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An Introduction to the Wage Curve

David G. Blanchflower and Andrew J. Oswald

Economists and policymakers are interested in understanding the forces that determine the level of unemployment and the level of wages. This paper describes an empirical discovery—made with the help of international microeconomic evidence covering more than a dozen nations—about a link between these two variables. The connection can be portrayed on a graph with the level of unemployment on the horizontal axis and the level of wages on the vertical axis. Then the “wage curve,” as shown in Figure 1, is a downward-sloping locus. This relationship tells us that (holding others things constant) if a region has a rise in unemployment in a particular year, those who live there will have a fall in their wages in that year.

What does this curve mean? How, in a field where fully controlled experiments are almost impossible, could there be any convincing scientific basis for this wage curve? What is the relationship between the wage curve and a Phillips curve, other than that the curve of Figure 1 looks like a Phillips curve with the vertical axis mislabeled? How does the wage curve fit into existing economic knowledge, and is the empirical finding consistent with competitive theory? This paper sketches answers to these kinds of questions. The discussion draws on our book, *The Wage Curve* (Blanchflower and Oswald, 1994), where the points raised here are investigated more fully. It also rests upon work done by other economists whose work is listed in the paper and the bibliography.

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Uncovering the Wage Curve

Any construction rests ultimately upon its methods and raw materials. The modus operandi in research on the wage curve has been to use random samples of workers and establishments. These data come from various nations. When the same statistical methods are employed on each nation's sample, the international data sets reveal approximately the same answer—that is, they seem to point again and again to a curve that resembles Figure 1.

In *The Wage Curve*, the size of sample varies from one part of the world to another. The years sampled also vary. For the United States, for example, the analysis draws upon the Current Population Surveys from 1964 to 1991. This provides a sample of more than 1.5 million American workers. Some recorded interviews in the 1960s; others did so a quarter of a century later. A similarly large sample is available for South Korea. That country's Occupational Wage Surveys of 1971, 1983 and 1986 offer the investigator information on approximately 1.4 million employees. At the other end of the spectrum, there are results for small countries, like Switzerland and Norway. In these cases, the samples are of less than 3000 people in each nation. Many of these data are from the International Social Survey Programme, a multicountry collaborative project in which survey teams from a dozen nations asked the same questions of random samples of individuals from each of the countries (Jowell, Witherspoon and Brook, 1989). Overall, the data in *The Wage Curve* provide information on approximately 3.5 million people, from 12 countries.

The wage curve is found by estimating large regression equations. The procedure is the following. For each person, from each country, the data sets record the individual's level of pay and his or her personal characteristics. In most instances, the name of the region in which the worker lives is also recorded in the data set. Rates of unemployment vary, as is well known, from one region to another and from one country to another. The analysis matches those unemployment rates to the sampled individuals. In other words, if Miss X of San Francisco is known to be earning \$12,000 per year in 1981, the unemployment rate in California in that year can be merged into the data set and treated as a variable that is potentially relevant in explaining the level of Miss X's pay. For Britain, similarly, the sample might include information on Mr. Y working in Edinburgh in the year 1974. The 1974 unemployment rate for Scotland, therefore, can be added to the data set as a possible influence upon Mr. Y's remuneration in that year. Repeating this process many times gives information on a large number of workers' pay levels and, in each case, an associated unemployment rate in the person's region.

What emerges from the data is a pattern linking pay and unemployment. A representative table of unemployment elasticities is given in Table 1. The 12 coefficients summarized in Table 1 are negative and in most cases well defined. As a crude characterization of the data, a typical wage curve is described by the

Figure 1
The Wage Curve



formula $\ln w = -0.1 \ln U + \text{other terms}$, where $\ln w$ is the logarithm of the wage, and $\ln U$ is the logarithm of the unemployment rate in the worker's area. Since both the local rate of unemployment and the wage are entered as logarithms, the coefficient on unemployment represents proportional change and can be read off as an elasticity. The other terms in the equation are variables for personal characteristics of the worker, like age, gender, race, years of schooling, and "fixed effects," which refer to controls for regions or industries. For example, in the U.S. data it is especially important to control for regional fixed effects—that is, to include a set of regional dummies or to difference the data.

This practice of treating regions as mini-economies provides many more units of observation than in conventional macroeconomics. For the United States, for example, some results focus upon 50 states through the 1980s, rather than on 10 annual aggregate time-series data points. Occasionally the analysis looks at industries rather than regions, but the underlying idea, that of uncovering the links between unemployment and earnings by using disaggregated information, remains the same.

