

A systems approach to the determination of the NAIRU, inflation and potential output in Austria

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Introduction

After decades of very low unemployment rates, tensions in the labour market also appeared in Austria by about the middle of the 1980s. Under the influence of the opening of the Eastern European countries, Austria's accession to the EU, globalisation and other shocks, the discussion has intensified whether and to what extent these developments may have contributed to the ongoing rise of unemployment and whether they will continue to do so. Problems of this kind are frequently discussed in terms of the natural rate of unemployment or the NAIRU (non accelerating-inflation rate of unemployment), which relate labour market concepts to inflation and potential output. As is well known, the NAIRU seems have risen in the last few years – not only in Austria, but in many other countries. From a policy perspective, it is of foremost interest whether the NAIRU can be sustainably reduced through deliberate economic policy measures by working, for instance, directly through labour market institutions and the wage bargaining process (OECD 1994). However, Ball (1996) pointed out that the disinflation policy of the last years has caused a considerable outward-shift of the NAIRU in many countries (i.e. the stability of the price level is now associated with higher unemployment than before).

During the 1970s, Austria's unemployment rate fluctuated within narrow margins around 2%. In 1980, unemployment started to accelerate, reaching 6.6% in 1995. Immediate questions are: what were the reasons for this development and what can we do about it?

In case of Keynesian unemployment, we should call for measures to stimulate effective demand; i.e. higher public spending or a looser monetary policy. At the moment, these measures are not very popular because of the binding constraints of the Maastricht criteria; and if we scan the data we cannot actually find any indication that the rise in unemployment is linked to too restrictive a course in terms of public spending or monetary policy. Budget deficits have been rising since the 1980s, and the downward trend in inflation already started in the mid-1970s when unemployment was pretty stable at about 2%.

Classical unemployment would instead call for measures to reduce the rigidity of real wages. In the analysis below, we will not deal with this case because the wage bargaining process among the social partners in Austria is meant to prevent unemployment.

Other sources of unemployment may be changes in production patterns which affect the demand and supply side of the labour market. Demographic developments, generous unemployment benefits, non-wage labour costs are some of the factors which drive the equilibrium unemployment rate. Unfavourable shifts in these determinants will increase the natural rate of unemployment and induce a parallel movement of actual unemployment or an ever accelerating inflation rate. If this is the case, the only wise response to high unemployment lies in the removal of structural impediments to the way the labour market works.

This paper tackles the questions raised above. After a short review of the results of some recent studies on Austria in Section 1, we specify and estimate single equations for wages, prices,

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output and unemployment in Section 2. In Section 3, this system of equations is estimated by 3SLS, and in the final section we try to draw some conclusions from the results.

1. The discussion in Austria

This section gives a short – and certainly incomplete – review of the discussion on wage-price relations, the Phillips curve, potential output and the NAIRU in Austria.

As far as the more recent investigations of these issues in Austria are concerned, we start with Wörgötter's (1983) contribution, in which he tries "... to give an explanation for the astonishing stability of the relationship between wage and price increases on the one side and unemployment rates on the other side in Austria from the end of the post-war recovery in 1955... Contrary to the experience in other industrialised countries no outward shift of the Phillips curve could be observed during the 1970's...". Wörgötter develops an equation system for the simultaneous determination of wages and prices and concludes from the results that the "... influence of social partners on the determination of wages and prices in Austria allows for a stable long-run empirical relationship between inflation and unemployment... The self-adjusting behaviour of social partners in Austria...removes this constraint on economic policy which can rely on the endogenous stabilisation of wages and prices, without being forced to apply an anti-inflationary fiscal and monetary policy."

In the context of monetary and exchange rate policy, Handler (1989) took a somewhat different view. He feels that, due to external influences (price shocks), the Phillips curve for Austria cannot be interpreted as a trade-off between inflation and unemployment. Therefore, monetary policy decisions should be only loosely based on this relation. Moreover, he did not find any empirical proof that the permanent dampening of the inflation rate through the hard-currency option had negative effects on the real economy and on unemployment. Thus the Phillips curve is no constraint for a stability-oriented monetary policy.

