UNIVERSITÀ DEGLI STUDI DI NAPOLI
"PARTHENOPE"
ISTITUTO DI STUDI ECONOMICI

MARKET CONSUMPTION AND HIDDEN CONSUMPTION. A TEST FOR SUBSTITUTABILITY

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Bruno Chiarini and Elisabetta Marzano *

Abstract

In this paper we perform an empirical analysis on the relationship between private consumption and underground economy for the Italian case. We find that private market consumption and underground (or hidden) consumption may be defined as ?complementary goods?: an increase in underground consumption tends to rise family market consumption and increase its marginal utility. An implication of this result is that the non-market sector does not offer hedging opportunities to the consumer-worker as stressed in Busato and Chiarini (2002) artificial economy. Moreover, wealth effects associated with a change in underground consumption are negative. A statistical model confirms this structural interpretation.

JEL Code: D11, D12, D18, E21, C52.

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Contents

1 Introduction

This paper analyzes the implications that a large and growing underground economy can have on private consumption. [1] In particular, we perform an empirical analysis on the relationship between aggregate private consumption and the hidden consumption component for the Italian case. There are several reasons why we are concerned about this investigation. First, like most Southern European countries, Italy has a sizeable underground sector, between 24-30% of the GDP. Second, polls and microeconomic studies stress that almost all the income earned in the hidden sector is immediately spent, producing an interesting effect on consumer behavior. Third, a recent estimation of the underground economy for this country uncovers some interesting cyclical properties. A time series plot of the output of these two sectors for Italy is presented in Figure 1. Casual inspection suggests that these sectors give rise to two distinct cycles. The figure reports the Hodrick-Prescott filtered series of the market and the underground components, stressing the countercyclical nature of the hidden component, and leads one to draw interesting conclusions regarding the smoothing behavior of agents and the volatility of consumption and income.

The cyclical features of the underground economy have led Busato and Chiarini (2002) to introduce this sector in a dynamic general equilibrium framework. They show that it provides a new degree of freedom for enriching the analysis and producing a better understanding of business cycle dynamics and policy implications. In this economy, the hidden consumption (the underground sector) provides an insurance scheme to insure agents against idiosyncratic risk. Informal markets may be an essential feature in explaining consumption allocations over states of nature. This insurance channel, alternative to financial markets, is available to people that face, for instance, liquidity constraints.

The goal of this paper is, therefore, to test whether or not the nonmarket sector may offer hedging opportunities to the consumer-worker. The test may reflect a representative agent who distributes labor supply and income in the two sectors. Alternatively, it may be consistent with the existence of a contract signed by different family members according to which total income and total labor supply are allocated between the two sectors. To this end we use a partial-equilibrium model of consumer choice and test the hypothesis of substitutability for describing the relationship between private and underground consumption. We perform this test estimating a structural model (Euler equation) and a statistical model (VAR cointegrated).

HERE FIGURE 1

[1] Here, we refer to those activities which are not taxed or registered. There exists a vast literature on this issue. See also Thomas (1992), Feige (1994), Lubell (1991), and the papers in The Economic Journal symposium (1999) among others. The methods of estimating the size of the underground economy have recently been surveyed by Schneider and Enste (2000).

The paper is organized as follows: Section 2 provides a consumer choice model, stressing the role of marginal utility dynamics determined by the effects of the two consumption (private and hidden) components. This section derives the Euler equation to be estimated. Section 3 describes the data source and presents the econometric results for two alternative models: the Euler equation-structural model and a reduced-form statistical model. Section 4 analyzes the main implications of the findings in terms of wealth effects. Conclusions are provided in the final section.

2 A Simple Model

This section describes a partial-equilibrium model of consumer choice that shows how apparent excess sensitivity arises in the presence of an underground consumption good. The representative individual inelastically supplies one unit of labor every period. We may assume that the consumer allocates a share of the total labor to market production and the remaining, working hours to the underground sector. As usual, tastes are represented by the following utility function,

$$U_t = E\sum_{t=0}^{\infty}\beta^t u(C_{t+1}^T) \tag{1}$$

where C^T denotes the level of the "effective" consumption, β is a constant rate of time preference and $u(.)$ is a time-invariant concave utility function. In an underground economy, the consumer derives utility from market consumption, C^m, and from underground produced consumption C^u. The two consumption goods may be conveniently defined as a linear combination of "market" private consumption and hidden consumption:

$$C_t^T = C_t^m + \lambda C_t^u \tag{2}$$

Equation (2) implies that a unit of underground goods and services provides the same utility as λ units of private market consumption.[2] The parameter λ is therefore a measure of the substitutability between the two consumption

