

Nice to see an Old Friend:
New Results for The Norwegian Wage Curve

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Main issues

How responsive are Norwegian manufacturing wages to unemployment?

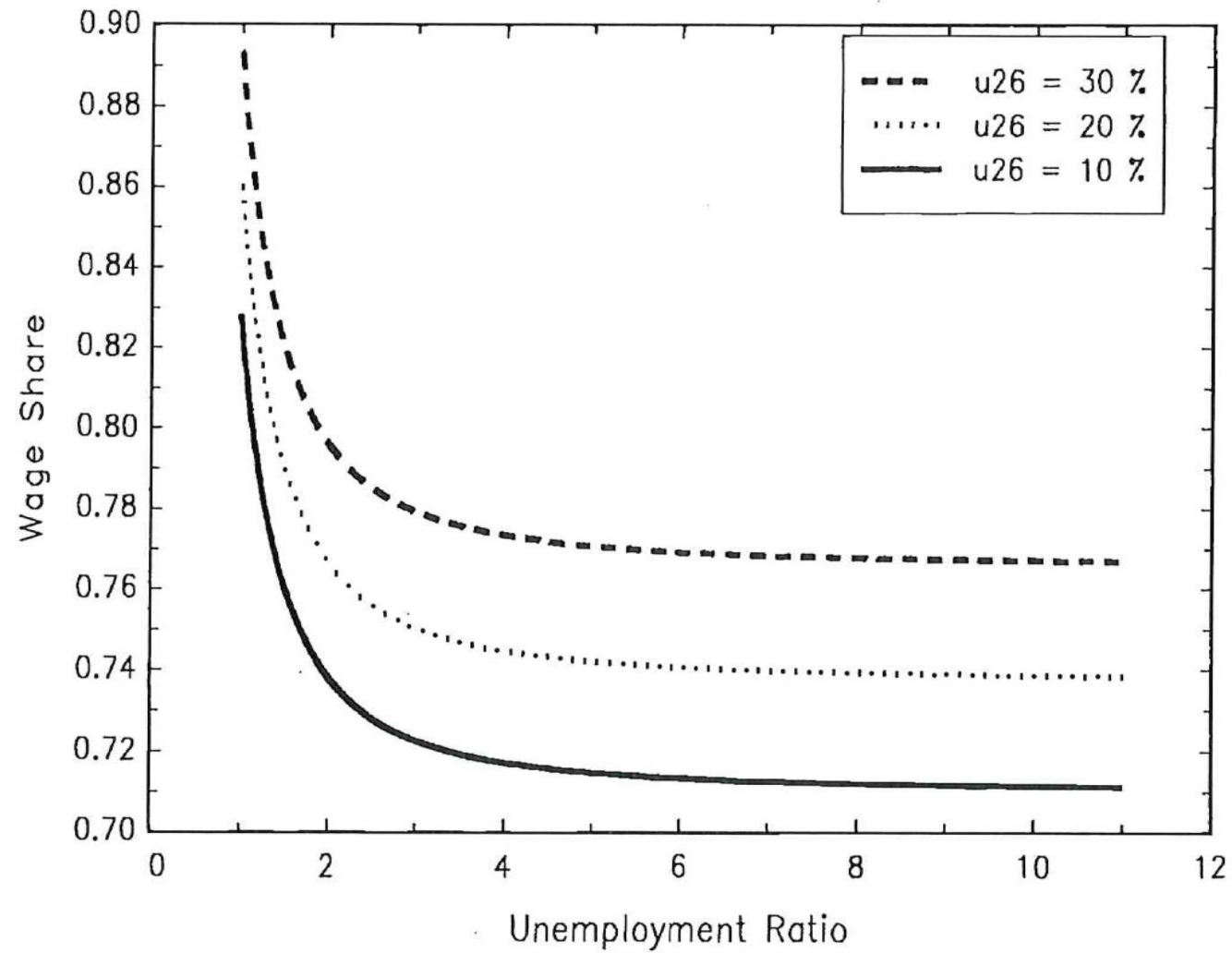
In particular: Investigate the shape of the wage curve and test whether the composition of unemployment by duration matters