For Britain, Canada and the United States, the estimates of the unemployment elasticity of earnings lie in a range from -0.08 to -0.11 in almost all specifications. For some nations, there are few years of data across which to pool, and it is then to be expected that the inclusion of regional dummies will weaken the power of the analysis and lead to low t -statistics. Southern Ireland is the only real outlier. Its coefficient is so unstable that the results were almost left out; they should be treated skeptically. Korea, for which an industry wage curve

Table 1
Wage Curves in 12 Nations

Country	Dependent Variable	Data Set	Coefficient on Log U (t -statistics)	Fixed effects		Sample size
				Y = yes	N = no	
USA	Annual earnings	Current Population Survey 1963–90	-.10 (25.0)	Y		1,730,175
Britain	Monthly earnings	General Household Survey 1973–90	-.08 (6.2)	Y		175,500
Canada	Gross annual earnings	Survey of Consumer Finances 1972–87	-.09 (6.1)	Y		82,739
S. Korea	Gross monthly earnings	Occupational Wage Surveys 1971–86	-.04* (25.7)	Y		1,359,387
Austria	Gross monthly earnings	ISSP 1986 & 89	-.09 (1.6)	S		1,587
Italy	Gross monthly earnings	ISSP 1986–9	-.10 (0.6)	Y		1,041
Holland	Net monthly earnings	ISSP 1988–91	-.17 (2.2)	S		1,867
Switzerland	Net monthly earnings	ISSP 1987	-.12 (3.6)	N		645
Norway	Gross yearly earnings	ISSP 1989–91	-.08 (2.2)	S		2,599
S. Ireland	Net monthly earnings	ISSP 1988–91	-.36 (1.9)	N		1,363
Australia	Weekly income	IDS 1986	-.19 (5.8)	N		8,429
Germany	Gross monthly earnings	ISSP 1986–91	-.13 (1.8)	Y		4,629

Notes: These are coefficients on local unemployment variables in microeconomic wage equations. The equations are estimated using the numbers of observations stated in the final column.

ISSP is the International Social Survey Programme.

Log U is defined as the logarithm of an area unemployment rate at various levels of disaggregation in different countries. T -statistics are in parentheses. Where indicated by a *, unemployment is measured at the industry level. The dependent variable, pay, is in natural logarithms. “Fixed effects” refer to controls for region or industries. In all equations, personal variables (gender, race, age, schooling, etc.) are included as controls.

Where few years of data are available, countries’ unemployment coefficients sometimes weaken when full regional dummies are added. This table is meant only to be representative. Fuller results are in the book *The Wage Curve*.

alone can be estimated, has an unemployment elasticity of -0.04 , which is somewhat lower than the other figures in the table.

The typical finding seems to be that a hypothetical doubling of the local unemployment rate is associated—consistent with early evidence discussed in Oswald (1986)—with a drop in pay of one-tenth (that is, a 100 percent rise in unemployment causes a 10 percent fall in the level of wages). Though not given here, there is evidence that the unemployment elasticity of pay differs among certain subgroups. It is higher for the young, the unskilled and those outside unions.

A worker who is employed in an area of high unemployment earns less than an identical individual who works in a region with low joblessness. Surprisingly, the nature of the relationship appears to be the same in different countries. The wage curve in the United States is very similar to the wage curves in, for example, Britain, Canada and Norway. Moreover, other economists have estimated wage curves for further nations. Montgomery (1993) obtains an unemployment elasticity of pay for Japan of -0.15 or less. Rebeck's (1995) Japanese results are similar. Hoddinott (1993) produces an estimate of -0.13 for the Cote d'Ivoire. This is doubly interesting, because it is one of the first estimates of the local unemployment elasticity of pay for a developing country, and because the calculated number is so like that in the industrialized West. Bhalotra (1993) finds a negative effect for India. Although the coefficient is not always well determined, once regional dummies are included, her estimated elasticity at the mean is, somewhat remarkably, again -0.13 . Edin and Holmlund (1989), Holmlund and Skedinger (1990) and Edin, Holmlund and Ostros (1994) estimate a small negative coefficient for regional unemployment in Sweden. Further results are in Groot, Mekkelholt and Oosterbeek (1992) for the Netherlands, Wagner (1994) for Germany, and Winter-Ebmer (1995) for Austria. Other studies offering some support for the wage curve include the work of Blackaby and Manning (1987, 1990), Card (1990), Christofides and Oswald (1992), Freeman (1988, 1991), Katz and Krueger (1991, 1992), and Lemieux (1993). Some early findings for Britain and the United States are reported in Blanchflower and Oswald (1990).

