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The impact of trend and cyclical behaviour of inventories and inflation on barter

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This paper extends analyses of the determinants of the level of transactions among barter exchanges in the US economy by separating the trend elements of the explanatory variables from their cyclical elements. The results suggest that the level of barter is positively influenced by the expected inflation as well as by the rising unexpected business inventories.

I. INTRODUCTION

The objective in this paper is to investigate the impact of expected vs unexpected inflation and aggregate business inventories on the level of barter transactions, through barter exchanges, in the US economy.[1] In a recent article, Marvasti and Smyth (1998) explored various macroeconomic variables that influence the level of barter transactions. Their statistical analyses, based on the percentage changes in three of the five measures of barter transactions, revealed that inflation, measured by the GDP implicit price deflator, and business inventories are important variables in the determination of the level of barter in the US. However, a procedure developed in 1980 by Hodrick and Prescott, which has recently been published (Hodrick and Prescott, 1997) allows decomposition of time series behavior of variables into trended and cyclical components. Application of this method, known as HP-filter trend and cycle decomposition procedure, makes analyses of the impact of anticipated versus unanticipated changes in inflation and aggregate business inventories on the level of barter possible.

II. DATA, MODEL AND RESULTS

Statistical analysis in this paper is based on annual data for the 1974–1994 period. Three measures of the level of transactions at barter exchanges, which include trade volume by small barter exchanges in real terms, number of clients, and number of barter exchanges, are used as dependent variables.[2] Following the 1998 work by the authors, variables representing business cycles and inflation are used as explanatory variables. However, in this paper, each explanatory variable is broken down into the HP trend and deviations from the trend reflecting cyclical variations. Ash *et al.* (1999) show that the HP trend meets the requirement for weak rationality. Therefore, according to Ash *et al.*, the HP trend in a time series variable can be interpreted as the expected changes in the values of the series while the cyclical variations could be interpreted as the unexpected changes.

The empirical model is developed based on the following rationale. Domestic barter is likely to flourish during economic downturns as companies attempt to reduce excess business inventories though barter transactions instead of

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[1] For a complete discussion of barter exchanges see Marvasti and Smyth (1998).

[2] The source of data for number of barter exchanges, number of clients at barter exchanges, and trade volume at barter exchanges (in millions of dollars) is the International Reciprocal Trade Association. In the earlier work by Marvasti and Smyth (1998), trade volume among large barter exchanges was also included in the statistical analyses. In the percentage change models, however, estimates of the barter transactions function, which included the GDP implicit price deflator and aggregate business inventories, using volume of transactions at large barter exchanges generated poor results and were subsequently dropped. Accordingly, volume of trade by large barter exchanges is excluded in this paper too.

Table 1. *OLS regression results for the percentage change in barter trade*

Explanatory variables	$\%\Delta RTS_t$	$\%\Delta RTS_t$	$\%\Delta NC_t$	$\%\Delta NC_t$	$\%\Delta NCL_t$	$\%\Delta NCL_t$
$\%\Delta\Omega_t^T$	−1.5459	–	−3.7320	–	0.2411	–
	(2.6755)		(3.6155)		(3.1496)	
$\%\Delta\Omega_t^C$	0.0003[a]	0.0003[a]	0.0001[b]	0.0001[b]	0.0003[a]	0.0003[a]
	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0001)	(0.0001)
Π_t^T	0.0088	0.0117[a]	0.0127[c]	0.01967[a]	0.0293[a]	0.0289[a]
	(0.0071)	(0.0049)	(0.0096)	(0.0068)	(0.0084)	(0.0057)
Π_t^C	−0.0035	−0.0032	0.1067[c]	0.1074[c]	0.0088	0.0088
	(0.0078)	(0.0077)	(0.0106)	(0.0106)	(0.0092)	(0.0098)
Intercept	0.0794	0.0399[c]	0.8376	−0.0117	−0.0152	−0.0090
	(0.0740)	(0.0276)	(0.0999)	(0.0382)	(0.0871)	(0.0322)
Adj. R^2	0.66	0.68	0.47	0.47	0.77	0.78
D.W.	1.51	1.46	1.64	1.50	1.76	1.76

Notes: All independent variables are also in percentage change. Standard errors are in parentheses: [a] Significant at the 1% level. [b] Significant at the 5% level. [c] Significant at the 10% level.