Pichelmann (1989), however, showed that the NAIRU doubled during the fifteen years preceding his investigation. He interprets this rise as evidence of "... an increase of distributional pressures in the Austrian economy" and addresses the question whether the Austrian political and organisational system may have lost some of its flexibility. Employing a simple macro-economic model of wage-price formation, he establishes that both the increase in employers' contributions to social security and the rising share of long-term unemployment associated with higher overall unemployment have exerted pressure on real product wages and thus exerted upward pressure on "the equilibrium rate of unemployment". Though hysteresis will have played an important role, the rise of NAIRU was regarded as evident.

Wehinger (1990) pointed out the problem that potential output and the natural rate of unemployment are frequently determined independently or only in a recursive way, and successfully tries a simultaneous approach. He identifies some marked output gaps between 1967 and 1988, but finds that they are slightly smoother compared to calculations using simpler methods.

Gartner's study (1995) represents a first attempt by Oesterreichische Nationalbank to introduce the concepts of potential output and the output gap into monetary analysis. Trend output was determined by means of the Hodrick-Prescott filter, and Granger causality tests were used to check whether the values for the output gap could contribute to forecasting inflation, which was confirmed.

Hahn and Rünstler (1996) try to combine a structural (e.g. the Hodrick-Prescott filter) and structural approaches in determining potential output, the latter being deduced from wage-price equations. They find that actual GDP in Austria was almost always below potential output since the beginning of the 1990s, and that the average length of cycles was 28 quarters, with the cyclical component of unemployment lagging behind the GDP cycle by about three quarters.

Pichelmann and Schuh (1996) point out some problems inherent in the concept of NAIRU. They survey a number of hysteresis-mechanisms which could lead to permanent shifts of equilibrium unemployment over time, implying that a long-run NAIRU may not even exist. Other problems are that empirically derived NAIRU estimates are highly dependent on model specifications, and that a considerable amount of statistical imprecision is inherent in the estimates. Therefore, they argue, any policy conclusions and recommendations drawn from the NAIRU must be judged with utmost care.

2. Single equation results

With these caveats in mind, we approach the task of finding some empirical evidence for the items involved. As mentioned, it is necessary to simultaneously estimate an equation system like the one below² in order to get consistent parameter estimates for the determination of wages, prices, potential output, and unemployment:

$$w = \alpha_0 + \alpha_1 p^c + \alpha_2 q^{pot} + \varepsilon_\omega \quad (1)$$

$$\Delta w = \beta_1 \Delta p^c + \beta_2 \Delta p_{-1}^c + \beta_3 \Delta(U - U^{nat}) + \beta_4 \Delta \Delta(U - U^{nat}) + \beta_5 \Delta(p^c - p) + \beta_6 \Delta(p^c - p)_{-1} + \beta_7 \varepsilon_{\omega-1} + \varepsilon_{\Delta\omega} \quad (2)$$

$$\Delta U = \gamma_1 \Delta(y - y^{pot}) + \gamma_2 \Delta(y - y^{pot})_{-1} + \gamma_3 \Delta(\Delta app + \Delta app_{-1}) / 2 + \gamma_4 \Delta nwl c + \gamma_5 \Delta union + \varepsilon_{\Delta u} \quad (3)$$

$$\Delta p = \delta_0 + \delta_1 (\Delta ulc + \Delta ulc_{-1} + \Delta ulc_{-2}) / 3 + \delta_2 \Delta p^m + \varepsilon_{\Delta p} \quad (4)$$

$$y - 0.75h - 0.25k = \zeta_0 + \zeta_1 T + \zeta_2 (y - y^{pot}) + \varepsilon_y \quad (5)$$

Equation (1) reflects the target-real-wage-bargaining model. In such an environment, unemployment in excess of the natural rate can coexist with stable wage and price inflation. Equation (2) is an equation for the short-run dynamics of wage inflation. The growth of wages Δw relates to consumer price inflation Δp^c , the change in the unemployment gap $\Delta(U - U^{nat})$, the growth of the gap between consumption and output prices $\Delta(p^c - p)$ and the lagged residuals from equation (1), which can be interpreted as the deviations of real wages from their target level. The change of the unemployment rate (equation (3)) is determined by the deviation of real output from its potential value y^{pot} ,³ the growth of non-wage labour costs $\Delta nwl c$, the growth of union density $\Delta union$ and the growth of the share of apprentices as a percentage of the labour force Δapp . The evolution of prices (equation (4)) is estimated from unit labour costs Δulc (the divergence between the growth rates of wages and potential productivity) and from the growth rate of import prices Δp^m . The production function (equation (5)) is solved for multi-factor productivity $(y - 0.75h - 0.25k)$ which is determined by a time trend T and the output gap.