This uniformity was probably not expected by any researcher and seems remarkable. By the standards of modern economics, the picture of a wage curve where the elasticity of wages with respect to unemployment is -0.1 seems to be a consistent one. However, much remains to be done in explaining the relationship, and that is the concern of later sections of the paper.

Checks and Criticisms

This journal is not the place for an in-depth discussion of the statistical nature of the wage curve, but three potential criticisms are worth a brief airing

here. For more detailed responses, the interested reader should consult our book, *The Wage Curve* (Blanchflower and Oswald, 1994).

The first concern is a possible simultaneity bias. The wage curve equations show wages depending on unemployment. However, unemployment may also depend upon pay, perhaps through the functioning of a downward-sloping labor demand curve. In this case, ordinary least squares estimation of the wage curve is flawed by a lack of allowance for simultaneity bias. Attractive though such thinking is theoretically, little support for it can be found empirically. One approach is to use instrumental variables like weather variables, military spending, industry mix or lagged unemployment in estimating a wage curve equation. Such an approach produces estimates of the elasticity of earnings with respect to unemployment that are only fractionally higher than those from ordinary least squares methods. At least in this context, unemployment apparently has the characteristics of a predetermined variable.

A second criticism is possible bias from common-group effects—in this case where the independent variable (unemployment) is more highly aggregated than the dependent variable (wages). The nature of the difficulty, which is routinely ignored in empirical research, is explained in sources such as Moulton (1986). When a correction is done, the substantive findings of the research remain unchanged.

A third potential criticism is that to measure real wages in different regions one should have regional consumer price data. However, these data are often not available. Although this problem is a real one, there are reasons to think that it is not too serious. Controlling for regional prices in Britain, where the data are available, leaves the wage curve intact. Nominal wages are likely to be sufficient whenever year dummies and regional dummies can be, as for most countries, included in the regression equations. The evidence for an industry wage curve, moreover, is presumably immune to the criticism that there are not geographical deflators. Finally, if prices depend dominantly upon wages and a constant, they can be substituted out to leave a nominal reduced-form wage equation.

Explanations and Interpretations

The evidence suggests that the wage curve is not the product of some mechanical error, or of a compositional omission or bias, or of some failure to control for hours of work or the automatic drops in income of those who lose jobs. It does not seem to be a special result that can be discerned only in particular time periods or places. Therefore, it provides a theoretical challenge.

One obvious interpretation is to think of the wage curve as a method for the calculation of an index of wage rigidity, or “stickiness.” This index is easily understood. It is a measure of the responsiveness of workers’ remuneration to the

amount of excess supply in the local labor market. This is captured in the wage curve by the coefficient on log unemployment in an equation for log earnings. Remarkably, despite countries' institutional differences, they exhibit more uniformity in wage flexibility than has been thought. Put more technically, the local unemployment elasticity of pay appears to be approximately the same across nations.

Most economists react to an empirical phenomenon by reaching, at least initially, for supply-and-demand analysis. Could a framework of that kind explain the wage curve? At first glance, it seems not. Unemployment in the neoclassical model of the labor market results when the wage exceeds the market-clearing level. The numbers of individuals who wish to supply their labor then exceeds the number whom firms wish to employ. The higher the wage, the greater the degree of unemployment. In a framework of the textbook kind, where unemployment is the gap between a supply curve of labor and a demand curve for labor, wages and unemployment are positively associated. This is the reverse of the empirically estimated curve in Figure 1.

However, the demand-and-supply model of the labor market cannot be dismissed quite this easily. Unemployment might be viewed as a voluntary choice by workers. Many commentators have pointed out that this is difficult to square with the distress shown by people when they lose their jobs. Nevertheless, there is a tradition within economics that questions the usefulness of the concept of "involuntary" unemployment. Thus, a possible way to make the wage curve consistent with a demand-and-supply analysis is to suggest that the curve is some kind of labor-supply function. Then, the key assumption is that unemployment is the negative of employment. If the potential labor force is fixed at some number greater than the level of employment on a labor supply curve, unemployment does not have to be thought of as a gap between the quantity of labor supplied and demanded. It could be viewed as the gap between labor supply and a fixed labor force.

