Working Paper 18/02

LABOR TAXES AND UNEMPLOYMENT
A SURVEY OF THE AGGREGATE EVIDENCE

Francesco Daveri (*)
University of Parma, and IGIER

This draft: June 10, 2001
First draft: October 12, 2000

This paper was presented at the CeRP Conference "Pension Policy Harmonization in an Integrating Europe", Turin, June 22-23, 2001. This paper draws on joint work with Marco Maffezzoli and Guido Tabellini, to whom I am indebted for many helpful discussions. This research project was funded by the CNR (Consiglio Nazionale delle Ricerche; project "Riforme fiscali e mercato del lavoro in Europa", #99.03504.ST74).

(*) Università di Parma, Facoltà di Giurisprudenza, Via Università 12, 43100 Parma, Italy. Phone: (++39 0521) 034561. Fax: (++39 0521) 034562. E-mail: francesco.daveri@unipr.it.

1. Introduction

The bulk of the rise in Government revenues in Industrial Countries over the last thirty years originated from the increased taxation of wage incomes.[1] The definite increase in labor taxation has often been contrasted to the parallel rise of European unemployment since the second half of the seventies. Yet providing robust evidence of a positive relation between labor taxes and unemployment has proved a tricky undertaking.

This paper surveys the findings and the unresolved issues faced in the strand of literature which has employed aggregate data to study the relation between labor taxes and unemployment.

In Section 2, trends in labor taxation, wages and unemployment in the US and the five largest EU countries are described. There is evidence of a positive, but noisy, relation between labor taxes and unemployment. This is more evident over time than across countries. Pair-wise correlation also reveals a timing issue: taxes and wages rose well before unemployment started rising.

Section 3 sums up what theory says. A textbook partial equilibrium model of the labor market posits a close relation between labor costs and unemployment, as well as between labor taxes and labor costs, as long as some conditions are met. The close link between labor costs and unemployment breaks down, however, when abandoning a static representation of the functioning of the labor market.

Section 4 surveys the aggregate evidence, emphasizing that recent research has overall strengthened the case for a positive relation between labor taxes and unemployment. Yet attributing a causal meaning to the findings from the macro-econometric literature remains hard to swallow to most scholars. In Section 5, the prospects from alternative methods of analysis (micro data and simulation techniques) are briefly evaluated. Section 6 concludes.

2. Labor taxation, wages and unemployment across countries and over time

Table 1 presents summary data on labor taxes, unemployment and real wages in the United States and the five largest EU countries in 1965-99. It thus provides first-hand

[1] Taxes on wage incomes may include imputations to labor incomes of income and consumption taxes, plus social security contributions and other payroll taxes. The statement in the main text holds irrespective of how 'taxation of wage incomes' is defined.

evidence on the pattern of correlation across countries and over time between the main variables of interest here.

Labor taxes

In **Table 1**, labor taxes are defined as average effective tax rates on labor incomes, in the same fashion as in Mendoza, Razin and Tesar (1994). They include social security contributions and an imputation of income taxes; consumption taxes are not included. The data reported here are updates of the data in Daveri and Tabellini (2000) to 1999.

Table 1 shows that cross-country differences in labor tax rates are large. In 1999, the latest available year, labor taxes equaled 45-50% of labor incomes - about one third of GDP - in France, Germany and Italy. Much lower values were observed in Spain, the US and the UK, with tax rates ranging between 25 and 30% of labor incomes, equivalent to 16-20% of GDP.

Labor taxes went up in all countries in 1965-99. This is more evident in countries in Continental Europe, where average effective tax rates rose by a minimum of 16 (Germany) to a maximum of 25 percentage points (France), with Italy and Spain in between. In Anglo-Saxon countries, the increase was more moderate (+11 p.p. in the US, + 6 p.p. in the UK).

Such increases in labor taxation did not uniformly spread over time. In five countries, most of the increase in labor taxation took place in 1965-80. In the US, the UK and Spain, labor taxes barely rose in 1980-99 (+1.5-2.0 p.p. in about twenty years). In Italy, the only exception to this rule, taxes on labor incomes went up by 9 percentage points in the 1960s and the 1970s and by nearly 13 points in the 1980s and the 1990s.

Unemployment rates

The behavior of unemployment rates in these countries is well-known and documented, both along the cross-section and the time series dimension.

In 1999, Spain featured the highest unemployment rate in the sample (about 16% of the labor force). In the other countries in Continental Europe (France, Italy and Germany), unemployment rates ranged around 10% of their labor force. Unemployment was instead lower in the UK (about 6%) and the US (about 4%).

Table 1 also shows that, notably, the US has not always been an 'employment miracle'. In the 1960s and the 1970s, the unemployment rate was lower in Europe than in the US. Back in 1965, the rate of unemployment was as low as 0.3% in Germany, and did not go

above 3% in France, the UK and Spain. In Europe, just Italy had a higher unemployment rate (5.3%) than the US.

