Dipartimento di Politiche Pubbliche e Scelte Collettive – POLIS
Department of Public Policy and Public Choice – POLIS

Working paper n. 52

May 2005

Rationally addicted to cinema and TV? An empirical investigation of Italian consumers

Andrea Sisto and Roberto Zanola

UNIVERSITA' DEL PIEMONTE ORIENTALE "*Amedeo Avogadro*" ALESSANDRIA

Rationally Addicted to Cinema and Tv?
An empirical investigation of Italian consumers[§]

A.Sisto[#] and R.Zanola[*]

ABSTRACT

A number of papers have empirically investigated the rational addiction model proposed by Becker and Murphy (1988) by using data on different harmful drugs; but also activities independent of a biological or pharmaceutical dependency have been analysed, such as cinema. The purpose of this paper is to extend previous works on cinema demand by including two addictive consumption goods, cinema and television. To this aim a panel-data GMM methodology is used to estimate a dynamic model of double rational addiction as proposed by Bask and Melkersonn (2004) using a sample of monthly time- and cross-sectional series covering the 20 Italian regions over the period 2000-2002.

Key words: cinema; tv; rational addiction; dynamic panel.

JEL classification: C6.

[§] An earlier version of this paper was presented at the first Workshop on the Evolution of Consumption held in Gaeta on 18-20 March 2005. This work has gained from the helpful comments of Prof. Mario Ferrero, Prof. Ulrich Witt, Prof. Bruno S. Frey, Prof. Gerben Bakker and all the partecipant of the workshop. The usual disclaimers applies.

[#] [°]University of Eastern Piedmont, Department of Public Policy and Public Choice, Italy.

[*] *Corrisponding author:* University of Eastern Piedmont, Department of Public Policy and Public Choice, Via Cavour, 84, 15100 Alessandria, Italy, e-mail: roberto.zanola@unipmn.it

1. Introduction

Dynamics have revealed to be very important for the explanation of individual behaviour in many empirical specifications. Hence, it seems natural to model the demand for addictive goods using a model which allows linkages of consumption over time. Becker and Murphy's (1988) rational addiction model explains the consumption of addictive goods as a specific dynamic human capital accumulation process. Whatever the origin of addiction (pharmacological or a psychological), the framework used to deal with habit formation (endogeneity of preferences or shadow prices) and the assumption about consumer behaviour (rationality or myopia), the key feature of this model is the deterministic impact of past consumption on present behaviour. People are hooked into addiction and consumption follows a predictable optimal path.

Although this model has been empirically investigated by a number of studies (McCain, 1979, 1995; Villani, 1992; Abbé-Deccarraux, 1994; Lévy-Garboua and Montmarquette 1996), only few authors have analysed cinema demand (Cameron, 1999; Dewenter and Westermann, 2005; Sisto and Zanola, 2004). The first two studies applied the Becker and Murphy's (1988)'s rational addiction model to a single country, respectively UK and Germany, failing to provide support for all the predictions of the rational addiction models. By contrast, Sisto and Zanola (2004) extend previous works by analysing a panel of thirteen European countries. Results provide strong evidence in favor of a model of cinema demand that emphasizes the role of past and future consumption in current consumption.

Despite these interesting findings, however, new useful insight could be provided incorporating into econometric analysis the relationship between consumption of cinema and television. First, if cinema and television are important substitutes (or complements), then a correctly specified cinema demand equation must include television. Otherwise, the estimated coefficients of the included variables may be biased, depending, as usual, on the relationship between the included and excluded variables. Secondly, models that include multiple addictive goods may offer useful policy guidance to evaluate the impact of public interventations since it is not sufficient to consider the consumption of different addictive goods independently (Decker and Scwartz, 2000; Palacios-Huerta, 2003).

The purpose of this paper is to extend previous works on cinema demand by including two addictive consumption goods, cinema and television. The idea of specific human capital accumulation in cinema consumption underlying the rational addiction approach is extended by allowing tv consumption to reinforce the movie stock (in the case of a complementary effect) or to depreciate it (if substitution effect emerges). To this aim a panel-data GMM methodology is used to estimate a dynamic model of double rational addiction as proposed by Bask and Melkersonn (2004) using a sample of monthly time- and cross-sectional series covering the 20 Italian regions over the period 2000-2002.