Logical and empirical difficulties then spring up. In particular, the unemployed in this definition are not offering their labor for sale. This seems inconsistent with the technical definition of unemployment used by most government survey agencies and perhaps runs counter to common sense.

One can test a labor-supply interpretation of the wage curve by comparing the explanatory power, within a wage equation, of both unemployment and conventional measures of the supply of labor. If unemployment is a mismeasured version of a normal labor-supply relationship, it should perform statistically less well, as a predictor of wages, than labor-supply variables like the participation rate or the employment/population rate. Empirically, however, it does not. In short, the evidence does not offer support for the idea that the negative correlation between pay and unemployment is explained by a labor-supply function.

We believe that a demand-and-supply framework is the wrong way to think about the labor market. As Solow (1990, p. 3) and others have suggested, there

may be something special about labor as a commodity and, therefore, about the labor market itself.

The Wage Curve and Harris-Todaro Compensating Differentials

To economists raised on the Harris-Todaro (1970) and Hall (1970, 1972) models, the wage curve may be a surprise. Those models predict the reverse slope. By the requirement for a spatial equilibrium in which all regions provide the same expected utility, high-unemployment areas ought also to be high-wage regions. In other words, to ensure that nasty and nice features of regions cancel out, the wage locus should have a positive gradient. This hypothesis is as decisively rejected by international microeconomic data as it is possible to imagine. This raises doubts about conventional wisdom in U.S. labor and regional economics.

That does not mean, however, that the idea of compensating differentials is wrong, or irrelevant. Movements in actual wages can be negatively correlated with movements in actual unemployment, while at the same time “permanent” unemployment, put loosely, is positively related to “permanent” wages. Migration is presumably driven by these permanent values. On one interpretation, the mistake that the early empirical literature made was to omit controls for regional fixed effects, that is, to leave regional dummies out of the estimated wage equations. Once those dummies are included, Hall’s (1970, 1972) predicted positive spatial correlation between pay and joblessness—the result in theory of compensating differentials across regions—comes out empirically as strongly negative.

A Noncompetitive Labor Market Explanation?

If the competitive market model gives an unconvincing rationalization of the wage curve, noncompetitive accounts of the labor market must be considered. In a bargaining model, a high degree of joblessness in the surrounding labor market might reduce the ability of workers to claim a large share of the surplus to be divided. A possible story—one theory of the wage curve—is that outside unemployment frightens workers. This may be because if something goes wrong, and individual workers need to obtain other jobs, finding jobs is likely to be harder when the local labor market is depressed. Therefore, although some details of the process here remain cloudy, rising joblessness might be thought to spawn declining levels of pay. A variant on this species of explanation relies on the explicit assumption of a trade union that worries about both its employed members and its unemployed members. High unemployment means that more of its members are likely to be without work and that an employed member who is dismissed or laid-off will have difficulty

finding new employment. An increase in unemployment may then tilt the union's preferences towards a greater concern with the number of jobs. If this implies a reduced concern for pay, or at least a slightly smaller weight on the target of high remuneration for union members, a lower negotiated level of pay could result.

While a bargaining or union approach might thereby render intelligible the pattern in the data of the wage curve, such an interpretation could be viewed as inappropriate in many settings outside western Europe and even in some industrial sectors within that part of the globe. Unionism is not pandemic. In the United States, the great majority of those who hold jobs do not belong to a trade union. This does not make bargaining theory irrelevant, but it raises some doubts about its pertinence.

A second noncompetitive way to provide an intellectual rationale for the wage curve is by appealing to efficiency wage theory. This approach is intrinsically nonunion, so it is potentially suitable for economies that are more like America than Sweden. The well-known characteristic of efficiency wage analysis is that firms set pay in an environment where the wage influences productivity. Shapiro and Stiglitz (1984) is an archetypal case. In equilibrium, firms try to maximize profits, and workers choose how hard to work. The outside rate of unemployment plays a central role, because it determines the ease with which a sacked worker can get another job. In a highly depressed labor market, employees are frightened of losing their jobs and so put in high effort even if pay is comparatively low. Put differently, a marginal rise in unemployment leads to a corresponding marginal fall in the level of wages. The reason is that firms can reduce pay slightly while still maintaining a motivated workforce. Unemployment here is a discipline device: when it is high, the generosity of workers' remuneration can be set low. Hence, there is an efficiency wage interpretation of the wage curve.