The preliminary specification search has to be performed by single-equation estimates using OLS. This is done in the following paragraphs.

² This approach goes back to Coe and Krueger (1990), who apply the target real wage bargaining model to the German labour market.

³ In the single equation estimation all potential values have been proxied by a Hodrick-Prescott filter.

2.1 The wage equation

Starting with the general wage formulation of equation (2), we tried to explore some additional and specific issues, which did, however, they did not contribute very much to the overall picture. We tried to include variables or proxies for unionisation, formulated more complex hypotheses for price expectations, and also experimented with error correction terms. Finally, we ended up with an estimation of the following form:

$$\begin{aligned} \Delta w = & 0.882\Delta p^c + 0.819\Delta p_{-1}^c - 3.170\Delta(U - U^{nat}) + 1.916\Delta\Delta(U - U^{nat}) - 0.941\Delta(p^c - p) \\ & (5.39) \quad (4.35) \quad (-4.05) \quad (3.59) \quad (-3.88) \\ & - 0.747\Delta(p^c - p)_{-1} - 0.155\varepsilon_{\omega-1} + \varepsilon_{\Delta\omega} \\ & (-3.02) \quad (-2.24) \end{aligned} \quad (2')$$

Numbers in parentheses are t-values. $R^2 = 0.93$. D.W. = 1.64. Estimation Period: 1972-95.

This result stands very much in the tradition of the Austrian wage-formation process, showing almost full compensation for the inflation of the past year (which could also be interpreted as a simple expectation formation). The error correction term of the level equation (1) is significant and correctly signed.

2.2 The unemployment equation

Estimation of equation (3) gives the following result:

$$\begin{aligned} \Delta U = & -0.153\Delta(y - y^{pot}) - 0.079\Delta(y - y^{pot})_{-1} - 0.943\Delta(\Delta app + \Delta app_{-1}) / 2 \\ & (-5.64) \quad (-2.57) \quad (-3.91) \\ & + 0.016\Delta nwl c + 0.076\Delta union + \varepsilon_{\Delta u} \\ & (3.62) \quad (2.60) \end{aligned} \quad (3')$$

Numbers in parentheses are t-values. $R^2 = 0.827$. D.W. = 2.47. Estimation Period: 1973-95.

This result conforms reasonably well to the expectations. Positive deviations of real output from its trend development reduces unemployment to a rather modest extent. As observed in many other studies, rising non-wage costs foster unemployment.

2.3 The price equation

According to equation (4), the evolution of prices is determined by the relation between wages and productivity and foreign prices. We get the following result:

$$\begin{aligned} \Delta p = & 1.168 + 0.476(\Delta ulc + \Delta ulc_{-1} + \Delta ulc_{-2}) / 3 + 0.080\Delta p^m + \varepsilon_{\Delta p} \\ & (2.131) \quad (5.625) \quad (1.79) \end{aligned} \quad (4')$$

Numbers in parentheses are t-values. $R^2 = 0.754$. D.W. = 1.724. Estimation Period: 1973-95.

Thus, price developments are mainly determined by changes in unit labour costs.

2.4 The production function

The production function is, as mentioned, solved for productivity, and estimation of equation (5) exhibits the following:

$$y - 0.75h - 0.25k = 3.515 + 0.013T + 0.688(y - y^{pot}) + \varepsilon_y \quad (5')$$

(772.17) (42.53) (5.11)

Numbers in parentheses are t-values. $R^2 = 0.988$. D.W. = 0.765. Estimation Period: 1970-92.

Accordingly, overall productivity is determined by an autonomous time trend and by the output gap.