Unemployment rates went up considerably in Europe, particularly in Continental Europe, in the 1980s and the first half of the 1990s. Within Europe, unemployment reached its maximum at different times in the various countries: 1985 in the UK, 1995 in France, Italy and Spain, 1999 in Germany. The UK since 1985 and Spain since 1995 clearly reversed the previous upward trend.

Between 1965 and 1999, the unemployment rate remained instead roughly constant close to 4.5% in the US. After reaching a maximum of 8.3% in 1975, the US share of unemployed people fell gradually to about 5.5% in 1990 and further down to about 4% in the 1990s.

Real wages

Table 1 also presents summary evidence as to the cumulated growth rates of real wages, gross and net of total factor productivity growth. The textbook model of the functioning of the labor market would point to changes in labor costs as a necessary transmission mechanism of a labor tax shock onto unemployment (see the next section). This suggests looking at what happened to real wages net of TFP growth as a potential cause of unemployment.

Table 1 bears two clear implications. First, there is evidence of an overall 'wage push' in five of the six countries in the sample. In 1965-99, real wages grew faster than TFP in all countries, but France. Hence, there was a wage push, but not specific to Europe or Continental Europe.

Second, the 'wage push' was largely over by 1980. In particular, in 1980-99, cumulative TFP growth was higher than cumulative real wage growth by more than 15 percentage points in Spain and France, about 7 p.p. in Italy and less than 2 p.p. in Germany. Real wage and TFP growth roughly offset each other in the US in the last twenty years. Somehow unexpectedly, the only country where real wage growth systematically outpaced TFP growth was the UK, both before and after 1980.

Summing up

Altogether, data in **Table 1** suggest four main conclusions.

(C1) There is evidence of a positive, but noisy, pair-wise correlation between labor taxes and unemployment, on one side, and between labor taxes and wages, on the other. This

makes thinking about it worthwhile.

(C2) The cross-country correlation between labor taxes and unemployment is not a close one. Unemployment is not necessarily high/low in countries where labor tax rates are high/low. In addition to labor taxes, other structural, *i.e.* time invariant, determinants of unemployment must be sought for.

(C3) The within-country time correlation between labor taxes and unemployment is stronger for some countries (such as Germany, France, Italy, Spain) than for others (the US, the UK).

(C4) The within-country time correlation between labor taxes and unemployment hides a 'timing mismatch'. The rise of unemployment in Europe took place five to ten years after the occurrence of the tax and wage hikes. A theory linking labor taxes and unemployment should also provide a solution to this puzzle.

Conclusions (C1)-(C4) provide useful guidance as to the list of plausible theoretical and empirical models to be employed when looking at the relation between labor taxes and unemployment.

3. What theory says

A partial equilibrium competitive model of the labor market shows that labor taxes raise labor costs and gross wages, negatively affecting equilibrium employment, as long as:

(a) labor demand is not too elastic and labor supply is not too inelastic;[2]

(b) the tax-financed benefit arising to the worker is not fully internalized by the worker herself;

(c) the worker's outside option is taxed at a lower rate than wage income and is not fully indexed to the net real wage.

Condition (a) is a standard tax-incidence argument. It can be found in any Economics I textbook. Condition (b) – first discussed by Summers (1989) with reference to the effects of mandated benefits - says that if workers internalize individual benefits arising from a tax on labor, their labor supply schedule would shift rightwards, keeping employment roughly constant. Condition (c) predicts that, for a tax on labor to affect employment, the relative convenience of being employed *vs.* unemployed must change. Some variants of

[2] Here I use 'labor demand' and 'labor supply' as handy shortcuts to the more precise and general concepts of 'price-employment' and 'wage setting' schedules, which apply to both competitive and non-competitive settings.

condition (c) were discussed by Pissarides (1998). [3]

To summarize: condition (a) establishes a close link between labor costs and the employment effects of a labor tax, while condition (b) and (c) are necessary and sufficient conditions for a labor tax to affect labor costs.

The tight link between labor costs and employment implied by the partial equilibrium competitive framework does not carry over to more complicated settings, however. Here I briefly discuss what happens when allowing for capital accumulation.

Suppose, under condition (a)-(c), that some increase in the gross real wage occurs as a result of the increase in labor taxation. This feeds on impact into a rise in the capital-labor ratio, possibly through an employment decline for a given capital stock. In turn, this reduces the rate of return on investment and investment. By this channel, the capital-labor ratio is gradually driven down back (or close, depending on technological assumptions) to its initial level. Note however that, as long as the downward revision in the outside income is incomplete, employment keeps falling alongside with real wages. This is potentially important on empirical grounds, for it suggests that we may observe a decline in the real wage - as a result of a past shock to capital accumulation - in the absence of an employment recovery.

Appending capital accumulation to a static representation of the labor market is thus important to make sense of the puzzle emphasized in conclusion (C4). There are other reasons for the link between labor costs and unemployment to break down (see *e.g.* the recent paper by Blanchard and Giavazzi, 2001). Their implications are not explored here.

4. Aggregate evidence

In principle, employing aggregate data involves dealing with aggregation problems.