The proceeding of this paper is as follows. Section 2 presents the theoretical framework. Data are described in Section 3. The econometric methodology is shown in Section 4. Section 5 summarises the empirical findings. Section 6 concludes.

2. Theoretical model

Following Becker and Murphy's rational addiction theory, a consumer is said to be addicted if an increase in past consumption leads to an increase in present consumption ceteris paribus. This type of behaviour involved reinforcement, as an increase in past level of consumption increases the marginal utility for present consumption, and tolerance, as the satisfaction from a given level of consumption is lower when past level is greater (Bask and Melkersson, 2004).

Although tolerance appears to be a reasonable assumption in the case of harmful goods (alcohol, tobacco, drugs, and so on), as a rational addicted consumer would discount the harmful effect of future addiction, it is more difficult to understand how it works in the case of harmless goods, such as the case of cinema consumption. However, it's well known that cinema is a time intensive activity. Hence, the optimal path of cinema consumption could increase at diminishing rates as opportunity costs of going to cinema are expected to increase with age, due to the cost of time and the access to less time consuming rival opportunities, such as television consumption. In fact, television viewing provides the possibility for different activities beside it and, furhermore, it offers some competitive advantags like comfort, convenience, privacy toghether with a potentially higher variety and quality of supplied programs (Cameron, 1990; Férnandez-Blanco and Banos-Pino, 1997; Dewenter and Westermann, 2005).

The Becker and Murphy's model of addiction considers only one addictive good and one non-addictive good. In what follows we extend this basic model by including two addictive goods, rather than one addictive, along with one non-addictive good (Bask and Melkersson, 2004). Relaxing separability by allowing utility in each period to depend on consumption in the current and previous periods (Becker et al., 1994), a concave utility function at time *t* may be defined as:

$$U_t = U\left(C_t, C_{t-1}, A_t, A_{t-1}, Y_t, e_t\right) \tag{1}$$

where C_t and A_t are respectively the consumption of two addictive goods; Y_t is the consumption of non-addictive good; and e_t represents all the other factors affecting individual's utility. Assuming a constant rate of time preference, σ, a constant price of the non-addictive good, treated as numeraire, and perfect capital markets, the intertemporal decision of the individuals consists in maximising utility subject to a usual intertertemporal budget constraint as follows:

$$
\begin{aligned}
&U = \sum_{t=0}^{T} \sigma^{t-1} U\left(C_t, C_{t-1}, A_t, A_{t-1}, Y_t, e_t\right) \\
&s.t. \ \sum_{t=1}^{T} r^{t-1}\left(Y_t + P_{ct} C_t + P_{at} A_t\right) \leq A_0
\end{aligned}
\qquad (2)
$$

where r is the constant real interest rate; P_c and P_a are the prices of the two addictive goods; and A_0 is the initial value of assets.

A standard technique used in literature to derive demand equations is to approximate the instantaneous utility function in the neighbourhood of steady-state by a quadratic function in the arguments. Assuming a rate of time preference equal to the market interest rate, one can derive the following difference equation:

$$
C_t = \theta_1 C_{t-1} + \theta_2 C_{t+1} + \theta_3 P_{ct} + \theta_4 A_{t-1} + \theta_5 A_t + \theta_6 A_{t+1} + \theta_7 P_{at} + \theta_8 e_t + \theta_9 e_{t+1}, \qquad (3)
$$

where the θ's are parameters which depend on the underlying preferences. Equation (3) nests different behaviours (Bask and Melkersson, 2004). Since a good is addictive if and only if an increase in past consumption leads to an increase in current consumption, a zero value of both θ_1 and θ_4 implies a non-addicted consumer. Testing for rational addiction is testing for forward looking behaviour. An addicted but myopic consumer is not farsighted, according to a simply backward looking consumer decision, while a rational addicted consumer takes into account consequences of past, current and future information. The rational model implies that coefficients on future consumption should have the same sign as coefficients on lagged consumption (the sign differ only by the term δ).