3. Results of the system estimation and interpretation

A system approach has some advantages over a partial equilibrium approach when estimating the natural rate of unemployment. In particular, the labour market gap will not only have an affect on wage inflation, nor will the product market gap have an affect on price inflation alone. Instead, the parameters that define the natural rate of unemployment and potential output are themselves estimated jointly with the parameters in the wage and price equations. The specifications for the system are those of the single equation estimation and are repeated here for the sake of convenience:

$$w = \alpha_0 + \alpha_1 p^c + \alpha_2 q^{pot} + \varepsilon_\omega \quad (6)$$

$$\Delta w = \beta_1 \Delta p^c + \beta_2 \Delta p_{-1}^c + \beta_3 \Delta(U - U^{nat}) + \beta_4 \Delta \Delta(U - U^{nat}) + \beta_5 \Delta(p^c - p) + \beta_6 \Delta(p^c - p)_{-1} + \beta_7 \varepsilon_{\omega-1} + \varepsilon_{\Delta\omega} \quad (7)$$

$$\Delta U = \gamma_1 \Delta(y - y^{pot}) + \gamma_2 \Delta(y - y^{pot})_{-1} + \gamma_3 \Delta(\Delta app + \Delta app_{-1}) / 2 + \gamma_4 \Delta nwl c + \gamma_5 \Delta union + \varepsilon_{\Delta u} \quad (8)$$

$$\Delta p = \delta_0 + \delta_1 (\Delta ulc + \Delta ulc_{-1} + \Delta ulc_{-2}) / 3 + \delta_2 \Delta p^m + \varepsilon_{\Delta p} \quad (9)$$

$$y - 0.75h - 0.25k = \zeta_0 + \zeta_1 T + \zeta_2 (y - y^{pot}) + \varepsilon_y \quad (10)$$

where

$$U_t^{nat} = 1.42 + \gamma_3 \sum_{k=71}^t (\Delta app_k + \Delta app_{-1}) / 2 + \gamma_4 \sum_{k=71}^t \Delta nwl c_k + \gamma_5 \sum_{k=71}^t \Delta union_k \quad (11)$$

$$y^{pot} = 0.75h^{pot} + 0.25k^{pot} + \zeta_0 + \zeta_1 T \quad (12)$$

$$q^{pot} = -0.25h^{pot} + 0.25k^{pot} + \zeta_0 + \zeta_1 T + l^{pot} \quad (13)$$

$$\Delta y^{pot} - \Delta h^{pot} + \Delta l^{pot} \equiv \Delta q^{pot} = -0.25\Delta h^{pot} + 0.25\Delta k^{pot} + \zeta_1 + \Delta l^{pot} \quad (14)$$

Compared with the single-equation estimates, no proxies for potential output or trend labour productivity plus the natural rate of unemployment are used. Instead it is necessary to substitute expressions (11)-(14) into equations (6)-(10).

The constant 1.42 in equation (11) is the unemployment rate in August 1971, which was the lowest rate during the sample period. The determinants of potential output have been expressed at their potential levels. For labour input (h), this is done by calculating total man-hours based on trend

average hours per employee, and employment levels consistent with unemployment at its natural rate. The stock of capital is corrected by a capacity utilisation rate.⁴ l is the log of the annual working hours per employee.

The system has been estimated using non-linear three-stage least squares. Endogenous variables in the system are the contemporaneous values of the dependent variables as well as the growth of labour productivity. The estimation period is from 1970 to 1995.