Background

Empirical results in Johansen (1995, 1997) imply:

- 1) An extremely non-linear wage curve**
- 2) Higher long-term unemployment has a small (if any) wage dampening effect**

Figure 3 in Johansen (1995)



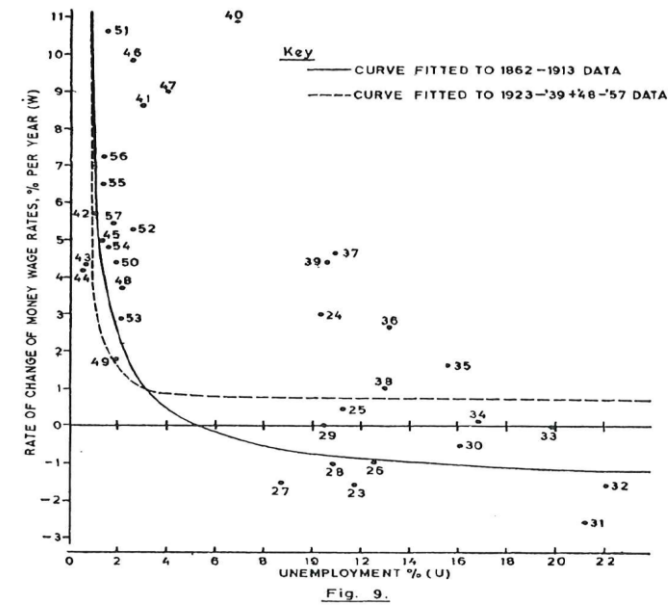
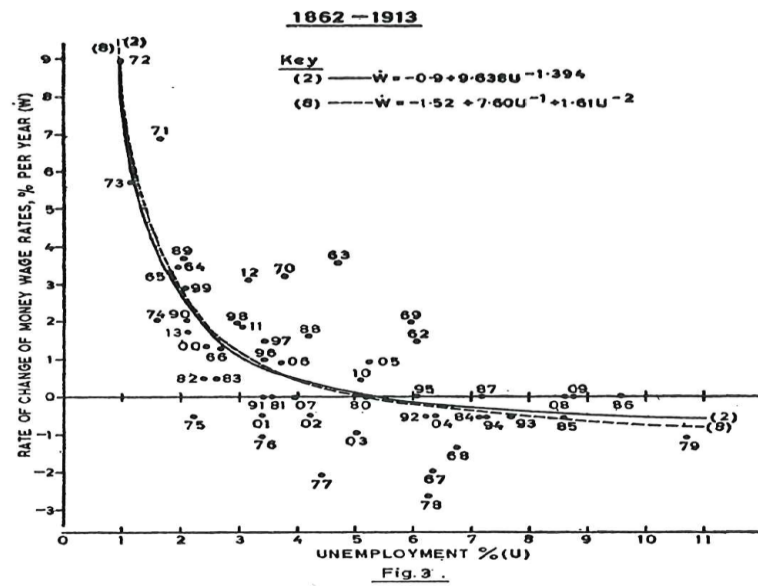
“Some results, for example the extremely non-linear wage curve and the importance of the composition of unemployment by duration, are so controversial that they will certainly provoke further research in the field.”

- **Results in Johansen (1995, 97) are based on data for the period 1964 – 1990**
- **The present paper uses time series for the period 1970 – 2021**
- **Particular question: Are the previous results robust?**

Literature

- **Non-linearity - mechanism**
 - **Probability of finding temporary work is decreasing and convex in unemployment (Blanchflower and Oswald, 1990)**
 - **Nickell (1987) derives an non-linear wage curve by aggregating over sub-markets**
 - **Socially more acceptable to be without job when unemployment is high (Sessions, 1993),**
 - **Increased unemployment may fail to reduce wages in a low inflation regime (Holden, 1991; Calmfors, 1992).**
- **Empirical evidence: Carruth and Oswald (1987), Nickell (1987), Blanchflower and Oswald (number of papers)**

And Lipsey (1960)...