Yet a further possibility is a halfway house between a union model and competitive theory. A "labor contract" model might be able to explain the negative correlation between wages and unemployment. In some versions of labor contract theory, wages and employment are positively correlated. A contract curve slopes upwards—meaning that wages and employment rise together—because when the wage rate is high, it is sensible for the workers and their firm to ensure that as many as possible of those in the labor pool have jobs. To those economists raised on neoclassical labor demand theory, this argument may have a strange ring to it. Should not employment be low when the price of labor is high? In this contractual framework, the answer is that it should not. An efficient labor contract maximizes the joint welfare of employer and employees. Unemployed workers contribute only a little to the surplus earned by the combination. The higher the level of pay, the more desirable it is, from the combination's point of view, to have extra individuals in work and fewer individuals drawing unemployment benefits. An upward-sloping contract curve here acts as a quasi-supply curve. It is therefore worth considering as another

potential source of a negatively inclined relationship between pay and unemployment.

There is a variant on this approach. Consider a situation in which demand shocks occur randomly, and the firm has to design a remuneration package that will both make it money and attract sufficient employees. If the firm dislikes risk, it will wish the wage to rise in good times and to fall in bad times. When there is a boom, many workers are employed. In a slump, some are laid off. Again, there is the basis here for a model in which pay and unemployment are negatively related.

Which of these theories is the most plausible? The wage curve in labor contract theories is not truly a causal relationship, because the changes in the level of unemployment do not cause the wage level to move. The apparent interdependence of the variables is a trick of the eye. This approach therefore suffers one of the disadvantages of the competitive demand-and-supply apparatus. It is inherently about employment rather than unemployment. To be convincing, it requires some additional theoretical justification. Our guess is that the wage curve is explained instead by bargaining or efficiency wage forces. But there is still much to be learned.

During the last few years, macroeconomics has begun to offer a generation of new models in which an aggregate wage curve (in this paper's terminology) is the primary distinguishing feature. The history of this current research is discussed in Layard, Nickell and Jackman (1991) and Phelps (1990). Influential early contributions include Rowthorn (1977), Shapiro and Stiglitz (1984), and Layard and Nickell (1986). The same kind of model was presented by David Soskice in unpublished Oxford lectures in the 1970s, and is contained in the textbook by Carlin and Soskice (1990). The gist of all the work is that, in the 1980s, "a surrogate employment supply curve, or equilibrium wage curve, was born" (Phelps, 1992, p. 1004). A recent book by Lindbeck (1993) adopts the same approach and uses the assumption that there is a wage-setting curve, different from and to the left of conventional atomistic supply, that slopes upwards in real-wage/employment space. Akerlof and Yellen (1990) offer another model in which a central part is played by the same form of wage equation, in this case motivated by a fairness approach. For another recent discussion, see Woodford (1994).

As Shapiro and Stiglitz (1984) and Layard and Nickell (1986) make clear, the novel aspect of these models is not their assumptions about labor demand, which are standard. Rather, it is that the models replace the conventional labor supply curve with a wage-fixing function. The crucial constituent part in this way of thinking is a fairly flat but negatively sloped curve linking the level of pay to the level of unemployment. This allows the theories to be consistent with both involuntary unemployment and the paradoxical fact, noted by Greenwald and Stiglitz (1993) and others, that real wages fluctuate little while the long-run supply of workers appears close to vertical. As this paper tries to make clear, there is now international microeconomic evidence for such a curve.

More on the Wage Curve vs. Supply and Demand

A few economists, particularly those convinced that it makes sense to use the same model when studying the labor market as when studying the market for strawberries, may look with surprise at the correlation at the heart of the paper. These readers may see the wage curve as an inexplicable reduced-form equation. Where, they may ask, are the structural neoclassical model and the supply-demand specification that any satisfactory research must, surely, contain? This reaction is a sensible one, and, over the years, it has probably helped the discipline of economics to advance. But it is dictated by habit, and it carries with it the danger that the idea of the wage curve will be pushed aside because it is outside our preset mental pictures.

