfors-Driffill	Schmitter	Cameron	Alvarez	Bruno-Sachs
Canada	CA	1	4	4	3	2
United States	US	2	5	3	4	1
Switzerland	SZ	3	6	6	·	12
Japan	JA	4	·	1	1	8
Italy	IT	5	1	5	5	4
United Kingdom	UK	6	2	8	9	6
France	FR	7	3	2	2	5
Australia	AL	8	NA	7	7	3

DATA APPENDIX

(CONTINUED)

I. Corporatism indices (continued)

Country	Label	Calmfors-Driffill	Schmitter	Cameron	Alvarez	Bruno-Sachs
New Zealand	NZ	9	NA	NA	NA	7
Belgium	BE	10	8	13	10	9
Netherlands	NL	11	9	10	8	15
Germany	GE	12	7	9	6	16
Finland	FN	13	10	12	11	10
Denmark	DK	14	11	11	12	11
Sweden	SW	15	12	16	15	13
Norway	NW	16	13	15	14	14
Austria	AU	17	14	14	13	17

II. Tax measures

Label	Tax revs/GNP 1980–1984	Labor taxes/GNP 1980–1984	Marg rate on labor 1979–1983	Avg. rate on labor 1983
CA	34.9631	28.0662	42.27	29.17
US	28.1983	22.704	42.68	28.21
SZ	29.7723	25.5313	40.96	22.61
JA	26.9504	18.9551	38.42	19.05
IT	33.3389	29.2422	59.49	48.88
UK	37.1206	28.57	53.17	38.97
FR	42.9165	37.8106	58.11	47.57
AL	30.0508	24.5996	43.39	31.01
NZ	34.6716	29.3077	51.23	31.98
BE	45.2936	41.7893	61.96	48.12
NL	45.6772	41.0404	69.73	37.51
GE	37.4241	34.2464	56.76	36.62
FN	35.0069	32.533	62.9	44.03
DK	47.5065	43.4683	69.59	53.41
SW	50.8025	48.4617	73.64	61.67
NW	48.7918	39.1079	65.31	50.36
AU	41.9879	39.4546	62.92	40.64

II. Tax measures (continued)

Label	Nonlabor revs/ GNP: 1980–1984	Corporate revs/ GNP: 1980–1984	Property revs/ GNP: 1980–1984	Labor revs/ total revs: 1980–1984
CA	6.8968	3.4699	3.2431	0.802497
US	5.4942	2.1688	3.3253	0.805213
SZ	4.2409	1.7684	2.4724	0.857569
JA	7.9953	5.5896	2.4056	0.703357
IT	4.0966	2.9212	1.1754	0.877316
UK	8.5506	3.757	4.7936	0.769922

DATA APPENDIX
(CONTINUED)

II. Tax measures (continued)

Label	Nonlabor revs/ GNP: 1980–1984	Corporate revs/ GNP: 1980–1984	Property revs/ GNP: 1980–1984	Labor revs/ total revs: 1980–1984
FR	5.1058	3.4563	1.6313	0.881017
AL	5.4511	3.1171	2.2818	0.818407
NZ	5.3639	2.6116	2.7523	0.845339
BE	3.5042	2.6323	0.8718	0.922641
NL	4.6367	3.0746	1.562	0.898478
GE	3.1777	1.9511	1.2265	0.915091
FN	2.4739	1.5743	0.8995	0.929366
DK	4.0382	1.6708	2.3674	0.915138
SW	2.3408	1.6015	0.7392	0.954002
NW	9.6838	8.8088	0.8567	0.801565
AU	2.5333	1.3303	1.1741	0.939671

III. Labor supply measures

Label	Marg rate on equip 1983	Marg rate on struc 1983	Corporate revs/ operating surplus 1980–1984	Hours per person 1980–1984	Contractual hours per person 1980–1984
CA	0.9	4.4	13.1	1136.398	NA
US	−15.1	25.8	12.0	1107.952	1286.776
SZ	19.9	23.0	8.5	1222.1	1401.664
JA	26.4	29.4	22.5	1462.644	1529.196
IT	−22.5	−24.5	8.2	952.3815	975.024
UK	−85.3	−53.9	23.2	994.5114	1178.814
FR	−4.0	−0.1	11.1	972.4921	1080.719
AL	−9.6	32.7	15.2	NA	NA
NZ	35.5	25.1	8.6	NA	NA
BE	−41.5	−1.2	11.4	824.1009	997.408
NL	−8.2	16.9	11.7	846.0098	920.46
GE	17.1	33.6	9.5	1014.571	1047.004
FN	−26.2	−21.5	7.6	NA	1331.128
DK	1.4	2.6	8.1	1117.75	1329.312
SW	−17.9	−0.9	9.2	1140.964	1416.6
NW	20.2	24.7	29.5	1135.575	1368.96
AU	−13.4	18.9	6.7	1066.102	1143.736

IV. Other covariates

Label	Inequality measure	Cameron leftist index	Gov't investment/ total investment	Union density	Government employment/ total employment
CA	7.55	1	0.1275	0.27	NA
US	7.53	2	0.09522	0.21	0.163209
SZ	5.76	7	0.10931	0.24	NA

DATA APPENDIX
(CONTINUED)

| | | IV. Other covariates (continued) | | | |
Label	Inequality measure	Cameron leftist index	Gov't investment/ total investment	Union density	Government employment/ total employment
JA	4.31	3	0.14633	0.16	0.06636
IT	7.08	4	0.13927	0.41	0.14832
UK	5.67	14	0.16941	0.45	0.218848
FR	7.67	5	0.12609	0.24	0.229513
AL	8.72	9	0.16661	0.4	0.47362
NZ	8.76	NA	0.08525	NA	NA
BE	4.56	8	0.13976	0.55	0.19324
NL	4.36	6	0.14712	0.28	0.15683
GE	5.0	13	0.12985	0.32	0.155102
FN	59.7	10	0.12507	0.47	0.18827
DK	7.15	11	0.13056	0.54	0.300401
SW	5.64	15	0.19687	0.7	0.318912
NW	6.37	12	0.17077	0.65	0.229619
AU	NA	16	0.14899	0.5	0.213691

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