Table 1
System estimates

Equation				
w	ΔU	Δw	Δp	$y-0.75h-0.25k$
$\alpha_0 = -9.827$ (-2.51)	$\gamma_1 = -0.071$ (-2.48)	$\beta_1 = 1.192$ (6.59)	$\delta_0 = 2.253$ (5.11)	$\zeta_0 = 3.511$ (521.86)
$\alpha_1 = -1.328$ (17.07)	$\gamma_2 = -0.119$ (-5.12)	$\beta_2 = 0.486$ (2.28)	$\delta_1 = 0.380$ (5.22)	$\zeta_1 = 0.013$ (26.51)
$\alpha_2 = 0.930$ (2.83)	$\gamma_3 = 0.903$ (-2.94)	$\beta_3 = -2.986$ (-3.58)	$\delta_2 = 0.104$ (2.70)	$\zeta_2 = 0.469$ (5.31)
$\alpha_3 = -0.045$ (-3.669)	$\gamma_4 = 0.016$ (2.66)	$\beta_5 = -1.507$ (-7.38)		
	$\gamma_5 = 0.065$ (2.201)	$\beta_6 = -0.690$ (-2.92)		
		$\beta_7 = -0.153$ (-1.90)		
$R^2 = 0.997$ $\bar{R}^2 = 0.996$ $SEE = 0.028$	$R^2 = 0.543$ $\bar{R}^2 = 0.421$ $SEE = 0.311$	$R^2 = 0.810$ $\bar{R}^2 = 0.684$ $SEE = 1.582$	$R^2 = 0.666$ $\bar{R}^2 = 0.627$ $SEE = 1.116$	$R^2 = 0.991$ $\bar{R}^2 = 0.990$ $SEE = 0.009$

The system estimation results imply the following expressions for the natural rate of unemployment and potential output:

$$U_t^{nat} = 1.42 - 0.903 \sum_{k=71}^t (\Delta app_k + \Delta app_{-1}) / 2 + 0.016 \sum_{k=71}^t \Delta nwlc_k + 0.065 \sum_{k=71}^t \Delta union_k \quad (15)$$

$$y^{pot} = 0.75h^{pot} + 0.25k^{pot} + 3.511 + 0.013T \quad (16)$$

Estimates of the historical path of potential output and output as well as the output gap and the growth rates of potential output are shown in Figures 1, 2 and 3.

One feature of the results is that the output gap fluctuated during the 1970s with spikes in 1974, 1977 and 1980. Subsequently the output gap decreased with a tendency to increase after 1988 (due to the lack of capital stock data, potential output could not be estimated for the years after 1992).

⁴ In a first approximation the August unemployment rate is considered to be the natural unemployment rate. In the yearly cycle the August unemployment rate is usually the lowest one. Total employees plus the fraction of the unemployed not considered as structural is the potential supply of employees (E^{pot}). Potential hours per employee (L^{pot}) is calculated as the long run equilibrium of an OLS regression of hours per employee on a constant, on trend and lagged hours per employee: ($L=f(l, T, L_{-j})$). Potential labour input is hence $HP^{pot}=L^{pot} E^{pot}$. A capacity utilisation index is constructed via yearly survey results of the "Konjunkturtest" (KT) and the "Investitionstest" (IT). An OLS regression of (100-IT) on a constant and KT yields the capacity utilisation variable with which the private capital stock is adjusted to yield potential private capital. Public sector real capital is assumed to be fully employed.

Figure 1
Output and potential output (in 1,000 billions of Austrian schillings)

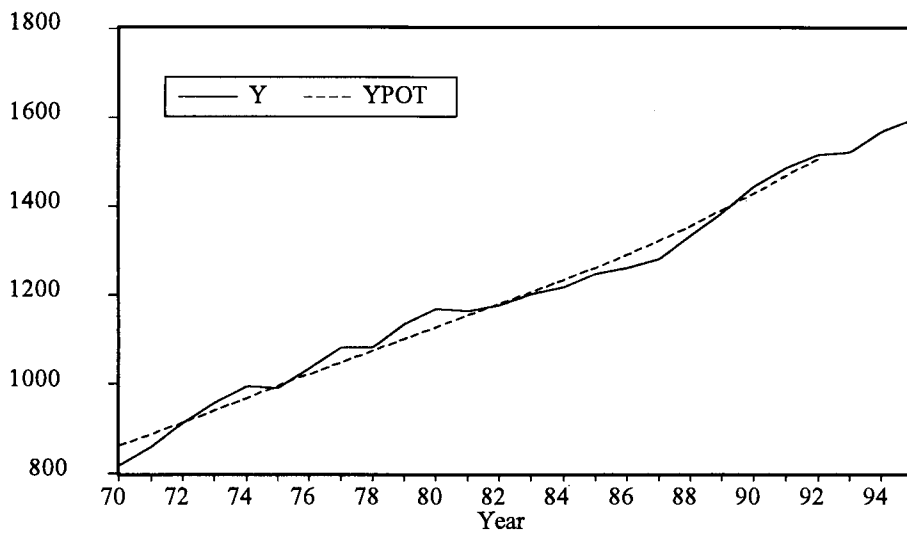


Figure 2
Output gap (as a percentage of potential output)