[2] We follow Barro (1989) and Christiano and Eichenbaum (1992) who define a relationship between consumption services and public consumption, and generalize the expected lifetime utility function (1) adding an extra-term $\phi(C_t^u)$ where ϕ is a concave function. With $\phi(C_t^u) > 0$, the consumer does not necessarily feel worse off when C_t^u is increased. Notice that $\phi(C_t^u)$ enters separably in (1) and, therefore, this term has no bearing on consumers' choices of consumption: C_t^u is modeled as an exogenous variable. See also Aschauer (1985) and Karras (1994).

goods. The greater the parameter λ the more closely underground consumption substitute for a unit of contemporaneous private market consumption. The substitution parameter defines the derivative of the marginal utility of C_t^m with respect to C_t^u. This value may be positive or negative. A negative value implies that increases in hidden consumption raise the marginal utility of C^m. That is, the two consumption aggregates are complementary goods. Thus, when the hidden consumption rises, the consumers are willing to raise market consumption. This interpretation, consumption aggregates are not rivals, is not consistent with the stylized facts reported above. On the contrary, a positive value of λ implies that an increase in C^u reduces the marginal utility of market consumption.

The dynamics of the individual's assets take the following form:

$$\frac{A_{t+1}}{(1+r_{t+1})} - A_t + C_t^m + C_t^u = (w_t^m + w_t^u) \tag{3}$$

The representative agent holds only a single asset (or a portfolio), A_{t+1} at the beginning of the period, and $w_t^m + w_t^u$ is the sum in wage rate he receives within the market and the underground sector. We assume, for simplicity, that the consumer earns a constant real return r.

Replacing C_t^m by $C_t^T - \lambda C_t^u$ in the flow budget constraint, the optimization problem for the representative consumer is to maximize,

$$U_0 = E_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{1}{1-\eta} \right) \varphi(C_t^m, C_t^u)^{1-\eta} \tag{1.1}$$

subject to (3).[3] When the utility function features constant relative risk aversion, the first order conditions for optimality give:

$$\frac{(C_{t+1}^T)^{-\eta}}{E_t(C_t^T)^{-\eta}} = (1+r)\beta \tag{4}$$

It is straightforward to show that the Euler equation along with definition (2) provides the following estimable equation:

$$C_t^m = \upsilon C_{t-1}^m - \lambda C_t^u + \upsilon\lambda C_{t-1}^u + \lambda(C_t^u - E_{t-1}C_t^u) + (C_t^m - E_{t-1}C_t^m) \tag{5}$$

where $\upsilon = \beta(1+r)^\eta$. Below we report the empirical analysis using official data for the consumption component and estimates for the underground consumption.

[3] Here $\varphi(.)$ is the linearly homogeneous aggregator of the two consumption goods.

3 Estimation

In this section, to test the degree of substitutability between private consumption and hidden consumption, we estimate the structural model developed above and a statistical model (reduced-form) for the variable involved. The empirical specifications are tested using data from Istat (National Accounts) for 1970-96. The private consumption data are an annual series on total family expenditures in real terms C_t^m (exclusive of public consumption C_t^p and underground consumption C_t^u). The GDP deflator P_t has been used to generate real consumption aggregates. All the variables are in log terms.

3.1 Underground Estimates

Although a large literature exists on many issues of the underground economy, a set of alternative estimates for Italy is lacking. Disagreement about definitions and estimation procedures is still strong and at the moment there exist few time series for the hidden component of the GDP. In this study, to measure the relative size of the hidden consumption, we adopt the series generated by Bovi (1999). Bovi has, in his works, generated and updated estimates of aggregate underground economy based on the currency demand approach. In particular, the unrecorded economy is generated by a modified version of Tanzi's approach (1980; 1983) to better depict some features of the Italian economy.[4]

Because these data are published and available for the period 1970-1997, and because they are, at moment, the most complete dataset available, we use them in estimating the model. No attempt at the former adjustment is made due to the arbitrariness and difficulties involved in the estimation of the underground economy (labelled C_t^u). The National Statistic Institute (Istat) is starting to calculate the size of the underground sector. However, at moment, it is not available a time series but only annual data for few years (1995 to 1999).