Phillips curves reproduced from R. G. Lipsey (1960): Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1862 – 1957: A Further Analysis

(Un)importance of Long Term Unemployment:

Mechanisms: Blanchard and Summers (1987), Layard and Nickell (1987), LNJ (1995):

- **Discouraged worker effect**
- **Lose opportunity of learning-by-doing and on-the-job training**
- **Negative signal to potential employers**

Empirical evidence

UK: Nickell (1987), Nickell and Wadhwani (1990), LNJ (1991); Germany: Franz (1987)

Data and Empirical Specification

Data source for manufacturing wages, product prices and productivity, and consumer prices: National Account Statistics, Statistics Norway

Aggregate unemployment rate is defined by the number of registered unemployed workers divided by the labor force. Source: Norwegian Labour and Welfare Administration (NAV)

Long term proportion is defined by the number of unemployed out of work for more than 26 weeks defines by the total number of unemployed. Source: Norwegian Labour and Welfare Administration

The general version of the dynamic wage equation, based on previous empirical research on Norwegian wages, takes the form:

$$(1) \quad \Delta wc_t = -\alpha(wc - p - y)_{t-1} + \beta_1 \Delta wc_{t-1} + \beta_2 \Delta p_t + \beta_3 \Delta p_{t-1} + \beta_4 \Delta y_t + \beta_5 \Delta y_{t-1} \\ + \beta_6 \Delta pc_t + \beta_7 \Delta pc_{t-1} + \beta_8 \Delta h_t + \beta_8 STOP_t + f(U_t, U_{t-1})$$

WC = log of wage costs per hour worked, p = log of product prices (value added deflator), y = log labor productivity (value added at constant prices per hour worked)

$WC - p - y$ = log of wage share, pc = log of consumer price index

h and $STOP$ er controls for normal working time and wage / price freeze

$$f(U_t, U_{t-1}) = \begin{cases} \delta_0 \ln U_t + \delta_1 \ln U_{t-1} \\ \gamma_0 U_t^{-1} + \gamma_1 U_{t-1}^{-1} \\ \kappa_0 U_t^{-2} + \kappa_1 U_{t-1}^{-2} \end{cases}$$

Step 1: Estimate (1) and test simplifying restrictions. Report results for the parsimonious models. Step 2: Expand with LTU, the long term proportion.

Table 1: Results without LTU, sample period 1971 - 2001

	Model 1	Model 2	Model 3
$wc_{t-1} - p_{t-1} - y_{t-1}$	-0.137 (3.43)	-0.136 (3.58)	-0.140 (3.90)
Δwc_{t-1}	0.51 (7.08)	0.495 (7.07)	0.495 (7.28)
Δp_t	0.133 (2.66)	0.122 (2.49)	0.112 (2.28)
Δpc_t	0.486 (4.81)	0.483 (5.08)	0.498 (5.53)
Δh_t	-0.328 (2.68)	-0.335 (2.84)	-0.351 (3.90)
$STOP_t$	-0.032 (3.55)	-0.031 (3.44)	-0.029 (3.22)
$\ln U_t$	-0.008 (1.65)	-	-
U_t^{-1}	-	0.019 (2.11)	-
U_t^{-2}	-	-	0.014 (2.33)
<i>const</i>	-0.039 (1.86)	-0.053 (3.31)	-0.049 (3.26)

Notice significant equilibrium correction (also under the null of no cointegration).

Implies existence of a meaningful long run wage curve.

But small estimated coefficients. Implies sluggish adjustment and more so compared with results in Johansen (1995).

