Credit View in Italy: a Statistical Analysis[1]

La "Credit View" in Italia: un'analisi statistica

Giuliana Passamani
Facoltà di Economia, Università di Trento, Via Inama, 5 – 38100 Trento,
e-mail: gpassama@gelso.unitn.it

Riassunto: nel lavoro si affronta il problema dell'identificazione empirica di relazioni di lungo periodo consistenti con la teoria dell'esistenza di un canale creditizio per il meccanismo di trasmissione della politica monetaria. La letteratura esistente ha, finora, fissato l'attenzione sul ruolo del credito bancario sulla domanda aggregata. In questo lavoro l'attenzione si sposta sull'offerta aggregata: variabili reali e variabili monetarie vengono analizzate congiuntamente per evidenzare che, in Italia, le variabili legate al credito hanno effetti significativi sull'offerta aggregata futura, sui salari reali e sull'inflazione attesa.

Keywords: Bank lending channel, identified long-run relation.

1. Introduction

The recent interest in the credit view of monetary transmission mechanism has given rise to empirical works based on theoretical models coherent with this view. Among these, perhaps the most successful one is the Bernanke and Blinder's model (1988), in which aggregate data are employed to investigate the relevance of a bank-lending channel (BLC) of monetary policy. Owing to the facts that Italy has a capital market not much developed and is characterized by the presence of a large number of small firms depending financially on bank credit, it is considered an interesting case-study country for BLC theory.
The first empirical estimations, based on aggregate time series, of a BLC operating mechanism in Italy are the ones by Buttiglione, Ferri (1994) and Bagliano, Favero (1988). Analyzing the demand side economics of the credit view, in both papers it is shown that monetary policy shocks affect the economy through exogenous variations of the interest rate in the market for bank reserves and their conclusions are similar. The aim of this paper is to analyze the supply side economics of the credit view, to find evidence of significant effects of credit variables on aggregate supply and on firms' employment (Fiorentini, Tamborini, 2001).

2. Empirical analysis

The observed variables we analyze are the real wage rate: $\overline{W}$, which is the nominal

[1] The present paper is financially supported by the research project "Fonti, valutazione e gestione integrata dei rischi nelle imprese non finanziarie", financed by MURST and the University of Trento, Italy, for the years 2001-2002.

wage rate deflated by the production price index (ISTAT); the industrial production index: *Y*, seasonally adjusted, (ISTAT); the inflation: Π, defined as P_t / P_{t-12}, where *P* is the consumer's price index (ISTAT); the three month interbank nominal rate: *K* (Banca d'Italia), that we consider as an indicator of the monetary policy stance; the *SPREAD* between the market lending nominal rate, R_l, and the yield on medium-term Government bonds, R_b, (Banca d'Italia). All variables are log-tranformed, except *K* and *SPREAD*. The log-transformed variables are denoted with lower case letters. In the data set we take the observations on the twelfth lead of Y_t, that is Y_{t+12}, as we aim to show that a variation in credit supply conditions have direct effects on output decisions and hence on aggregate future supply, where we assume the hypothesis of a 12-months production period. Moreover, we assume flexible prices so that we can take next year observed inflation as a proxy for next year expected inflation.

The time series analyzed are monthly and running from the beginning of 1986 to the end of 1998, that is the period ending with the beginning of the third phase of the EMU. As has been shown in Buttiglione, Ferri (1994), it's from the second half of the eighties that the credit channel starts to operate in Italy.

The basic model for our analysis is a five-variable vector VAR(*p*) model with normal disturbances, possibly augmented to include a constant term, a linear trend, seasonal dummies and intervention dummies [2]. In order to obtain residuals close to normality, in our data set we introduce four intervention dummies, to account for the exit of Italian lira from the ERM in 1992 and for a coulpe of other events, and eleven centred seasonal dummies. Maximum lag analysis has lead us to choose a lag parameter *p* equal to four. With four lags the hypothesis of white noise residuals is not rejected. [3].

The testing for the cointegration rank *r* is connected with determining the appropriate trend polynomial. The Johansen's *trace-test* for the cointegration rank, together with a graphical inspection of the stability of the same, suggests to assume a cointegration rank *r*=3 and to include in the model an unrestricted constant and a trend restricted to the cointegration space.

The identification of the cointegration space (Johansen,1995) is performed by defining the restriction matrices that the estimated cointegration vectors $\hat{\beta}$ should satisfy, in order to have unique cointegrating relations, interpretable as long-run relations among

Table 1: *Structure of the matrix* β

$\overline{w}_t$	1.0000	β_{12}	0.0000
y_{t+12}	0.0000	1.0000	0.0000
π_{t+12}	0.0000	β_{32}	1.0000
K_t	β_{41}	0.0000	β_{43}
$SPREAD_t$	β_{51}	β_{52}	β_{53}
$trend_t$	0.0000	β_{62}	β_{63}

