7. The Working of an AB-Model

This section contains a discussion of how a Structural VAR model works on a real economic setting. To this end, I will qualitatively summarize some results of an exercise on Italian data (C. Giannini, A. Lanzarotti and M. Seghelini, "Traditional and Eclectic Interpretations of Macroeconomic Fluctuations: The Case of Italy", in preparation) which strictly parallels Blanchard's 1989 work on U.S. data.

The model considers the behaviour of five quarterly variables, namely: the logarithm of output (at constant prices), $y$; the unemployment rate, $u$; the logarithm of prices, $p$; the logarithm of nominal wages, $w$ and the logarithm of nominal money, $m$. This latter variable is based upon the M2 aggregate, whereas Blanchard's work used the M1 aggregate.

Our usual $y_t$ vector should be seen as

$$y_t' = [y_{t1}, y_{t2}, y_{t3}, y_{t4}, y_{t5}] = [y_t, u_t, p_t, w_t, m_t]$$

The traditional interpretation of macroeconomic fluctuations that, with some semantic qualms Blanchard call "Keynesian", relies a two-sided conceptual framework made of two blocks: aggregate demand and aggregate supply. Aggregate demand characterizes the behaviour of aggregate demand for goods given prices. Aggregate supply characterizes the behaviour of prices given output and include a relation between unemployment and output (Okun's law), a wage setting equation (the Phillips curve) and a price setting equation.

These relationships correspond to a system of five-equation connecting observable variables to unobservable independent shocks. This system will be presented later on.

Frequency domain techniques have been used to seasonally adjust the aforementioned variables referred to Italian data. Unit-root tests have then allowed us to qualify our seasonally adjusted series as $I(1)$ variables including Italy's unemployment rate\(^1\).

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1 This last result was in contrast with the empirical results of similar series referred to other countries. We have tried to correct this somewhat absurd result using a
Our estimation of the reduced form (an unstructured VAR model) provided another difference with Blanchard’s analysis that, surprisingly enough, had found no evidence of cointegration between the variables referred to U.S. data.

We found strikingly different results on this point through the application of Johansen methodology.

Starting from a "reduced form" of the type

\[ A(L) y_t = \mu + \varepsilon_t \]

\[ A(0) = I_n \]

where \( \mu \) is a vector of constant terms and using standard testing procedures (see Sims, Stock and Watson, 1990, p. 134) we have found a maximum lag length equal to 4. Then using Johansen’s F.I.M.L. set-up we have unambiguously found a cointegrating rank \( (r) \) equal to 3, so the \( A(1) \) matrix

\[ A(1) = I - A_1 - A_2 - A_3 - A_4 \]

can be factorized as

\[ A(1) = \gamma \alpha' \]

with \( \gamma \) and \( \alpha \) full column rank matrices of 5×3 order.

Using exclusion restrictions and usual normalization rules we have tried to isolate three theoretically meaningful independent cointegrating vectors corresponding to long-run relations between the variables. Such relations can fall within a "Keynesian"-like conceptual framework.

Using three normalizing non-homogeneous restrictions (one for each row of the \( \alpha' \) matrix and each referred to different columns of the same matrix) and \( r^2 - r (9-3) \) exclusion restrictions, \( r-1 (3-1) \) for each row of the \( \alpha' \) matrix we arrived at the following structure\(^2\)

\[ \text{corrected unemployment rate which accounts for the trending effect of the participation of Italian women to the labour market. However, the corrected series still behaved as a } I(1) \text{ process.} \]

\[ \text{The signs and magnitudes of free } \alpha_{ij} \text{ coefficients of the } \alpha \text{ matrix looked economically correct.} \]