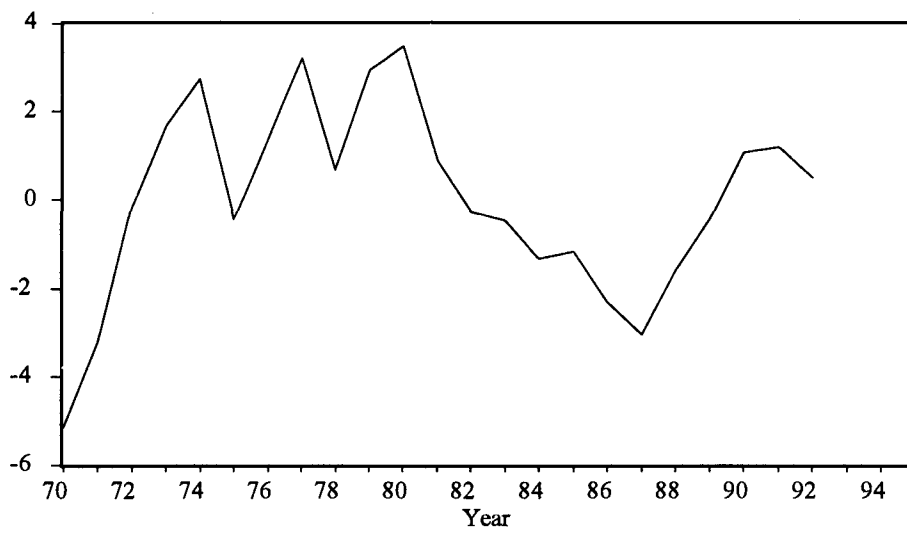
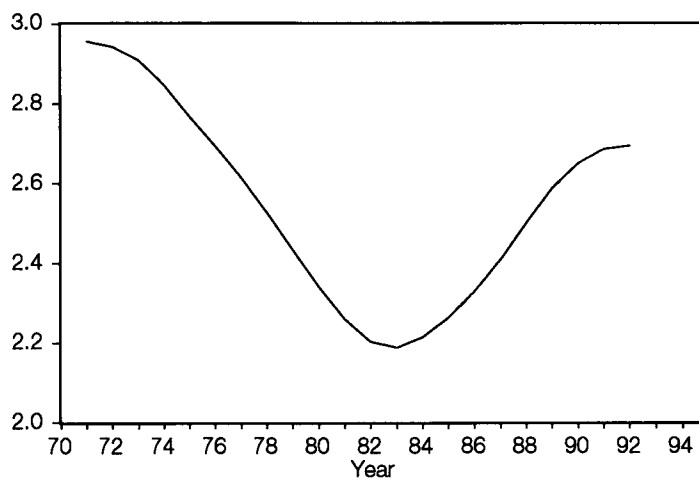


Figure 3
Potential output (annual percentage changes)



Estimates of potential output along with the contributions to growth of changes in potential factor inputs and multifactor productivity are shown in Table 2.

Table 2
Contributions to the growth of potential output
 Annual percentage changes

	1970-80	1981-88	1989-92
Potential output	2.82	2.19	2.09
Labour	0.41	0.29	0.53
Capital	0.86	0.58	0.50
Multifactor productivity	1.55	1.32	1.06

Slower growth in factor inputs contributed most to the slowdown in the growth of potential output during 1981-88. In the period 1989-92 labour growth picked up whereas capital did not return to its contribution of the 1970s. Multifactor productivity gradually decreased over the whole estimation period.

The natural rate of unemployment is estimated to have increased steadily from a low of 1.5% in 1971 to a high of 6.3% in 1995. The increase in the natural rate of unemployment gained momentum particularly during the 1980s. The unemployment gap widened during the 1980s but narrowed in the last couple of years.