Table 2: Long run semi elasticities in %, $100 \cdot \frac{\Delta WC}{WC} / \Delta U$

	1,5%	3%	4%
$\ln U_t$	-4	-2	-1,5
U_t^{-1}	-5,6	-1,6	-0,9
U_t^{-2}	-5,9	-0,74	-0,31

Specification, misspecification and encompassing

- All models are valid simplifications of their corresponding general counterparts
- All diagnostic test statistics (AR, normality, stability) indicate that the models are well specified
- Encompassing: M2 encompasses M1, and M3 encompasses both M2 and M1
- Also, AIC implies that M3 (the inverted square specification) is the preferred model

Table 3: Comparison with previous results (Johansen 1995, 1997)

	New results	Previous
Short run estimates		
$\ln U_t$	-0.008 (1.65)	-0.018 (4.97)
U_t^{-1}	0.019 (2.11)	0.029 (6.03)
U_t^{-2}	0.014 (2.33)	0.022 (6.64)
Long run estimates		
$\ln U_t$	-0.058	-0.071
U_t^{-1}	0.140	0.138
U_t^{-2}	0.100	0.102

Table 4: Results including LTU

	Model 4	Model 5	Model 6
$wc_{t-1} - p_{t-1} - y_{t-1}$	-0.139 (3.47)	-0.146 (3.94)	-0.154 (4.28)
Δwc_{t-1}	0.529 (7.35)	0.519 (7.52)	0.525 (7.83)
Δp_t	0.142 (2.84)	0.126 (2.62)	0.113 (2.40)
Δpc_t	0.502 (5.02)	0.521 (5.60)	0.548 (6.02)
Δh_t	-0.281 (2.26)	-0.285 (2.43)	-0.318 (2.81)
$STOP_t$	-0.032 (3.55)	-0.029 (3.62)	-0.027 (3.37)
$\ln U_t$	-0.014 (2.33)	-	-
U_t^{-1}	-	0.033 (3.00)	-
U_t^{-2}	-	-	0.021 (3.50)
LTU_t	0.065 (1.50)	0.084 (2.00)	0.072 (1.90)

Table 5: Comparison with previous results

	New results	Previous
Short run estimates		
$\ln U_t$	-0.014 (2.33)	-0.018 (4.97)
LTU	0.065 (1.50)	0.115 (2.33)
U_t^{-2}	0.021 (3.50)	0.022 (6.64)
LTU	0.072 (1.90)	0.077 (3.08)
Long run estimates		
$\ln U_t$	-0.101	-0.120
U_t^{-2}	0.136	0.160

Table 6: Estimates of Unemployment with and without LTU

	Without LTU	LTU included
Short run estimates		
$\ln U_t$	-0.008 (1.65)	-0.014 (2.33)
U_t^{-1}	0.019 (2.11)	0.033 (3.00)
U_t^{-2}	0.014 (2.33)	0.021 (3.5)
Long run estimates		
$\ln U_t$	-0.058	-0.101
U_t^{-1}	0.140	0.227
U_t^{-2}	0.100	0.160

Differences not surprising since there is a strong positive correlation between LTU and the unemployment rate. Typical omitted variable bias.

Other results

- **In general, all estimates are robust with respect to specification**
- **Estimate of lagged wage growth approximates 0,5 with t-values above 7. Picks up much of short run dynamics which might explain small short-run estimate of product prices (just above 0,1)**
- **Short run elasticity of CPI approximates 0,5. No long run effect.**
- **Near dynamic homogeneity**

Concluding comments

- **The paper provides empirical evidence in favour of a highly non-linear wage curve. Wage responsiveness to unemployment acts more like an inflationary mechanism in a heated situation, than as an equilibrating mechanism on the labour market.**
- **The results also support the long-term unemployment hypothesis: Long-term unemployed exert a less wage dampening effect than do recently laid off workers.**
- **These results are (surprisingly?) consistent with empirical evidence reported 30 years ago!**

Further issues

- **Expand data set with more observations after the pandemic**
- **Control for composition of employment over the cycle (Bell, Nickell and Quintini (2002); Dapi, 2020)**
- **Alternative measures of labor market tightness**
 - **Underemployment rate (Bell and Blanchflower, 2021; Blanchflower, Bryson and Spurling, 2024)**
 - **Transition probability from unemployment to employment (Carlsen, Johansen and Røed, 2006)**