A common mistake is to argue in the following way. The wage curve, seminar discussants sometimes say, looks consistent with a normal supply-and-demand model that is repeatedly in disequilibrium. This is because bad demand shocks occur at the same time as low pay, and that fact is what is being picked up by the econometric equations. However, such an argument seems wrong. It confuses the idea of falling wages (which is what the competitive model predicts when there is high unemployment) with low pay (which is what the wage curve shows there to be empirically when there is high unemployment).

The purpose of the research behind the wage curve has been, among other things, to question the notion that labor market outcomes are usefully viewed as cutting points on graphs inscribed with demand functions and supply functions. It would not make sense, therefore, to glance into the research and ask to be shown the underlying demand-and-supply framework behind the data's configuration. The wage curve replaces the labor supply curve.

The Wage Curve and the Phillips Curve

A first look at the wage curve conjures up thoughts of the curve noticed by A. W. Phillips (1958), using nine decades of British aggregate data. The Phillips curve, however, is not what is being estimated in research on the wage curve. Why, exactly?

First, the Phillips curve links the rate of change of pay to the aggregate unemployment rate. The wage curve links the level of pay to the local unemployment rate. Crucially, the Phillips curve is about inflation, and the wage curve is not; and (less important) the Phillips curve is about the effect of aggregate unemployment, and the wage curve is about the role of local unemployment. Anyone tempted to argue that there is little difference between pay and pay inflation might ponder how they would feel as an astronaut being shot up at the moon by a group of physicists who had confused, in their technical calculations, the concepts of velocity and acceleration. Second, the Phillips

curve is traditionally estimated on time-series macroeconomic data. The wage curve is estimated on pooled cross sections of microeconomic data. Third, as a matter of interpretation, the Phillips curve was proposed as a disequilibrium adjustment mechanism. This is how it has entered the minds of countless undergraduates and politicians. In our conception, the wage curve is an equilibrium locus that is a description neither of inherently temporary phenomena nor of transitory dynamics.

Nevertheless, as Manning (1993) has argued, there may be other ways to defend the idea of a Phillips curve. It would be quite wrong, too, to view the wage curve as outside the tradition that Phillips began. Phillips' underlying concern, to understand the macroeconomic influence of joblessness upon wage setting, is continued here. Even so, if he had had access to microeconomic data, it is possible that A. W. Phillips might not be remembered today as a student of inflation.

There is a modern literature that attempts to distinguish between dynamic models, like the Phillips curve, and the properties of long-run equilibrium, which may be captured by a wage curve. These "error-correction models" suggest that it is valuable to specify Phillips-style equations with an extra lagged wage-level term on the right. In the steady state, when wage change has gone to zero, such a model can exhibit a connection between wage levels and unemployment levels. Sargan (1964) may have been the first such paper, although, because of its poorly defined standard errors, the substantive results about wage determination are not compelling.

In the microeconometric work on wage curves, when lagged values of wages are added as independent variables (along with the level of unemployment), they usually have a coefficient close to zero. Unemployment explains pay, but past levels of pay do not explain present levels of pay, and unemployment does not, in any simple sense, explain inflation. It is possible that the correlation termed the Phillips curve is misleading. It may be a mirage produced by a combination of overly aggregated data and inappropriate specification. If this vision proves correct, macroeconomics may find it valuable to turn more to microeconomic data.

Summary and Conclusion

This paper documents the existence of an international empirical regularity. The study of the wage curve fuses elements from, and seems to have implications for, macroeconomics, labor economics and regional economics. At this point, the main conclusions of the research are the following:

1. A wage curve exists. Employees who work in areas of high unemployment earn less, other things constant, than those who are surrounded by low unemployment.

2. A picture of this downward-sloping locus can be drawn with either regional unemployment or industry unemployment on the horizontal axis.

3. The wage curve is almost identical across the countries of the world. Approximately the same curve holds in data from the United States, Great Britain, Germany, Canada, Austria, Holland, Switzerland, Korea, Norway, Ireland, Italy, Japan, Australia, the Cote d'Ivoire, Sweden and India. It is also present, within nations, across different periods of time.

4. In the countries studied in the book, the estimated unemployment elasticity of pay is approximately -0.1 . This uniformity runs counter to orthodox teaching (based on time-series analysis), which claims that countries have very different degrees of wage flexibility.

5. Although matters are far from decided, it is difficult to see how the wage curve can be compatible with the textbook competitive model of the labor market. This idea takes some getting used to. A reader of the paper might ask, for example, why the observed curve could not be compatible with the simple view that, after a bad shock, slow adjustment in the labor market means we might often see high unemployment and low wages occurring together. This, however, confuses low wages with falling wages. It is the latter that unemployment in a competitive market should produce.