Naturally, there are other possible measures of the hidden economy: disparate estimates based on questionnaires or experiments or, in some cases, official information on aggregate income-tax-evasion data. However, these data for the unrecorded economy are not revised or updated and cannot be used in a time series model.

Finally, a further note of caution comes from our assumption about the correspondence between the income generated and earned in the underground economy and consumption. This adjustment is crude and, moreover, many goods included in the underground consumption would have durable or investment characteristics.

[4] See also Bovi and Castellucci (1998). Two additional methods for estimating the underground economy based on the labor market statistics are reported in Castellucci and Bovi (1999).

Summing up, the variable definitions and statistical sources are:

C_t^m=private real consumption expenditure (durable and nondurables goods and services). Sources: Istat.

C_t^u=total income of the underground economy. In this paper we use the overal income figures of the Italian underground economy as consumption series. Of course, this is a first approximation and it reflects the fact that at least two-thirds of the income earned in the underground economy is immediately spent. The figure derives from polls of some European countries.[5] Sources: Bovi (1999)'s estimation.

All the other variables (the GDP deflator P_t and public consumption expenditure C_t^p) are taken from the Istat database.

3.2 Structural Estimates

First note that market and nonmarket consumption variables are not stationary series.[6] In this case we know that C^T has a unit root and therefore we have $\upsilon = 1$. The equation (5) can be estimated under this restriction and, therefore, may be written in terms of stationary variables ΔC_t^m and ΔC_t^u. Notice that the underground consumption should be endogenously determined and, of course, it is measured with error. These facts make the right-hand side variable correlated with disturbances. We use Two Stage Least Square regression to eliminate the correlation between the underground consumption and the disturbances. The estimator used is

$$\lambda_{tsls} = \left[X'Z(Z'Z)^{-1}(Z'X)\right]^{-1} X'Z(Z'Z)^{-1}Z'y \tag{6}$$

with the estimated covariance matrix $\Omega_{tsls} = s^2 \left[X'Z(Z'Z)^{-1}(Z'X)\right]^{-1}$, where s^2 is the estimated residual variance, y is the dependent variable, Z the matrix of instrument and X a vector of explanatory variables.

Furthermore, the use of annual series imposes some time aggregation on (5). In this case, the regression error is not white noise, but it may follow an MA(1) process. The basic point is the same as that discussed in the literature on the "timing of consumption" (see Deaton 1992, Attanasio 1999): this is based on the fact that we have no grounds for supposing that the annual data that we use here correspond to the period over which consumers make their decisions. The planning interval may be shorter than the data interval. This problem,

[5] See Schneider and Enste (2000) and the works quoted therein.

[6] The *ADF* test for Private Consumption is -2.17 whereas, for the Undrground Consumption data, the *ADF* statistic is -1.1348. Critical values at 1% and 5% are, respectively, -3.72 and -2.985.

"induce spurious correlations for adjacent observations of a series that has been first-differenced". Notice also that the error term has one-period memory we cannot use variables dated before *t-2*.

The parameters estimated for the model $\Delta C_t^m = \gamma - \lambda \Delta C_t^u + \lambda \varepsilon_t + \xi_t$ with $\varepsilon_t = (C_t^u - E_{t-1} C_t^u)$ and $\xi_t = (C_t^m - E_{t-1} C_t^m)$, are reported in Table 1. For the first three models (models1-3), we do not consider any particular structure for the regression error. The fourth model reports the parameter estimates after considering the MA(1) process. Order and rank conditions for identification are satisfied.[7]

None of the Jarque-Bera statistic for testing normality (distributed as $\chi^2(2)$), rejects the null hypothesis of normally distributed errors. For instance, in the estimated model (5) in the table, the JB statistic is 0.0958 with an associated probability value of 0.953 and a Kurtosis value of 3.1. In the estimated equations, the Breusch-Godfrey test for second order serial correlation ($p-values$ in parentheses) does not indicate a significant presence of this phenomenon. Notice that imposing an MA(1) process on the error term does not improve the stochastic properties of the residuals.

The most interesting result from the table is the robustness of the estimates of λ. The estimated parameter is negative, statistically significant and ranges from .37 to .48. The estimates indicate that private market consumption and underground consumption may be defined as "complementary", which is to say, an increase in underground consumption tends to raise the family market consumption and increase its marginal utility.