3. Data

This section provides a brief description of the data sets used in this paper. The data consists of aggregate regional monthly time series from January 2000 to December 2002 for eighteen of the twenty Italian regions. In particular, the theoretical framework is investigated using the following variables.

(i) *Cinema demand*: cinema demand, *adm*, is captured by the number of tickets sold in one month divided by population size. The data are obtained from *Eropean Cinema Yearbook* published by Mediasalles and *Lo spettacolo in Italia* published by SIAE.

(ii) *Television consumption*: the identification of an appropriate measure of television consumption is a difficult task. Previous empirical researches use very different strategies to deal with this issue. Cameron (1986) uses the number of colour licenses; Cameron (1990) defines a log dummy time trend to account for private television channels introduction; Fernandez-Blanco and Banos-Pino (1997) employ a dummy variable to model the introduction of regional television channels in Spain; Macmillan and Smith (2001) adopt the number of licenses for households to capture the effect of tv-set introduction on post-war cinema admissions. However, all these strategies appear to be imperfect measures of tv consumption and, consequently, empirical analyses are likely to be biased. In fact, inclusion of dummy variables could not fully capture either changes in tv ownership nor in quality/variety of television programming through the availability of more private or regional channels. The use of television licenses is also problematic. First, licenses are paid only on the first tvset owned so that this measure substantially underestimate the number of total household tvsets existing. Secondly, it does not provide any valid measure of consumption. A way to overcome some of these limits is to use tv audience. Hence, in order to check for a common habit accumulation process between cinema and tv, we use public and commercial television[1] prime time movie audience, *tv*, calculated as the monthly number of tv movie spectators divided by population size. Data are obtained from *Auditel data elaboration* published by Media Consultants.

(iii) *Prices*: price of admission to cinemas, *p*, is the ticket price at box-office.[2] The variable is the average expense per film-goer, which is the ratio between the monthly total regional receipts and the monthly number of film-goers, according to the data supplied by *Mediasallers* and *SIAE* publications. One would expect that the cinema demand is negatively related to the ticket price. However, in our case the elasticity of cinema admission with respect to price variations may not be overinterpreted due to the difficulty to exactly capture price variations when using monthly data (Dewenter and Westermann, 2005). By contrast, a pecuniary measure of tv price is difficult to define. In fact, Italian television owners have a virtually zero marginal costs for movie consumption as the license cost must be incurred whether or not the television set is used. Hence, television movie price is assumed to be an unmeasurable variable compressed in the error term.

[1] RAI and the two major commercial broadcasting networks (Mediaset and La Sette).

[2] Due to the lack of information, we cannot take account of a second component of price – the cost of other activities which are gradually becoming essential to cinema attendance – for a description of which see Fernández Blanco and Baños Pino (1997).

(iv) Other Factors: disposable per capita income and number of screens are other important factors affecting cinema demand (Macmillan and Smith, 2001; Sisto and Zanola, 2004). However, since monthly observations prevent us from taking account of these variables, the effects of them on cinema consumption is partially captured by regional dummies.

All monetary variables are deflated at 1995 price level by CPI index. Descriptive statistics are reported in Table 1.

[TABLE 1]

4. Empirical Methodology

In order to apply the theoretical framework of previous section, equation (3) can be specified by noting whether cinema consumption is affected (or not) to tv consumption and the evaluating the following equations:

$$
\begin{aligned}
adm_{i,t} &= \alpha_0 + \alpha_1 adm_{i,t-1} + \alpha_2 adm_{i,t+1} + \alpha_3 p_{i,t} + \varepsilon_{i,t} \\
adm_{i,t} &= \alpha_0 + \alpha_1 adm_{i,t-1} + \alpha_2 adm_{i,t+1} + \alpha_3 p_{i,t} + \alpha_4 tv_{i,t} + \varepsilon_{i,t} \\
adm_{i,t} &= \alpha_0 + \alpha_1 adm_{i,t-1} + \alpha_2 adm_{i,t+1} + \alpha_3 p_{i,t} + \alpha_4 tv_{t-1} + \alpha_5 tv_{i,t} + \alpha_6 tv_{i,t+1} + \varepsilon_{i,t}
\end{aligned}
\quad (4)
$$

where subscripts *i* and *t* stand respectively for the region and the period (month) considered and $\varepsilon_{i,t}$ is the error term.