6. The idea of a Phillips curve may be misleading. This is another idea that is at first difficult to get one's mind around. Put in technical jargon, the autoregression commonly found in macroeconomic equations for the level of pay tends to disappear when micro data are used. More simply, it may not be sensible to think of there as being a relationship between unemployment and pay inflation, but rather one between (local) unemployment and the level of pay.

7. Harris-Todaro orthodoxy, which says that regional wages are positively correlated with regional unemployment, seems to be misleading.

8. Bargaining and efficiency wage models, because they give the correct prediction, are consistent with the wage-curve pattern.

9. The wage curve helps to provide the missing empirical foundation—a flat quasi-supply function—for a new class of noncompetitive macroeconomic models. The evidence suggests that it is not a conventional labor-supply curve.

10. Microeconomic data drawn from internationally comparable random samples provide economists of the 1990s with a rich new resource for testing hypotheses. Research of the kind described here probably only scratches the surface of what might be done in the future.

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References

- Akerlof, George A., and Janet L. Yellen, "The Fair Wage Hypothesis and Unemployment," *Quarterly Journal of Economics*, May 1990, 105, 255-83.
- Bhalotra, Sonia, "Geographical Differences in Unemployment and Wage Rates in India," mimeo, Wolfson College, Oxford University, 1993.
- Blackaby, David H., and D. Neil Manning, "Regional Earnings Revisited," *Manchester School of Economics and Social Sciences*, June 1987, 55, 158-83.
- Blackaby, David H., and D. Neil Manning, "The North-South Divide: Questions of Existence and Stability," *Economic Journal*, June 1990, 100, 510-27.
- Blanchflower, David G., and Andrew J. Oswald, "The Wage Curve," *Scandinavian Journal of Economics*, 1990, 92:2, 215-35.
- Blanchflower, David G., and Andrew J. Oswald, *The Wage Curve*. Cambridge: MIT Press, 1994.
- Card, David, "Unexpected Inflation, Real Wages and Employment Determination in Union Contracts," *American Economic Review*, September 1990, 80, 669-88.
- Carlin, W., and D. Soskice, *Macroeconomics and the Wage Bargain*. Oxford: Oxford University Press, 1990.
- Christofides, Louis N., and Andrew J. Oswald, "Real Wage Determination and Rent-Sharing in Collective Bargaining Agreements," *Quarterly Journal of Economics*, August 1992, 65, 985-1002.
- Edin, Per-Anders, and Bertil Holmlund, "The Unemployment Elasticity of Pay: Evidence from Swedish Micro Data," mimeo, University of Uppsala, Sweden, 1989.
- Edin, Per-Anders, Bertil Holmlund, and Thomas Ostros, "Wage Behavior and Labor Market Programs in Sweden: Evidence from Micro Data." In Tachibanaki, T., ed., *Labour Market and Economic Performance: Europe, Japan, and the USA*. New York: St. Martin's Press, 1994, pp. 33-55.
- Freeman, Richard B., "Evaluating the European View that the United States has No Unemployment Problem," *American Economic Review*, Papers and Proceedings, May 1988, 78, 294-99.
- Freeman, Richard B., "Employment and Earnings of Disadvantaged Young Men in a Labor-Shortage Economy." In Pado Schioppa, Fiorella, ed., *Mismatch and Labor Mobility*. Cambridge: Cambridge University Press, 1991, pp. 360-81.
- Greenwald, Bruce, and Joseph E. Stiglitz, "New and Old Keynesians," *Journal of Economic Perspectives*, Winter 1993, 7, 23-44.
- Groot, Wim, E. Meckelholt, and Hessel Oosterbeek, "Further Evidence on the Wage Curve," *Economics Letters*, March 1992, 38, 355-59.
- Hall, Robert E., "Why is the Unemployment Rate So High at Full Employment?," *Brookings Papers on Economic Activity*, 1970, 3, 369-402.
- Hall, Robert E., "Turnover in the Labor Force," *Brookings Papers on Economic Activity*, 1972, 3, 709-56.
- Harris, John R., and Michael P. Todaro, "Migration, Unemployment and Development: A Two-Sector Analysis," *American Economic Review*, March 1970, 60, 126-42.
- Hoddinott, John, "Wages and Unemployment in Urban Cote d'Ivoire," mimeo, Centre for the Study of African Economies, Oxford University, 1993.
- Holmlund, Bertil, and Per Skedinger, "Wage Bargaining and Wage Drift: Evidence From the Swedish Wood Industry." In Calmfors, L., ed., *Wage Formation and Macroeconomic Policy in the Nordic Countries*. Stockholm: SNS Forslag, Oxford: Oxford University Press, 1990, pp. 363-88.
- Jowell, Roger, S. Witherspoon, and L. Brook, eds., *British Social Attitudes: Special International Report*. Aldershot: Gower Press, 1989.
- Katz, Lawrence F., and Alan B. Krueger, "Changes in the Structure of Wages in the Public and Private Sectors," *Research in Labor Economics*, 1991, 12, 137-72. Greenwich, Conn.: Jai Press.
- Katz, Lawrence F., and Alan B. Krueger, "The Effect of the Minimum Wage on the Fast Food Industry," *Industrial and Labor Relations Review*, October 1992, 46, 6-21.
- Layard, Richard, and Stephen J. Nickell, "Unemployment in Britain," *Economica*, Supplement 1986, 53:210S, S121-70.
- Layard, Richard, Stephen J. Nickell, and Richard Jackman, *Unemployment: Macroeconomic Performance and the Labour Market*. Oxford: Oxford University Press, 1991.
- Lemieux, Thomas, "Unions and Wage Inequality in Canada and the United States." In Card, D., and R. Freeman, eds., *Small Differ-*