They have two main dimensions. Suppose labor homogeneous first. Even in this case, the conditions for meaningfully extract unbiased estimates of deep parameters (*i.e.* demand and supply elasticity) from aggregate data are stringent. The problem – first emphasized by Theil (1954) and summarized by Hamermesh (1993) – is one of linearly aggregating non-linear relationships and can be exemplified as follows. If all the establishments in the economy have identical CES technologies – a heroic assumption indeed - this gives rise to the following labor demand functions at the establishment level: $\ln L_i=\delta-\sigma \ln W_i+\ln Y_i$ (with δ = distribution parameter; σ the constant elasticity of substitution

[3] Pissarides' 1998 paper also studies other important issues disregarded here, such as the role of

between capital and labor, W wage and Y output). Unfortunately, there is no reason to expect that estimating the aggregate relation $\ln L=\delta'-\sigma'\ln W+\theta\ln Y$ ($A=\Sigma_i A_i$; A=L, W, Y) would deliver $\sigma=\sigma'$ or $\theta=1$. Moreover, the direction of the bias is unknown, unless specific assumptions as to the distribution of the W_i or Y_i are made.

The other dimension of the aggregation problem has to do with the heterogeneity of workers. Obviously no worker is exactly the same as another one, but estimating separate demand functions for each worker in the labor force is not feasible. A theoretically acceptable compromise would be to aggregate workers according to the respective degree of substitutability. Yet the evidence on the extent of the elasticity of substitution between different types of workers is controversial as well.

Hence, although partial equilibrium analysis suggests that demand and supply elasticities crucially determine the impact of labor taxes on wages and employment, early and recent studies employing aggregate data mostly left the estimates of deep parameters and aggregation problems aside.

4.1 The early aggregate evidence

The early aggregate evidence on taxes and unemployment, surveyed in Bean (1994, 589-590), found little or no evidence of distorting effects of taxes on unemployment. Moreover, the numerical estimates of the tax shifting onto wages wandered around so much to be practically devoid of economic meaning. Not by chance, a list of the causes of European unemployment compiled in the mid 1990s would include labor market regulation, unemployment subsidies, terms of trade shocks, skill-biased technical change and anti-inflationary aggregate demand policies, but not labor taxes.

Leuthold (1975) and Beach and Balfour (1983) evaluated the impact of payroll taxes on labor demand in, respectively, the US private sector and the UK manufacturing sector, by replacing the wage W with $W(1+t_w)$ in the first order condition of firm's profit maximization. As pointed out by Feldstein (1972), however, this procedure does not produce an estimate of the equilibrium shift of wage and employment.

Studying the role of taxation as a possible source of high unemployment rates in an 'elasticity-free' framework was the focus of Layard, Nickell and Jackman (1991). In the wording of Blanchard and Katz (1997, p.67):

> "the effort was judged only partially successful at the time (Bean, Layard and Nickell, 1986), and has not withstood the test of time well.

---

progressive taxation.

> The cross-sectional evidence within Europe does not reveal much correlation between tax rates and unemployment rates, nor between changes in tax rates and changes in unemployment rates. In the recent study by Jackman, Layard and Nickell (1996), taxes no longer appear in the equation used to explain time series and cross-section movements in unemployment"

Within this strand of early studies, a few also provided evidence on the coefficient of payroll taxes in reduced-form wage equations. Hamermesh (1979), Holmlund (1983), Dye (1985), Bean, Layard and Nickell (1986) and others quoted in Hamermesh (1993, Table 5.1, p.171) estimated Phillips-curve-type equations with a payroll tax term appended. The estimates of the tax shift on wages are usually – not always ! – positive and within the admissible zero-one range. No consensus emerged, however, either about the likely size of the tax shift or about the likely causes of the estimated differences. Newell and Symons (1987) report estimates in the error correction form, where the change, and not the level, of the tax wedge is found significant, implying only a transient effect of permanent tax shocks.

4.2 The recent aggregate evidence

Recent research employing aggregate data has led to conclusions somewhat different from the past. Recent macro-econometric studies have estimated reduced-form employment (or more often, unemployment) and wage regressions, inclusive of shifters of labor supply (replacement rates, benefit duration) and labor demand (TFP growth, measures of strictness of employment protection and other labor and goods market imperfections) for identification purposes and tackle omitted variables bias.

Results

All of the recent studies have found statistically significant labor tax coefficients, although the size of the estimated coefficients greatly differs. The view that labor taxation exerts little employment effect has been forcefully re-asserted by Blanchard and Wolfers (2000). Most other studies, such as Alesina and Perotti (1997), Elmeskov, Martin and Scarpetta (1998), Nickell and Layard (1999), and Daveri and Tabellini (2000), have found evidence of *(i)* medium-sized to large effects of labor taxes on unemployment; and: *(ii)* positive but incomplete forward shifting of labor taxation onto labor costs and gross wages. These findings hold in particular for countries in Continental Europe, and much less elsewhere.

The precise boundaries of the disagreement across the different studies are as follows. Blanchard and Wolfers (BW, from now onwards) found a β of about 0.02. The upper bound of the recent estimates is β=0.30 obtained by Daveri and Tabellini (DT), with Nickell and Layard (NL)'s 0.22 [4] and Elmeskov, Martin and Scarpetta's 0.15 lying in between.