These findings do not seem to imply the existence of informal markets in which consumers can insure against idiosyncratic income shocks. This result may be due to the fact that in good times progressive tax rates in the market economy become higher and boost the underground economy, introducing a procyclical component into C^u. A further element should be assessed. Italy and many others Southern European countries, have a high degree of institutionalization of the traditional family model. A situation where different generations are brought together in the same household. This family structure has the advantage of offering everyone a sort of protection.[8] In this context, family's members works in different markets and with a different status and some of them are willing to accept any kind of job in any market. When the underground earnings increase, the family's income as a whole, increases pushing up its consumption.

HERE TABLE 1

[7] See, among others, Davidson and MacKinnon (1993).

[8] See the papers in Gallie and Paugam (2000) and the works quoted therein.

3.3 Reduced Form Estimates

If the random variables are unit root nonstationary and are cointegrated, we can use a statistical model to fit the data generation mechanism. To this end, the VEC (vector error correction model) is widely used. This representation always exists when the variables are cointegrated. Although there have been some attempts to recover structural parameters from these models, imposing particular restrictions (see Ogaki and Park 1998 and Ogaki 1999), the VEC is a reduced form model and, therefore, it better describes the process of generating data. Here we use Johansen's (1988; 1995) Maximum Likelihood method to estimate the model and provide the impulse-response functions.

The vector error correction model estimated is a bivariate restricted VAR that has a cointegration vector restriction built into the specification:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{2} \Gamma \Delta y_{t-1} + Bx_t + \epsilon_t \tag{7}$$

where the model follows the standard notation. For our case, y is a 2-vector of nonstationary *I(1)* variables, x is a vector of deterministic variables and ϵ is a vector of innovations. The coefficient matrix Π has reduced rank $r < 2$, with $2 \cdot r$ matrices α and β with rank r such that $\Pi = \alpha\beta'$ is stationary.

In particular, our VEC specification assumes that there are linear trends in the series and a constant in the cointegrating equation. The assumption made on the deterministic trends follows one of the possibilities defined by Johansen (1995):

$$H(r) : \Pi y_{t-1} + Bx_t = \alpha(\beta' y_{t-1} + \rho_0 + \rho_1 t) + \alpha \perp \gamma_0 \tag{8}$$

That is, both the series y and the cointegrating equation have linear trends. The LR test statistic (*trace statistic*) rejects the hypothesis of no cointegration but not the hypothesis of at most one cointegration relation: $LR = 21.33$ (critical values: 15.4 at 5% and 20.1 at 1%).

The lag order of the VEC is 2 and is estimated for the period 1970-1996 and consists of changes in private consumption ΔC_t^m and hidden consumption ΔC_t^u,both in real terms. The model is conditioned upon a dummy variable for 1975 to account for an outlier and the public consumption expenditure in real terms.[9]

[9] Maximum likelihhod assumes that the errors are multivariate normal. The Jarque-Bera statistic does not reject the hypothesis of normal distribution for the two equations of the model: for the ΔC_t^m equation the statistic is 0.262, with a $p-value$ of 0.877 (with a Kurtosis value of 3.2) while for the ΔC_t^u equation, the $J.B.$ is 0.29 (0.864) and the Kurtosis value is 2.62. The first equation yields an adjusted $R^2 = 0.855$ and a standard error of regression $S.E. = 0.029$. The second equation yields, respectively, $R^2 = 0.811$ and $S.E. = 0.081$.

The residual covariance matrix shows that the innovations in different variables are quite independent (they are orthogonal):

$$\Omega_\epsilon = \begin{bmatrix} 0.000547 & -0.00109 \\ -0.00109 & 0.0040 \end{bmatrix}$$

This ensures that changing the order of the equation does not dramatically change the impulse responses. Figures 2-6 report the impulse responses of the two consumption models. The first is a stable bivariate VEC model, where y is a 2-vector of nonstationary I(1) variables C_t^m and C_t^u, whereas in the second model, public consumption expenditure C_t^p enters as a further endogenous variable.

Although the dynamics are affected, they yield very similar results. After the disturbance in hidden consumption (a standard deviation shock), the private consumption raises below its preshock level (Figures 2 and 3).[10] In Figures 4- 6 the consumption innovations induce the two consumption components to react asymmetrically. In Figure 4 private consumption responds positively to a one standard innovation in hidden consumption and public expenditure consumption whereas underground consumption reduces to a one standard deviation innovation in private consumption. These findings appear to be robust to different specifications and do not seem to depend on the ordering of equations.