Mirroring the development of potential output, the same three periods seem to have crystallised, with different trends in actual and natural unemployment – pretty stable development during 1970-80, a drastic pickup after 1980 with a narrowing of the unemployment gap after 1988.

According to the estimation, the bulk of the increase in unemployment after 1980 can be attributed to a rising natural unemployment rate.

Figure 4
Actual and natural unemployment rates

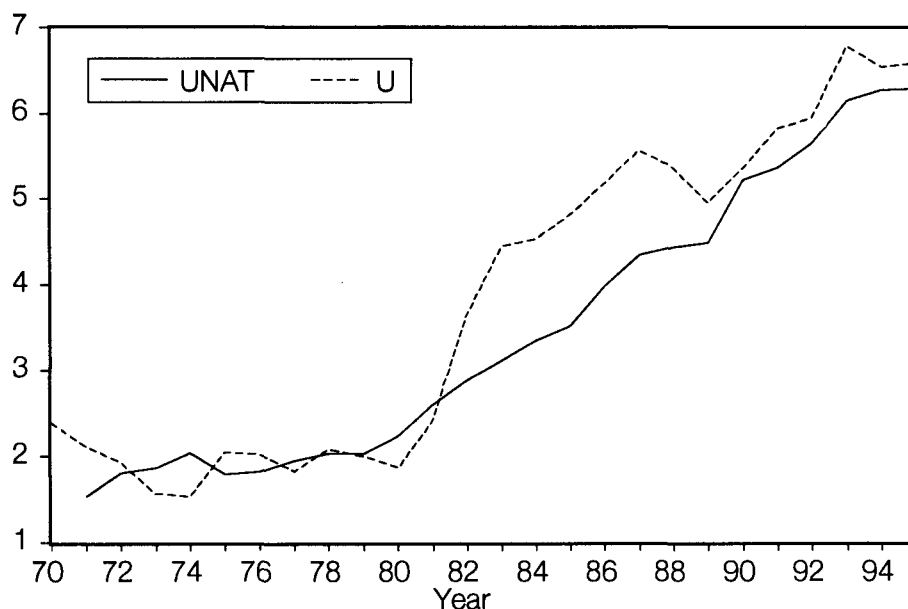


Table 3
Contributions to changes in the natural rate of unemployment

	1970-80	1981-88	1988-95
Changes in actual unemployment rate	-0.2	3.0	1.6
Changes in natural rate	0.7	1.8	1.8
Due to non wage labour cost	1.7	0.7	0.7
Due to changes in apprentices	-1.2	1.2	1.5
Due to changes in union density	0.2	-0.1	-0.4

Conclusions

What lesson may we draw from this exercise? The rise in unemployment after 1980 seems to be determined by structural factors which raised the natural unemployment rate. We estimated a steady increase of the NAIRU from 1.5% in 1971 to 6.3% in 1995. The rise gained momentum particularly in the 1980s and the gap between the NAIRU and actual unemployment widened in this period, but has narrowed again recently. From this point of view, measures to remove the structural impediments responsible for the malfunctioning of the labour market are called for. We have identified three microeconomic factors, namely non-wage labour cost union density and the share of apprentices in the labour force.

One policy conclusion from this result would be that measures should be taken to speed up an easier integration of young people into the Austrian labour market and the flexibility of the labour market should be enhanced – for example with respect to aspects of labour market regulation which primarily affect the cost of labour; e.g. labour cost advantages of employing part-time workers, cost of overtime pay and so on. Though we regard our results for the NAIRU as plausible, it has to be pointed out that they seem to be very sensitive to parameter changes and to the specification of the underlying equations and assumptions. Thus, policy conclusions should be drawn with great care.

What the results certainly dismiss is that fiscal or monetary policies have a tight link with the rise of the unemployment rate in Austria.

Appendix: Data sources

In the empirical analysis, annual data were used, ranging from the beginning of the 1970s until 1995 (depending on availability). Most time series are taken from Österreichisches Statistisches Zentralamt: Österreichs Volkseinkommen, as provided by WSR Data Bank.