The polar cases within this small cross-section of estimates bear very different numerical implications. The rise in labor taxation documented in section 2 may be taken to have increased the German unemployment rate by 0.3 percentage points if Blanchard and Wolfers are right, or by 4.8 percentage points if Daveri and Tabellini are right. These figures compare with an overall rise of German unemployment of about 8.5 percentage points. Differences are even sharper, if we take data for France, Italy and Spain.

In the light of this more recent evidence, Nickell and Layard conclude that:

> ".. there is evidence that overall labour tax rates do influence labour costs in the long run and hence raise unemployment" (Nickell and Layard, 1999, end of Section 5, p.44)

The important methodological question to be addressed is how studies using roughly similar data can get so wildly different answers to the deceptively simple question: does a tax on labor raise unemployment ?

Why such differences ?

At first sight, the various studies differ under many respects: within-equation restrictions, methods of estimation, time periods and number of countries. It may thus look complicated to reconcile the different results or – a more modest goal - understand the source of the differences.

The typical unemployment regression estimated in recent multi-country time series studies has the form:

$$U_{it} = CONSTANT_i + \beta * TAX_{it} + \gamma * X_{it} + e_{it} \qquad (3.1)$$

where *i* is the country index; *t* is the time index, often referred to period (typically: five-year) averages; *U* is the unemployment rate (sometimes in log form), *TAX* is the average tax rate on labor income (payroll and imputation of direct taxes to labor incomes) or the

[4] The estimated coefficient of the tax variable (the overall tax wedge on labor, thus including payroll, income and consumption taxes) in the most recent unemployment regressions (in logs) estimated by Nickell and Layard (1999, Table 15) was 0.027. Once multiplied by 7.9% (the average unemployment rate in the sample over the years 1985-1994) to get rid of the semi-log form, this gives a point-wise estimate of the β in (3.1) roughly equal to 0.22.

total tax wedge (inclusive of payroll, direct and consumption taxes), and *X* is a vector of control variables, typically inclusive of variables measuring each country's labor market institutions.

The list of the X variables varies across studies, but often includes replacement rates, benefit duration, density and coverage of trade unions, the GDP share of government spending in active labor market policies (ALMP), indices of employment protection legislation (EPL), the extent of bargaining coordination and centralization for employers and employees. Such variables are deemed to change very slowly over time. Available information is often insufficient, however, to evaluate this claim, for only a handful of observations (typically in the late 1980s or early 1990s) is available.

The main specification problems plaguing these regressions are the potential biases arising from the exclusion of unobservable explanatory variables and the endogeneity of some included regressors. Different treatments of these issues may be at the root of diverse regression results.

Omitted variables bias

The omitted variables bias is potentially more serious for DT than for the other studies, for a somewhat smaller number of control variables is included in DT than NL and BW. In particular, DT never includes the whole list of X variables, but only a few of them at a time. Both NL and BW usually have all of them at once. It may thus be the case that DT's β is high due to the exclusion of some potentially important variables, otherwise included in other studies.

This brings out a very important issue, concerning the nature of the X variables. Most of the Xs are qualitative and/or subjective indices. Such variables are often the result of an aggregation of individual labor market features, whose extent has been evaluated by experts well aware of labor market circumstances of each country. The rationale for aggregating – often merely adding them up – such diverse things as hiring and firing rules and other legislative features into a single figure remains somehow obscure. In general, the subjective and qualitative nature of such summary indices makes them prone to endogeneity and measurement error, and somehow hard to update over time. Appending many of them to the right-hand side of a regression is thus not necessarily a good idea.

BW also makes the X vector interact with fixed time effects. One may wonder why the potentially valuable available information on the time variation of some of the X

variables (such as tax rates and replacement rates)[5] is not exploited, instead. One commonly shared opinion is that the X variables (mostly the qualitative ones) are rather crude proxies, which makes institutions measured with error. Taking average values over the entire period of analysis (1960-96) would lessen this problem. Yet, as mentioned above, most available indices of labor market institutions are not long-run estimates, but rather point-wise values calculated at a specific date in the late 1980s or the early 1990s.

Moreover, by interacting institutions with time fixed effects, a specific correlation structure is super-imposed over the data. By construction, above-average values of the tax impact unemployment to the same extent in each country. This is at variance with the DT finding that the estimated tax coefficients differ across country groups (identified from both coverage and density data, based on **Table 2**) and may contribute to explain why BW finds a much smaller coefficient than DT. If the DT regressions are run without distinguishing the groups, the estimated coefficient gets smaller, although the estimated β does not fall to the BW coefficient of 0.02.

Endogeneity bias

It may be the case that the estimated β in all of the studies surveyed here simply reflects reverse causation from unemployment to labor taxes. Suppose that some exogenous shocks other than labor taxation has pushed up the unemployment rate. This, in the face of an unchanged level of Government spending, may have translated into higher taxes levied on the employed. Unemployment may lead labor taxes, not the opposite. Note that the same line of reasoning applies to proxies for labor market institutions, especially considering that they are measured in the late 1980s or in the early 1990s.