HERE FIGURES 2-6

Forecast error variance decompositions of the two variables are reported

in Table 2. The table presents the percentage of the variance of each series explained by innovations in ΔC^m (first part of the panel) and the percentage of ΔC^m variance explained by the shocks in ΔC^u (second part of the panel). The column S.E. is the forecast error of the variable for each forecast horizon. This error is determined by the changes in the values of the innovations to each variable in the model. About 43% of the 1-step forecast error variance of hidden consumption is accounted for by its own innovations and about 56% is accounted for by private consumption innovations. For 10-step forecast, 86% and 14% of the error variance is accounted for by hidden and private consumption, respectively. Thus, for a short forecast horizon, private consumption innovations contribute substantially to the forecast error variance of underground consumption. Furthermore, the importance of the hidden consumption shocks increases over the horizon of the simulation: a remarkable and increasing fraction, from 33% to 79%, of the forecast error variance of private consumption is accounted

[10] As a consequence of the unit root in the model the impulse response function does not return to zero. The estimated responses of private consumption in first differences taper off to their initial level. See Lutkepohl (1993).

for by innovations in the hidden consumption. The ΔC^u innovations explain more than 67% of the 4-step-ahead forecasting error variance for the private consumption. These results confirm that private and underground consumption are well defined as complementary goods.

Both the impulse response analysis and the variance decomposition show that the dynamic of the private consumption aggregate is strongly determined by the hidden consumption innovations.

HERE TABLE 2

4 Wealth Effects

Using equation (3) for each period starting from *t=1*, we may write the budget constraint in present value form:

$$A_t + \sum_{j=0}^{\infty} \beta^j w_{t+j}^m + \sum_{j=0}^{\infty} \beta^j w_{t+j}^u = \sum_{j=0}^{\infty} \beta^j C_{t+j}^T + (1-\lambda) \sum_{j=0}^{\infty} \beta^j C_{t+j}^u \qquad (9)$$

Forward substitution in equation (3) shows that the present discounted value of total consumption is constrained by the level of wealth A_t plus the present discounted value of labor earnings in the two sectors of the economy, plus $(1-\lambda)$ time the present discounted value of underground consumption. If $\mid \lambda \mid < 1$, the underground consumption may impose a negative (positive) wealth effect on the representative consumer as long as $\lambda < (>) 0$. With a constant interest rate and $\lambda > 0$, an increase of underground labor income from 0 to w^u provides an increase in wealth in accordance with the budget constraint. However, our estimations yield a negative value of λ. In this case, an increase in w^u and C^u will produce a wealth loss.[11] This result implies that a country with a large underground economy tends to have a low private saving ratio.

5 Conclusions

In this paper we have presented empirical evidence on the importance of the hidden consumption for a country with a large underground economy. Using both a structural model (Euler equation) and a statistical model (VEC), we

[11] Notice that wealth may fall and utility may rise because of the $\phi(.)$ term. See footnote n.2 and Barro (1989).

show that in Italy, aggregate hidden consumption is not a rival good for aggregate family private spending. The models are estimated using official (NA) aggregate data, whereas the underground economy used in the paper has been generated by a model based on the currency demand approach (Tanzi's approach). Thus, notwithstanding the robustness of our results, the unofficial character of the underground variable utilized requires some caution in interpreting these findings.

Busato and Chiarini (2002) using an artificial economy characterized by a stochastic growth model, show that the relationship between private consumption and hidden consumption is relevant to the consumption insurance issue. In an economy with a large underground sector, consumers might be insured by this alternative (or additional) market and therefore able to smooth aggregate consumption over states of nature.[12] Using a two sector model in general equilibrium framework, the quoted authors show that this smoothing out is achieved by switching employment, production and consumption between the market and underground sectors. In this paper using econometric techniques in a partial equilibrium framework, we stress that in economies with a sizeable underground sector, private and underground consumption are complementary and therefore they tend to change together. Moreover, the presence of a sizeable underground consumption component produces negative wealth effects.

Our results indicate that, for economies with a sizeable underground sector, a consumption model that does not explicitly incorporate this sector may be seriously compromised. Indeed, there exists a substantial difference between empirical consumption patterns and theoretical predictions (for instance Attanasio 1999), and this issue can be reasonably tied to the presence of a nonmarket sector, at least in those countries where this phenomenon is relevant.

Since the underground economy is an increasingly important phenomenon that arises in all countries, the evidence of this paper suggests that additional research in this area is justified, and can be extended in a variety of ways: the models (both the structural models and statistical models) might be extended to other variables, and the research should provide alternative estimations of the underground series. With unofficial data, it is desirable to carry out comparative analyses.

