

# Testing for a U-Shaped Wage Curve. A Response

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## I. Introduction

Sessions (1993) has written an interesting theoretical note in which he provides a possible analytical justification for a “wage curve” that is U-shaped. His idea is to incorporate the stigma of unemployment into the kind of bargaining model set out in Blanchflower and Oswald (1990). In Sessions’ framework, once the unemployment rate becomes sufficiently high, and thus individuals believe it is socially acceptable to be without a job, unemployment fails to dampen wage pressure.

We argued in Blanchflower and Oswald (1990) that the slight evidence there of a U-turn in the wage curves for Britain and the U.S. was probably not plausible or empirically convincing. The apparent U-shape rested on:

- (i) small numbers of observations in the high-unemployment portion of the curves;
- (ii) wage regressions in which it was not possible to control fully for regional and industry fixed effects.

Our conclusion was that the wage curve was probably best thought of as monotonic, that is, that a rise in local or industry unemployment always depresses pay. We argued that at high unemployment rates, however, it is possible that the wage curve becomes fairly flat.

## II. A New Test: U.S. Data 1963–1987

What is needed to test whether the wage curve turns up, or is instead monotonically decreasing, is a data set of sufficient size to circumvent problems (i) and (ii) described above. The object of this response to Sessions’ note is to report such a test.

We have pooled data from the United States Current Population Survey (CPS) tapes from 1963 to 1987 to produce a sample of wage and other information on approximately 1.5 million American workers. For this purpose, each worker was classified into one of twenty-one different geographical regions of the United States, and into one of forty-three different industries. Unemployment data for these regions and industries were then grafted on to the sample. The CPS provides information on personal characteristics, so that it allows the inclusion, within wage regressions, of a set of individual-level control variables. The comparatively long time period also allows controls for fixed effects (that is, dummy variables) for regions and industries to be included in regression equations.

Table 1 reports earnings equations for this sample. It estimates U.S. wage curves in which unemployment variables are included on the right-hand side of otherwise conventional regression equations. The dependent variable is the logarithm of annual earnings. The aim of the exercise is to see what kind of unemployment effect, if any, is detected in the sample.

Three experiments are performed in Table 1 to determine the appropriate specification of the unemployment terms. In column 1, levels of

Table 1. *Estimating a United States wage curve: 1963–1987*

	(1)	(2)	(3)
Industry unemployment	-0.018 (38.87)	-0.015 (12.83)	
(Industry unemployment) <sup>2</sup>		-0.0002 (2.76)	
Regional unemployment	-0.014 (23.72)	-0.024 (11.83)	
(Regional unemployment) <sup>2</sup>		0.0006 (5.18)	
1/(industry unemployment)			0.343 (26.27)
1/(regional unemployment)			0.427 (21.52)
Year dummies	24	24	24
Regional dummies	21	21	21
Constant	5.776 (576.54)	5.799 (455.086)	5.420 (566.310)
Adjusted R <sup>2</sup>	0.57532	0.57533	0.57506
F	20,783.79	20,377.014	20,761.128
N	1,534,093	1,534,093	1,534,093

Source: Current Population Surveys — March tapes.

Note: All equations include full sets of year dummies (24), regional dummies (21), and industry dummies (43), plus personal controls for experience and its square, years of schooling, four marital status dummies, two race dummies, a private sector dummy, and a part-time dummy. The dependent variable is the log of annual income. Unemployment is in levels not logs. *t*-statistics are in parentheses.

unemployment (both for industry and region) are included alone. The result is a negatively-sloped wage curve, with apparently very large *t*-statistics. These *t*-statistics may be biased upwards, because of common group-effects of the type discussed in Moulton (1990) or Blanchflower and Oswald (1993), but we are content to believe that the results replicate the essence of our earlier 1990 paper, and use data that are superior to those that were available at that time.

To check for a U-shape, squared unemployment terms are added in column 2 of Table 1. Some indication of non-linearity appears: both squared terms show signs of significance. However, the squared regional unemployment rate is the only one to enter positively. Does this suggest that there is, after controlling for regional fixed effects, a turn-up in the regional wage curve? This would be consistent with Sessions' hypothesis.

The answer, in the practical sense, appears to be no. Solving for the implied function in column 2, the minimum of the estimated United States wage curve occurs at approximately 20 per cent unemployment. This is considerably above the rate of unemployment in the U.S. regions. Our conclusion, therefore, is that over any reasonable range, the estimated U.S. wage curve does not have a U-shape. At best, the results suggest, as an abstract possibility and out-of-sample, that there might be a turn-up in the regional curve at enormously high unemployment rates.

Finally, as a check, column 3 includes the reciprocals of the industry and regional unemployment rates. None of these specifications dominates the earlier ones reported in the Table. Estimated wage curves obtained using the specifications of Table 1 are very similar to those we have reported for a variety of countries in Blanchflower and Oswald (1993).

These findings are for the United States, of course, and it would be interesting to know if other countries' labour markets show signs of U-shaped wage curves. Our own work on international wage curves, however, has not found strong support for that.

### **III. Conclusion**

The conclusion from this analysis, using a more comprehensive data set than was possible in Blanchflower and Oswald (1990), is that there continues to be evidence of a negatively-sloped non-linear relationship between pay and the local (or industry) unemployment rate. The results given here are based upon CPS data on 1.5 million American workers from 1963–1987. There is not convincing empirical evidence, however, that over the relevant range this wage curve is U-shaped. Sessions (1993) has an intriguing theory, and in principle we are sympathetic to his model, but it is not clear that it fits the data. The empirical results seem to suggest that the wage curve slopes down.

## References

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