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**Comments on: "A systems approach to the determination
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by Palle Andersen

As the title suggests, this paper follows the approach of Coe and Adams (1990) and Coe and Krueger (1990) for the United States and Germany. This is certainly the right approach to these issues; yet I have some problems with the specifications used by Fritzer and Glück, their estimates and the final results for the NAIRU. Although I cannot quite find the source, I also think there is some inherent instability in the model.

I do not have much say about their review of the literature for Austria, except that the authors have not received much help from this source. Perhaps one estimate could have been updated and used and that is Pichelmann's finding that distributional issues have forced up the rate of unemployment in Austria. Since distributional issues are usually not included in wage negotiations but left to fiscal policies, it is quite possible that in a period when fiscal consolidation has made it more difficult to apply fiscal policy to solve distributional issues, these may have contributed to the rising unemployment. In other words, distributional proxies could have been tested in the equation for unemployment.

Let me then turn to the specification of the model and the individual equations. The basic wage equation is based on the target real wage bargaining model, with real consumption wages targeting potential productivity, and estimated as an error correction model. This differs from the standard expectation-augmented Phillips curve in that deviations between actual and equilibrium unemployment do not necessarily result in a continuous deceleration or acceleration of nominal wage changes. Given the close link between Austria and Germany, it is also worth noting that Fritzer and Glück are able to confirm that the wage equation found by Coe and Krueger for Germany also applies to Austria. Moreover, as for Germany, changes in the terms of trade (modelled as the difference between changes in respectively output and consumer prices) significantly affect nominal wages. In fact, in their estimates, the overall coefficient on consumer prices is actually 0 while output prices obtain a coefficient of 1.7 which seems a bit on the "high side" to satisfy the homogeneity condition. Perhaps, the authors should have used output prices instead of consumer prices in their target equations as the "story" of the error correction equation is clearly one of nominal wages following output prices.

The unemployment equation is specified in first differences which is sensible since the rate of unemployment follows an A2-process for the period considered. In other words, there is almost complete hysteresis. Including changes in non-wage labour costs, unionisation and the proportion of apprentices as explanatory variables is also sensible, whereas I am not quite sure why the authors prefer *changes* in the output gap; after all, by construction, the output gap is a stationary variable.

While the wage equation "overshoots" the homogeneity condition by assigning a very high coefficient to price changes, we have the reverse problem in the price equation as the sum of the nominal coefficients is less than 0.6. This clearly creates some short-run instability in the model which, undoubtedly, would show up as very large short-run swings in the implicit profit share. Given that Austria is a small and open economy, I was also surprised to see such a small impact of foreign prices. Perhaps more lags should have been included or possibly a joint term in import prices and the output gap as the pass-through of import prices might be influenced by cyclical conditions in Austria.

In the production function, which is specified with total factor productivity as the dependent variable, I was slightly disturbed by the rather high coefficient on the ratio of actual to potential output. This is a very strong Verdoorn-effect and really implies that by running the economy

above potential one can generate a permanent rise in the level of total factor productivity; I suspect that this might be another source of the instability referred to above¹.

There are relatively few major changes in going from the single-equation estimates to the system approach and it is reassuring to see a confirmation of the importance of output prices in the setting of wages and of the high degree of real wage flexibility in Austria. I am, however, a bit disturbed by the further drop in the nominal coefficients of the price equation and by the implicit rise in the short-run instability of profits.

Finally, let me turn to the implications of the estimates for the natural rate of unemployment as presented in Figure 4 and Table 3. The major cause of the rise in the NAIRU since 1980 seems to be the fall in the number apprentices as a proportion of the labour force. That is a very strong result and rather unique among European countries and I wonder what caused it and what could be done to reverse the trend. Is it possible that this variable could be acting as a proxy for something else and something more fundamentally disturbing? In this context, I also wonder how one can be so certain that the rise in the natural rate had nothing to do with fiscal and monetary policy? I certainly hope that this is true, but since the Austrian unemployment story is essentially a hysteresis story, I would not give a "not guilty" verdict to policies without further proof.

¹ Incidentally, let me note that it would be helpful to know how the variables have been defined and measured and what sources have been used. This would also enable other readers to reproduce and test the results.