These findings may, to a large extent, due to the underground estimations, the selection of the variables in the VEC, the imposed exogeneity in the Euler equation, or the cointegration analysis. The structural form is specified on the basis of a priori knowledge on the structure of the relationship between the variables of interest, while a major limitation of our reduced form systems is the potential incompleteness. We work with low-dimensional VAR systems with potential omitted variables in the innovations.

[12] For this issue, see for instance, Cochrane (1991).

6 References

References

[1] Aschauer D.A. (1985), Fiscal policy and aggregate demand, *American Economic Review*, 75, 117-27.

[2] Attanasio O.P. (1999), Consumption, in J.B. Taylor and M. Woodford (eds.), *Handbook of Macroeconomics*, Vol.I, Elsevier Science, Amsterdam.

[3] Barro R.J. (1989), The neoclassical approach to fiscal policy, in Modern Business Cycle Theory (ed.) by Robert J. Barro, Cambridge Mass: Harvard University Press.

[4] Bovi M. (1999), Un miglioramento del metodo di Tanzi per la stima dell'economia sommersa in Italia, in *Istat, Quaderni di Ricerca*, N.2, 5-51.

[5] Bovi M. and Castellucci L. (1998), C'era una volta l'economia sommersa, ora è informale, *CEIS Newsletter*, 4, pp. 4-6.

[6] Busato F. and Chiarini B. (2002), Market and Underground activities in a two-sector dynamic equilibrium model, forthcoming, *Economic Theory.*

[7] Castellucci L. and Bovi M. (1999), What do we know about the size of the underground economy in Italy beyond the "common wisdom"? some empirically tested propositions, paper prepared for The Far Eastern Meeting of the Econometric Society, Singapore, July.

[8] Christiano L.J. and Eichenbaum M. (1992), Current real business cycle theories and aggregate labor market fluctuations, *American Economic Review*, 82, pp.430-50.

[9] Cochrane J.H. (1991), A simple test of consumption insurance, *Journal of Political Economy*, 99, pp.957-76.

[10] Deaton A. (1992), *Understanding Consumption*, Clarendon Press, Oxford.

[11] Davidson R. and MacKinnon J.G. (1993), *Estimation and Inference in Econometrics*, Oxford University Press, Oxford.

[12] Economic Journal (1999), Controversy: On the Hidden Economy, 109, No 456.

[13] Gallie D. and Paugam S. (eds.)(2000), *Welfare Regimes and the Experience of Unemployment in Europe*, Oxford University Press, Oxford.

[14] Feige E. (1994), The underground economy and the currency enigma, *Public Finance*, 49, 119-36.

[15] Johansen S.J. (1988), Statistical analysis of cointegration vectors, *Journal of Economic Dynamics and Control*, 12, pp. 231-54.

[16] Johansen S.J. (1995), *Likelihhod-Base Inference in Cointegrated Vector Autoregressive Models*, Oxford University Press, Oxford.

[17] Karras G.(1994), Government spending and private consumption: Some international evidence, *Journal of Money, Credit and Banking*, 26, 9-22.

[18] Lubell H. (1991), *The Informal Sector in the 1980's and 1990's*, OECD, Paris.

[19] Lutkepohl H. (1993), *Introduction to Multiple Time Series Analysis*, Springer-Verlag, Berlin.

[20] Ogaki M. and Park J.Y. (1998), A cointegration approach to estimating preference parameters, *Journal of Econometrics*, 82, pp.107-34.

[21] Ogaki M. (1999), GMM estimation techniques, in Laszo Matyas (ed.), *Generalized Method of Moments Estimation*, Cambridge University Press, Cambridge.

[22] Schneider F. and Enste D. (2000), Shadow economies: Size, causes and consequences, *Journal of Economic Literature*, XXXVIII, pp.77-114.

[23] Tanzi V. (1980), The underground economy in the United States: estimates and implications, *BNL Quarterly Review*, 135:4, pp 427-53.

[24] Tanzi V. (1983), The underground economy in the United States: Annual estimates, 1930-1980, *IMF Staff Papers*, 30:2, pp. 283-305.

[25] Thomas J. (1992), *Informal Economic Activity*, LSE Handbooks in Economics, Harvester Wheatsheaf, London.