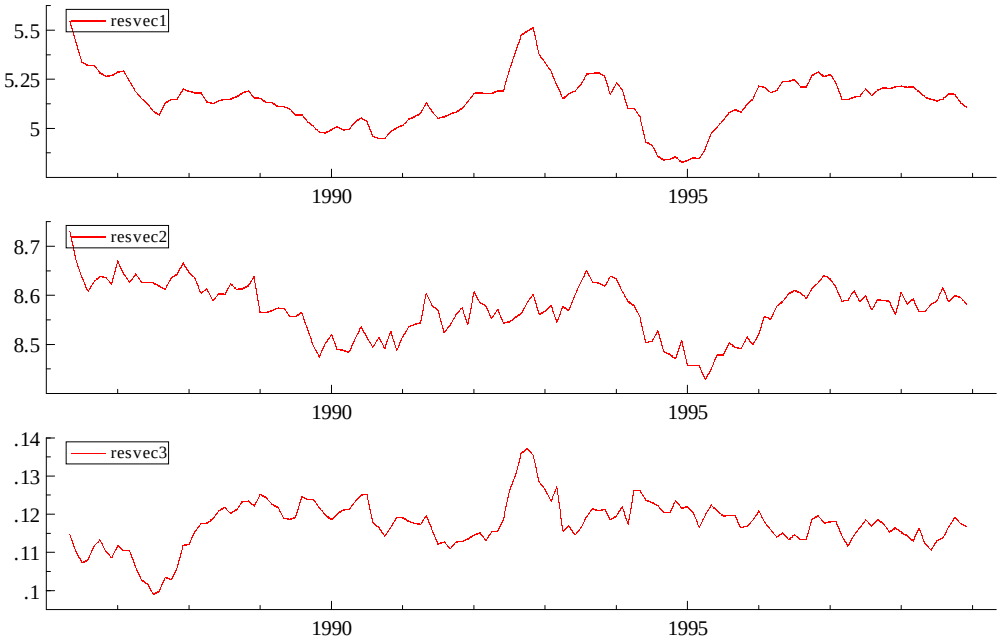
[2] The empirical analysis has been performed using the software MALCOLM, which needs the package RATS to be run, and the software PcFilm 9.0 for Windows.

[3] All the results are available upon request.

the observed variables. The focus is to study the effects that credit variables exert on aggregate future supply, employment and expected inflation, therefore, on the basis of various attempts to identify the structure that seems consistent with the chosen data set, the structure we impose is the one described in Table 1. As can be seen from the table we assume, but only after some preliminary analyses, that the trend component is not relevant in the first relation, while it's relevant in the other two relations. On this structure we further impose the restriction $\beta_{32} = -\beta_{52}$.

Quite surprisingly, the likelihood ratio test that we have applied to test the validity of the restrictions we have imposed and whose distribution is χ^2_1, where 1 is the number of overidentifying restrictions, has given a value equal to 0.03, with an associated p-value equal to 0.87, so that the restrictions are, with no doubt, consistent with our data set. In Figure 1 we have the graph of the restricted cointegration vectors.

Figure 1: *The restricted cointegration vectors*



The identification analysis has lead us to the following identified and economically meaningful relations:

$$\overline{w}_t = -3.0789K_t - 10.755SPREAD_t \quad , \tag{1}$$

$$y_{t+12} = -0.9605\overline{w}_t + 2.5268\pi_{t+12} - 2.5268SPREAD_t - 0.0033t \quad , \tag{2}$$

$$\pi_{t+12} = -0.1961K_t - 0.5521SPREAD_t + 0.0004t \quad . \tag{3}$$

The first relation represents the effect that a variation in the interbank rate, which induces a change in the spread, has on real wages. If the variation is positive, that is there is a restrictive monetary policy intervention, its effect is negative, as well as the effect of the spread.

The second relation can be rewritten as follows, after having substituted for $SPREAD_t = R_{l\,t} - R_{b\,t} \cong log(1+R_{l\,t})\text{-}R_{b\,t}$:

$$y_{t+12} = -0.9605\overline{w}_t - 2.5268\,log((1+R_{l_t})/\Pi_{t+12}) + 2.5268R_{b_t} - 0.0033t \quad , \qquad (2)$$

It's a structural relation which represents the aggregate supply. It shows that next year's aggregate supply depends negatively on real wages and on real expected interest rates and positevely on bond yield.
The third relation represents the effect that a variation in the interbank rate has on future prices, after having affected the spread. It shows that a restrictive intervention has a negative effect on expected inflation.
The trend conponent in the relations captures the effects of omitted variables.
The mechanism which operates is described in Fiorentini e Tamborini (2001) and it acts as follows: a raise in the interbank rate *K* increases the bank lending rate R_l and with it the real expected interest rate; labour demand shifts downward, nominal wage rate decreases and so real wages; but this latter variable has a weaker effect than the one of real expected interest rate, which is strengthened by the the lower expected inflation generated by the restrictive policy. The net effect is an increase in real marginal costs of firms and, therefore, a net cut on employment and future output.
To summarize, our results show that firms' employment and output decisions are affected by credit supply conditions to the extent that these entail changes in the interest rates due to banks, and that wage rate, interest rate and expected price changes do not exactly offset each other (Fiorentini, Tamborini,2001).

3. Conclusions

The aim of the empirical study was to establish whether in Italy a bank lending channel of monetary transmission mechanism has been operating. The results show that a credit channel has been identified and specific credit effects influence the supply-side of the economy through aggregate supply, real wages, and inflation. A restrictive policy, which increases the level of the interbank rate has a significant negative effect on real wages and these together with increasing real lending interest rates have significant negative effects on production within twelve months. Expected prices react negatively to a restrictive policy, but their effect is very small compared with the one on quantities.

References

Bagliano F.C., Favero C.A. (1998) Canale creditizio del meccanismo di trasmissione della politica monetaria e intermediazione bancaria. Un'analisi dell'evidenza empirica, in Vaciago G. *Moneta e Finanza*, Il Mulino, Bologna.

Buttiglione G., Ferri G. (1994) Monetary Policy Transmission via Lending Rates in Italy: Any Lessons from Recent Experience?, *Temi di discussione, Servizio Studi Banca d'Italia*, n° 224.

Fiorentini R., Tamborini R. (2001) The monetary transmission mechanism in Italy: The credit channel and a missing ring, *Giornale degli Economisti* (forthcoming).

Johansen S. (1995) *Likelihood Based Inference in Cointegrated Vector Auto-Regressive Models*, Oxford University Press, Oxford.