This is a serious issue for all of the studies surveyed here, and possibly for all regressions employing aggregate data. The overall issue is the long-standing problem of finding reliably exogenous instruments at yearly or five-year frequencies. DT, in line with the applied growth regression literature, employ lagged variables of the tax rates as instruments for current tax rates. Yet this does not fully tackle the bias problem, as long as taxes are generated by an AR process.

It is just fair to say that solutions to the endogeneity issue are hard to come by within this strand of literature. In section 5 the potential for solving this problem through other methods of analysis is briefly evaluated.

[5] Both variables are now regularly updated once a year (taxes) and every other year (replacement rates) in the OECD Revenue Statistics and the Social Expenditure Database.

Wage equations

Finally, to test whether the channel of transmission from labor taxes to unemployment goes through wages, as it should based on static partial equilibrium analysis. Compared to the earlier attempts discussed above, the range of the available estimates appears smaller. DT (2000, Table 11, p.83) estimated a reduced-form wage regression of the form:

$$g_{Wit} = \text{constant} + \delta_1 \Delta\tau^{W}_{it} + \delta_2 \Delta x_{it} + e^{w}_{it}$$

where g_W is the growth rate of gross real wages, $\Delta\tau^W$ is the change in the tax rate on labor, and Δx is a set of control variables in first differences, inclusive of shifters of the wage setting function (such as the replacement rates and the past unemployment rate) and of the labor demand (TFP growth rate or the instrumented per-capita GDP growth rate).

Their estimate of δ_1 is 0.4 for countries in Continental Europe, about 0.2 for Nordic countries (but imprecisely measured) and statistically zero for the US, Japan and Canada. These results are very similar to the results in Alesina and Perotti (1997, Table 7, col.4), where the same idea of estimating different coefficients between countries with similar labor market institutions was implemented first. [6] Alesina and Perotti found a positive relation between labor taxes and unit labor costs in manufacturing in a sample of annual data from 14 OECD countries (the same as Daveri and Tabellini), except that they have Denmark instead of Spain. Their estimated coefficients were again 0.4 for countries in Continental Europe, 0.3 for other EU countries and zero for the US and Canada.

Summing up

While the evidence provided in the early studies unanimously rejected it, recent research with aggregate data has overall strengthened the case for an empirical link between labor taxes and unemployment. Whether the pattern of detected partial correlation is to be interpreted in a causal sense remains highly controversial, however.

[6] Note however that, as is often the case in this literature, the classification of countries marginally differs in some cases. Alesina and Perotti followed the qualitative classification suggested by Calmfors and Driffill (1988), instead of relying directly on coverage and density data as criteria for separating countries as Daveri and Tabellini did.

5. Alternative methods of analysis

5.1 Micro data

Studies based on micro data, as long as carried out in quasi-natural experiment settings, are well-equipped to tackle the difficulty of isolating the really exogenous component of a policy change by finding reliable instruments for right-hand side variables. Moreover, the policy change under study and its differential effects on various groups of workers can be precisely captured. Scope exists for classifying policies depending on whether they affect demand or supply of labor, or if they are general or tailored to some group. These conditions are not easily met when working with aggregate data. [7]

Labor economists working micro data have seemingly reached an overall consensus on the long-run neutrality of labor taxes on labor costs and employment. The bulk of the evidence surveyed in Gruber (1998, Table 8, 75-76) finds nearly full backward shifting of exogenous changes in employer-provided insurance costs and maternity benefits on net wages only, and cannot thus be literally taken to imply zero employment effect of labor taxes as well. A few micro studies look at wages and employment or hours simultaneously, though. Gruber (1997) finds that the dramatic reduction in payroll taxation, associated with the 1981 Chilean pension reform, fed into higher net wages in the manufacturing sector, with little or no employment effects. Gruber and Krueger (1991), Gruber (1994) and Anderson and Meyer (2000) had also obtained similar results when studying the impact of government mandated employer-provided benefits in the US (insurance for workplace injuries, childbirth coverage, unemployment insurance), where the mandated cost was different across states at a point in time and within each state over time.

As appropriately pointed out by Gruber (1997, S79), however, it remains unclear whether the results obtained for a specific benefit program in Chile and specific states of the US can be readily extended to other programs and country-specific institutions. Moreover, natural experiments do not occur often, which somehow constrains the scope for extending the application of studies on micro data.

Finally, sudden changes may be slow in producing effects. Hence, even in the absence of a long run employment effect of taxes, the transition to the long run may last long enough to be relevant for most policy-makers, even in countries where the long-run neutrality result is found to hold.

[7] Contini (2000) effectively surveyed the main methodological issues confronting users of micro data.