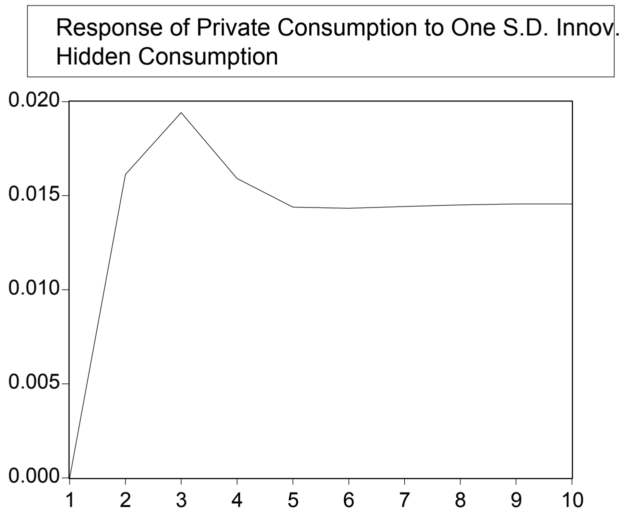

Figure 2: Model C(m), C(u)

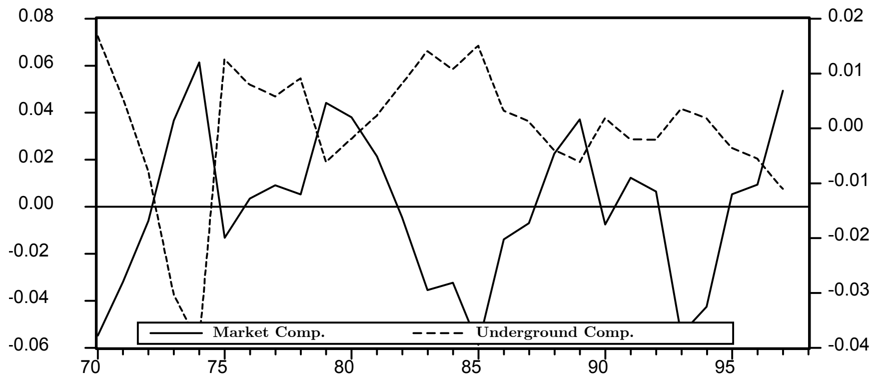

Figure 1: Filtered Series. Sources: Istat and Bovi (1999)

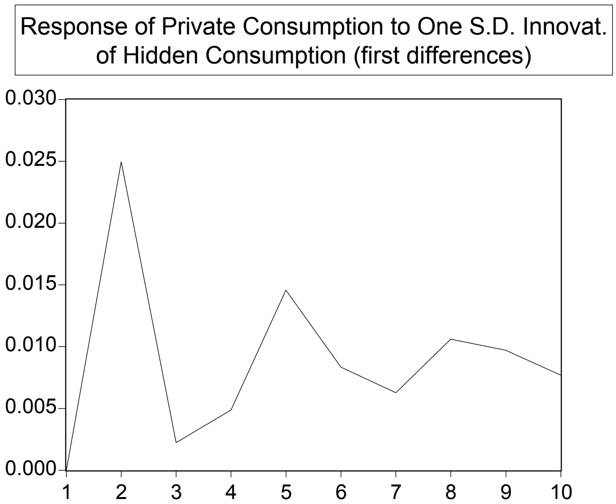

Figure 3: Model C(m), C(u)