selling their products to liquidators at less than wholesale prices. Aggregate business inventory in real terms from the national income accounts of the USA is used to represent business cycles.[3] To avoid being subject to price increases and uncertainties associated with trade under inflationary conditions, interest in barter is also likely to increase during inflationary periods.[4] Then, given the importance of inflation and business inventories, the HP procedure is applied to break each variable into two components of trend and cyclical. Thus, the barter equation to be estimated is specified as:

$$B_t = \alpha_0 + \alpha_1\Omega_t^T + \alpha_1\Omega_t^C + \alpha_2\Pi_t^T + \alpha_3\Pi_t^C + \varepsilon_t \qquad (1)$$

where Ω_t^T is the trend in business inventory, Ω_t^C is the cyclical component of business inventory, Π_t^T is the trend in inflation, Π_t^C is the cyclical component of inflation, and ε_t is the error term. No *a priori* sign is expected for the trend in business inventory accumulation as it is assumed to be anticipated and to grow with the trend in the size of the economy. On the other hand, since the level of unanticipated business inventories is counter-cyclical, the expected sign for the coefficient of unexpected business inventory is positive. Based on the earlier argument that barter provides an opportunity to avoid some of the problems caused by inflation, a positive sign is also expected for the coefficients of both components of inflation.

The OLS method is used for estimation of Equation 1.[5] The results for the percentage change in the variables are presented in Table 1. Since inflation is measured as the percentage change in the average level of prices, its percentage change is not calculated for the purpose of estimation. The initial estimates of the three measures of the level of barter include all four explanatory variables. No significant level of multicollinearity was detected among explanatory variables. The adjusted R^2 from the estimated equations suggest that the explanatory variables chosen are capturing a fair amount of the variations in the level of barter. Rather similar results are obtained from the estimates of the three versions of the barter equation. While the coefficient of the trend in aggregate business inventories is statistically insignificant in all three models, the coefficient of the cyclical component of this variable is statistically significant (at least at the 5% level) and carries the expected positive sign. The coefficient of the trend in inflation is also statistically highly significant with the correct sign. Finally, the coefficient of the cyclical component of inflation is statistically significant (at the 10% level) only in the number of clients equation.

Since the coefficient of the trend in aggregate business inventories is consistently statistically insignificant, it is dropped in the second round of estimates. No noticeable impact is observed in the value of the R^2. However, dropping the trend in aggregate business inventories has improved the statistical significance of the trend in inflation. But, the size of the coefficients for the remaining explanatory variables, particularly aggregate business inventories, continue to be fairly small. This is partly due to the relatively small size of the level of activities among barter exchanges in comparison with the total size of the US economy. The results from the second round of estimations suggest that the cyclical, or unexpected, business inventory accumulation is likely to be dealt with, in part, by selling the excess production through barter exchanges. The results for the trend component of inflation are more pronounced than for the cyclical, or unexpected, increases in the level of prices.

[3] The source of data for the aggregate business inventories, measured in billions of dollars, is the US Department of Commerce.
[4] Similar to the 1998 paper, changes in GDP implicit price deflator is used to represent the rate of inflation.
[5] Because of the annual data used in this study, in the HP filtering procedure, 100 frequency filtering is applied which is the default in the EVIEWS software.

III. CONCLUSIONS

Examination of the impact of trend and cyclical components of inflation and aggregate business inventories on the level of barter transactions through barter exchanges has led to the following conclusions. The unexpected business inventory accumulation stimulates barter while the effect of the expected inventory changes is not clear. Also, the long-run expected inflation rate, rather than the short-run deviations from it, affects the level of barter.

REFERENCES

Ash, J. C. K., Essaw, J. C. Heravi, S. M. and Smyth, D. J. (1999) Are Hodrick-Prescott 'Forecasts' Rational?, working paper.

Hodrick, R. J. and Prescott, E. C. (1997) Postwar US business cycles: an empirical investigation, *Journal of Money, Credit, and Banking*, **29**, 1–16.

Marvasti, A. and Smyth, D. (1998) Barter in the US economy: a macroeconomic analysis, *Applied Economics*, **30**, 1077–88.

Smant, D. J. C. (1998) Modelling trends, expectations and the cyclical behaviour of prices, *Economic Modelling*, **15**, 151–161.