5.2 Simulation

Irrespective of the aggregate evidence previously surveyed, the view that taxes have no employment effects finds its ultimate roots in the *timing mismatch* between the 'wage push' in the 1960s and the 1970s, and the rise in unemployment in the 1980s and the 1990s. When unemployment went up, it is argued, the wage push was largely gone. Unless a transmission mechanism to explain the delayed effects of the wage push of the seventies is postulated,[8] this timing mismatch weakens the tax-push-based explanation of the rise in unemployment in Europe. If labor taxes have important distorting effects, why did unemployment rates start their rise so much later than labor costs ? If there is such a close connection between wages and unemployment (as posited by the static labor market model), why did unemployment stay up well after the decline in real wages ?

The macro-econometric literature has not addressed these questions yet. It may even never succeed doing so, for the exogenous shocks to taxes – sometimes luckily available when working with micro data - are not easily identified in the aggregate data.

A possible way out of this dilemma draws on numerical simulation. In recent work, Daveri and Maffezzoli (2001), building on Daveri and Tabellini (2000), have pursued this idea further. A dynamic general equilibrium model with a labor market imperfection and exogenous growth is calibrated to replicate the functioning of EU laboratory economies. In this framework, the dynamic effects of the wage push on capital accumulation and wage aspirations can be studied along a transitional dynamics path.

Their numerical analysis shows that wages predictably fall after the initial tax shock (or their growth rate falls short of TFP growth), but this is not beneficial to employment. The initial employment fall is even magnified over time, as long as aspirations take time to adjust. When the adjustment is complete, real wages are eventually back to where they were at the beginning, while employment does never recover. The slowdown of real wage growth with still high unemployment rates in Europe – a symptom of 'hysteresis' according to Blanchard and Summers (1986) - may then be given a neoclassical rationale and interpreted as the backlog of the adjustment process of the economy in the aftermath

[8] There is indeed a long list of potential candidates as transmission mechanisms. Blanchard and Summers (1986) proposed a theory of hysteresis in unemployment due to insider-outsider mechanisms. Bentolila and Bertola (1990) modelled asymmetric firing costs. Phelps (1972) and others mentioned skill deterioration of the unemployed as an obstacle to their re-entry in the labor market. Dreze and Bean (1990) collected a few papers where the idea of capital shortages as a factor contributing to the persistence of unemployment was explored. My, perhaps biased, reading of Bean's 1994 survey (Section 5) is that all of these mechanisms were usually regarded as theoretical curiosum, establishing possibilities rather than necessities.

of the tax shock.

This paves the road to solve the mismatch puzzle mentioned above. Moreover, the endogeneity problem which plagues the macro-econometric literature is solved by construction in simulation studies.

Numerical simulation also allows one to carefully assess the importance of alternative methods of financing the tax reduction. Carraro, Galeotti and Gallo (1996) explore the 'double dividend hypothesis' asking whether a reduction in labor taxes financed through a 'green tax' (such as a tax on CO_2 emissions) would bring substantial gains from employment. In the paper quoted above, Daveri and Maffezzoli evaluate the effects of alternative fiscal policy measures on employment and growth. Both papers conclude that employment is unlikely to be markedly affected by labor tax reductions when this simply reallocates the deadweight loss elsewhere (*e.g.* from labor to capital). Daveri and Maffezzoli also find that, instead, sizable employment gains arise if the fiscal reform comes about from a plan aimed at shrinking overall government size. Based on these findings, one may conclude that a large effect of labor taxation on unemployment is more likely observed when government size expands in parallel, as has been the case since the mid 1970s. This also suggests that we should not expect much employment gain from reductions in labor taxation when the overall tax burden stays unchanged. In other words, as also emphasized in Mendoza, Milesi-Ferretti and Razin (1997), the structure of taxation does not appear to matter very much.

6. Conclusions

Charlie Bean ended his 1994 survey on the causes of European unemployment stating:

> There needs to be a more deliberate attempt to compare results across studies and to identify the extent to which apparent differences in fit are due to different variable definitions and different conditioning assumptions (Bean, 1994, p.616)

In this paper, I took his statement seriously and put together the results from different studies trying to make sense of differences and similarities.

In general, the applied literature on labor taxes and unemployment has attracted a lot of attention for its policy relevance, and has been object of careful empirical scrutiny. Whether these studies have substantially furthered our understanding of the causes of unemployment in the OECD remains perhaps debatable. Undeniably, however, a broad pattern of partial correlation between labor market outcomes (unemployment,

employment, wages) and proxies for institutions and policies has been explored at length and brought to the public attention.

In conclusion, although the labor market effects of labor taxes have been extensively analyzed in macro-econometric, micro-econometric and simulation studies, we still don't know whether labor taxes have statistically significant and economically important effects on labor costs and employment. My reading of the empirical literature is that the three strands of analysis have not just been distinct, but outright separate. A contribution of this paper is to show that scope for comparison across methods and studies does exist and may be fruitful for future research.