Figure 4: Response of Private Consumption

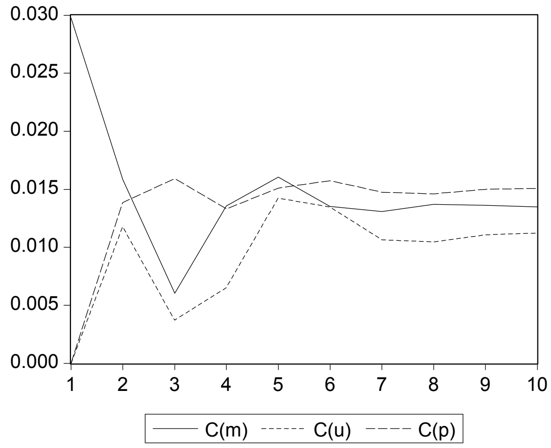

Figure 5: Response of Hidden Consumption

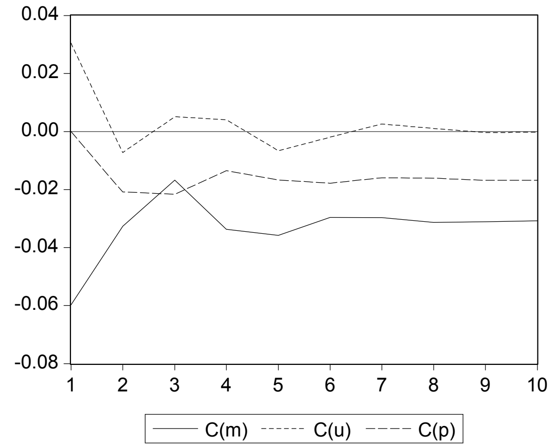

Figure 6: Response of Public Consumption

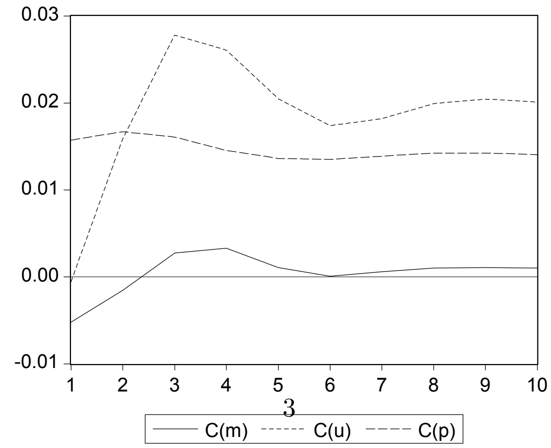

Table 1: *TSLS Estimates of* $\Delta C_t^m = \gamma - \lambda \Delta C_t^u + \lambda \varepsilon_t + \xi_t$

Models	γ	λ	MA(1)	AdjustedR^2	S.E	DW	LM(p)
1	0.036 (0.005)	-0.484 (0.09)		0.80	0.0243	1.96	0.318 (0.85)
Instruments	$\Delta C_{t-2}^m, \Delta C_{t-2}^u, \Delta P_{t-2}, \Delta C_{t-2}^p, c$						
2	0.034 (0.006)	-0.481 (0.10)		0.76	0.0266	2.29	1.62 (0.45)
Instruments	$\Delta C_{t-2}^m, \Delta C_{t-2}^u, \Delta P_{t-2}, \Delta C_{t-2}^p, Dummy81, c$						
3	0.035 (0.005)	-0.379 (0.06)		0.80	0.0240	1.52	0.257 (0.88)
Instruments	$\Delta C_{t-2}^m, \Delta C_{t-2}^u, \Delta P_{t-2}, \Delta C_{t-2}^p, Dummy75, c$						
4	0.036 (0.005)	-0.484 (0.101)	0.0015 (0.232)	0.79	0.0249	1.96	2.89 (0.23)
Instruments	$\Delta C_{t-2}^m, \Delta C_{t-2}^u, \Delta P_{t-2}, \Delta C_{t-2}^p, c$						
5	0.032 (0.005)	-0.371 (0.05)		0.81	0.0215	1.72	0.559 (0.95)
Instruments	$\Delta C_{t-2}^m, \Delta C_{t-2}^u, \Delta P_{t-2}, \Delta C_{t-2}^p, \Delta C_{t-3}^m, \Delta C_{t-3}^u, \Delta P_{t-3}, \Delta C_{t-3}^p, c$						

Estimated standard errors in parentheses; *sample: 1970-1996*.
S.E.=standard error of regression; *LM*=Breusch-Godfrey serial correlation LM test of order 2;
Dummy81=1:1981; Dummy75=1: 1975.

Table 2: *Variance Decomposition*

Variance Decomposition of ΔC_t^m					Variance Decomposition of ΔC_t^u			
Period	*S.E.*	ΔC_t^m	ΔC_t^u		Period	*S.E.*	ΔC_t^m	ΔC_t^u
1	0.02353	100.0	0.00		1	0.06430	56.41	43.59
2	0.02879	66.83	33.16		2	0.07458	43.07	56.92
3	0.04177	32.81	67.19		3	0.10922	20.70	79.30
4	0.04565	32.92	67.08		4	0.12089	20.80	79.20
5	0.04581	33.32	66.68		5	0.12193	21.41	78.59
6	0.05064	27.42	72.57		6	0.13372	17.82	82.18
7	0.05381	25.46	74.54		7	0.14377	16.36	83.63
8	0.05440	25.54	76.46		8	0.14677	16.42	83.58
9	0.05666	23.54	76.45		9	0.15335	15.09	84.91
10	0.05925	21.92	78.81		10	0.16128	14.02	85.98

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