ences that Matter: Labor Markets and Income Maintenance in Canada and the United States. Chicago: University of Chicago Press and NBER, 1993, pp. 69–107.

Lindbeck, Assar, *Unemployment and Macroeconomics.* Cambridge: MIT Press, 1993.

Manning, Alan, “Wage Bargaining and the Phillips Curve: The Identification and Specification of Aggregate Wage Equations,” *Economic Journal*, January 1993, 103, 98–118.

Montgomery, Edward B., “Patterns in Regional Labor Market Adjustment: The US Versus Japan.” NBER Paper No. 4414, 1993.

Moulton, Brent R., “Random Group Effects and the Precision of Regression Estimates,” *Journal of Econometrics*, August 1986, 32, 385–97.

Oswald, Andrew J., “Wage Determination and Recession: A Report on Recent Work,” *British Journal of Industrial Relations*, July 1986, 24, 181–94.

Phelps, Edmund S., “Effects of Productivity, Total Domestic Product Demand and ‘Incentive Wages’ on Unemployment in a Non-Monetary Customer-Market Model of the Small Open Economy,” *Scandinavian Journal of Economics*, 1990, 92:2, 353–67.

Phelps, Edmund S., “Consumer Demand and Equilibrium Unemployment in a Working Model of the Customer-Market Incentive-Wage Economy,” *Quarterly Journal of Economics*, August 1992, 107, 1003–32.

Phillips, A. William, “The Relation Between Unemployment and the Rate of Change

of Money Wage Rates in the United Kingdom, 1861–1957,” *Economica*, November 1958, 25, 283–99.

Rebick, Mark, “Widening Firm Size Differentials in Japan,” *Journal of the Japanese and International Economies*, forthcoming 1995.

Rowthorn, Robert E., “Conflict, Inflation and Money,” *Cambridge Journal of Economics*, September 1977, 1, 215–39.

Sargan, J. Dennis, “Wages and Prices in the United Kingdom: A Study in Econometric Methodology,” 1964. In reprint, Hendry, David F., and Kenneth F. Wallis, eds., *Econometrics and Quantitative Economics.* Oxford: Basil Blackwell, 1984, pp. 275–317.

Shapiro, Carl, and Joseph E. Stiglitz, “Equilibrium Unemployment as a Worker Discipline Device,” *American Economic Review*, June 1984, 74, 433–44.

Solow, Robert M., *The Labor Market as a Social Institution.* Oxford: Basil Blackwell, 1990.

Wagner, Joachim, “German Wage Curves: 1979–1990,” *Economics Letters*, 1994, 44:3, 307–11.

Winter-Ebmer, Rudolph, “Unemployment and Individual Pay: Wage Curve or Compensating Differentials?,” *Labour Economics*, forthcoming, 1995.

Woodford, Michael, “Structural Slumps,” *Journal of Economic Literature*, December 1994, 32, 1785–815.