REFERENCES

Alesina, A. and R.Perotti, (1997), The Welfare State and competitiveness, *American Economic Review*, 87, 921-939

Anderson, P.M. and B.D. Meyer (2000), The effects of unemployment insurance payroll tax on wages, employment, claims and denials, *Journal of Public Economics*, 78, 81-106

Beach, C. and F.Balfour (1983), Estimated payroll tax incidence and aggregate demand for labour in the United Kingdom, *Economica*, 50, 35-48

Bean, C. (1994), European unemployment: a survey, *Journal of Economic Literature*, vol.32, 573-619

Bean, C., R.Layard and S.Nickell (1986), The rise in unemployment: a multi-country study, *Economica*, 53, S1-S22

Blanchard, O.J. and F.Giavazzi (2001), Macroeconomic effects of regulation and deregulation in goods and labor markets, NBER Working Paper #8120, February

Blanchard, O.J. and L.F.Katz (1997), What we know and do not know about the natural rate of unemployment, *Journal of Economic Perspectives*, 11, 51-72

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

Carraro C., Galeotti M., and Gallo M. (1996), Environmental taxation and unemployment: some evidence on the 'double dividend hypothesis' in Europe, *Journal of Public Economics*, 62, 141-181

Contini, B. (2000), Introduction to the Workshop "Lowering payroll taxes: does it help to improve employment opportunities?", Turin, February 25-26, mimeo

Daveri, F. and M.Maffezzoli (2001), Employment and output effects of reducing labor taxes in Europe: a numerical approach, IGIER, Università Bocconi, mimeo, May

Daveri, F. and G.Tabellini (2000), Unemployment, growth and taxation in Industrial Countries, *Economic Policy*, April 2000, 47-104

Feldstein, M. (1972), The incidence of the payroll tax: a comment, *American Economic Review*, 62, 735-738

Gruber, J. (1994), The incidence of State-mandated maternity benefits, *American Economic Review*, 84, 622-641

Gruber, J. (1997), The incidence of payroll taxation: evidence from Chile, Journal of Labor Economics, S72-S101

Gruber, J. (1998), Health insurance and the labor market, *NBER Working Paper* #6762, October

Hamermesh, D.S.(1979), New estimates of the incidence of the payroll tax, *Southern conomic Journal*, 45, 1208-1219

Hamermesh, D.S. (1993), *Labor demand*, Princeton, N.J.; Princeton University Press

Layard, R., S.Nickell and R.Jackman (1991), *Unemployment: Macroeconomic performance and the labour market*, Oxford, Oxford University Press

Leuthold, J. (1975), The incidence of the payroll tax in the United States, *Public Finance Quarterly*, 3, 3-13

Mendoza, E., G.Milesi-Ferretti and P.Asea (1997), On the ineffectiveness of tax policy in altering long-run growth: Harberger's superneutrality conjecture, *Journal of Public Economics*, 99-126

Mendoza, E., A.Razin and L.Tesar (1994), Effective tax rates in macroeconomics: cross-country estimates of tax rates on factor incomes and consumption, *Journal of Monetary Economics*, 34, 297-323

Nickell, S. and R.Layard (1999), Labor market institutions and economic performance, in

O.Ashenfelter and D.Card (eds.), *Handbook of Labor Economics*, vol.III

Padoa Schioppa, F. (1990), Union wage setting and taxation, *Oxford Bulletin of Economics and Statistics*, 52, 143-166

Phelps, E.S. (1994), *Structural slumps: the modern equilibrium theory of unemployment, interest and assets*, Cambridge, Mass., Harvard University Press

Pissarides, C. (1998), The impact of employment tax cuts on unemployment and wages; the role of unemployment benefits and tax structure, *European Economic Review*, 155-183

Summers, L., J.Gruber and R.Vergara (1993), Taxation and the structure of labor markets: the case of corporatism, *Quarterly Journal of Economics*, 385-411

Theil, H. (1954), *Linear aggregation of econometric relations*, Amsterdam, North-Holland

Table 1
Labor taxes, unemployment and real wages

	USA	UK	Germany	France	Italy	Spain
Average effective labor tax rates						
1965	17.5	20.4	29.0	25.4	24.8	13.3
1970	22.6	24.7	31.5	32.6	27.3	17.5
1975	24.6	27.4	36.4	34.5	30.1	22.9
1980	27.6	25.0	38.3	40.2	33.8	29.8
1985	28.3	26.8	40.4	44.2	38.2	34.2
1990	29.1	24.5	40.2	45.8	42.2	36.9
1995	27.4	25.4	43.5	49.3	47.1	31.5
1999	29.2	26.4	45.1	50.9	46.5	31.7
1965-99	**+11.7**	**+6.0**	**+16.1**	**+25.5**	**+21.7**	**+18.4**
1965-80	**+10.1**	**+4.6**	**+9.3**	**+14.8**	**+9.0**	**+16.5**
1980-99	**+1.6**	**+1.4**	**+6.8**	**+10.7**	**+12.7**	**+1.9**
Unemployment rates						
1965	4.4	2.0	0.3	1.5	5.3	2.6
1970	4.8	3.0	0.8	2.5	5.3	2.4
1975	8.3	4.3	3.6	4.0	5.8	3.6
1980	7.0	6.4	2.9	6.2	7.5	11.1
1985	7.1	11.2	7.1	10.2	9.6	21.1
1990	5.4	6.8	4.8	8.9	10.3	15.9
1995	5.5	8.7	8.2	11.6	11.6	22.7
1999	4.2	6.1	8.8	11.3	11.3	15.9
1965-99	**-0.2**	**+4.1**	**+8.5**	**+9.8**	**+6.0**	**+13.3**
1965-80	**+2.6**	**+4.4**	**+2.6**	**+4.7**	**+2.2**	**+8.5**
1980-99	**-2.8**	**-0.3**	**+5.9**	**+5.1**	**+3.8**	**+4.8**
Cumulated real wage growth						
1965-99	+32.2	+62.1	+53.0	+47.7	+54.2	+58.0
1965-80	+14.8	+28.8	+40.5	+37.5	+44.6	+49.6
1980-99	+17.4	+33.2	+12.5	+10.2	+9.6	+8.4
Cumulated TFP growth						
1965-99	+25.2	+46.1	+44.3	+58.1	+50.3	+52.8
1965-80	+8.4	+20.4	+30.1	+30.9	+33.2	+28.7
1980-99	+16.8	+25.7	+14.2	+27.2	+17.1	+24.1
Cumulated (wage-TFP) growth						
1965-99	**+7.0**	**+16.0**	**+8.7**	**-10.4**	**+3.9**	**+5.2**
1965-80	**+6.4**	**+8.4**	**+10.4**	**+6.6**	**+11.4**	**+20.9**
1980-99	**+0.6**	**+7.5**	**-1.7**	**-17.0**	**-7.5**	**-15.7**

Table 2
Features of labor bargaining in Industrial Countries

Country	*Coverage*		*Density*		*Coordination*	
	1980	*1990*	*1976-81*	*1986-91*	*Union*	*Employer*
ANGLO						
Canada	37	38	26	32	1	1
Japan	28	23	31	26	2	2
USA	26	18	23	15	1	1
United Kingdom	70	47	48	39	1	1
EUCON						
Australia	88	80	46	44	2	1
Belgium	90	90	55	54	2	2
France	85	92	19	12	2	2
Germany	91	90	35	31	2	3
Italy	85	83	45	34	2	2
Netherlands	76	71	35	23	2	2
Spain	68	68	25	11	2	1
NORDIC						
Finland	95	95	69	71	2	3
Norway	75	75	52	54	3	3
Sweden	83	83	76	83	3	3

Source: Daveri and Tabellini (2000)

Notes:
"Coverage" measures the extent to which contracts signed by organized unions extend to the rest of the labor force.
"Density" measures the rates of net union density, i.e. the number of union members net of pensioners divided by the labor force.
"Coordination" measures the extent of contracting coordination within different union and employer organizations in 1989-94. The index provides a qualitative ranking of countries: "1"means "Low", "2" is for "Medium", "3" is for "High".

Our papers can be downloaded at:

http://cerp.unito.it

CeRP Working Paper Series:

N° 1/00	Guido Menzio	Opting Out of Social Security over the Life Cycle
N° 2/00	Pier Marco Ferraresi Elsa Fornero	Social Security Transition in Italy: Costs, Distorsions and (some) Possible Correction
N° 3/00	Emanuele Baldacci Luca Inglese	Le caratteristiche socio economiche dei pensionati in Italia. Analisi della distribuzione dei redditi da pensione (only available in the Italian version)
N° 4/01	Peter Diamond	Towards an Optimal Social Security Design
N° 5/01	Vincenzo Andrietti	Occupational Pensions and Interfirm Job Mobility in the European Union. Evidence from the ECHP Survey
N° 6/01	Flavia Coda Moscarola	The Effects of Immigration Inflows on the Sustainability of the Italian Welfare State
N° 7/01	Margherita Borella	The Error Structure of Earnings: an Analysis on Italian Longitudinal Data
N° 8/01	Margherita Borella	Social Security Systems and the Distribution of Income: an Application to the Italian Case
N° 9/01	Hans Blommestein	Ageing, Pension Reform, and Financial Market Implications in the OECD Area
N° 10/01	Vincenzo Andrietti and Vincent Hildebrand	Pension Portability and Labour Mobility in the United States. New Evidence from the SIPP Data
N° 11/01	Mara Faccio and Ameziane Lasfer	Institutional Shareholders and Corporate Governance: The Case of UK Pension Funds
N° 12/01	Roberta Romano	Less is More: Making Shareholder Activism a Valuable Mechanism of Corporate Governance
N° 13/01	Michela Scatigna	Institutional Investors, Corporate Governance and Pension Funds

N° 14/01	Thomas H. Noe	Investor Activism and Financial Market Structure
N° 15/01	Estelle James	How Can China Solve ist Old Age Security Problem? The Interaction Between Pension, SOE and Financial Market Reform
N° 16/01	Estelle James and Xue Song	Annuities Markets Around the World: Money's Worth and Risk Intermediation
N° 17/02	Richard Disney and Sarah Smith	The Labour Supply Effect of the Abolition of the Earnings Rule for Older Workers in the United Kingdom
N° 18/02	Francesco Daveri	Labor Taxes and Unemployment: a Survey of the Aggregate Evidence