The direct estimation of equation (4) may give rise to some misleading results and some caution is necessary. First step in the analysis is to test wheter data can be pooled. Following Levaggi and Zanola (2003), F-tests are performed on the null hypothesis that the coefficients for each variable in equation (6) are the same for each year. Results are reported in table 2. The null hypothesis of equal coefficients could not be rejected in either case, therefore data can be pooled.

[TABLE 2]

Next step is to check for stationarity of the variables included in the model. In order to determine the presence of panel unit root we apply a battery of tests running the IPS t-bar tests (Im et al., 2003) and the Levin-Lin-Chu test (Levin, Lin and Chu, 2002), including a heterogeneous time trend in each specification.

[TABLE 3]

Although results in Table 3 seem to strictly reject the null hypothesis of nonstationary for all the variables of the model, in some cases the findings of these unit root tests has proved to be very sensitive to the specification of the number of lags and time trend. Banjery (1999) showed that both IPS and Levin-Lin-Chu tests suffered from low power and failed to distinguish between I(0) and I(1). Visual inspection of each variable suggests a strong presence of seasonality, inducing us to include monthly dummy variables to prevent our estimates from spurious regressions. Therefore, equation (4) is estimated in first differences, introducing eleven monthly dummies to check for seasonality, as follows:

$$\begin{aligned}
\Delta adm_{i,t} &= \alpha_0 + \alpha_1 \Delta adm_{i,t-1} + \alpha_2 \Delta adm_{i,t+1} + \alpha_3 \Delta p_{i,t} + \varepsilon_{i,t} \\
\Delta adm_{i,t} &= \alpha_0 + \alpha_1 \Delta adm_{i,t-1} + \alpha_2 \Delta adm_{i,t+1} + \alpha_3 \Delta p_{i,t} + \alpha_4 \Delta tv_{i,t} + \varepsilon_{i,t} \\
\Delta adm_{i,t} &= \alpha_0 + \alpha_1 \Delta adm_{i,t-1} + \alpha_2 \Delta adm_{i,t+1} + \alpha_3 \Delta p_{i,t} + \alpha_4 \Delta tv_{t-1} + \alpha_5 \Delta tv_{i,t} + \alpha_6 \Delta tv_{i,t+1} + \varepsilon_{i,t}
\end{aligned} \tag{5}$$

where Δ is the first difference operator.

5. Results

Taking first differences will induce a first-order moving average process into the transformed residuals (Arellano, 1989). Hence, in order to get consistent estimates we instrument endogenous variables (past and future consumption of dependent variable) with several lagged and leda levels of ticket price variable. Due to over-identification, we adopt the generalized method of moments (GMM) which is proved to be an appropriate method to get a consistent estimator when the number of instruments is higher than exogenous variables, as is the case here (Hamilton, 1995). The GMM estimators have the further advantage that we do not have to rely on the restrictive assumption of independent variables being strictly exogenous. Thus, independent variables may instead be assumed to be predetermined or allowed to be endogenous (Heinesen, 2004). Instruments validity is checked using the Sargan test for over-identifying restrictions (Sargan, 1958; Hensen, 1982). Table 4 summarizes the main results.

[TABLE 4]

Column 2 reports the results of the standard Becker and Murphy's (1988) model of addiction which considers only one addictive good and one non-addictive good. Results provide a strong evidence that cinema consumption conforms to a rational addiction hypothesis. Both the coefficients on past and future consumption are positive and significantly different from zero, so that past and future changes significantly impact present consumption. Furthermore, we also notice that $\alpha_1 > \alpha_2$ as expected. This finding may support the hypothesis that cinema is a time consuming activity. In fact, the existence of increasing opportunity cost related to age, together with the access to less time consuming leisure activities, decreases the impact of future consumption, so that the coefficient is positive, but smaller than that associated to past consumption. Also the price coefficient is negative and significantly different from zero. The short-run price elasticity, measured at sample means[3], is –0.37 that is rather small than those obtained in comparable studies of rational addictive products (Dewenter, 2003). The long-run price elasticity is –0.80 which is about twice the short-run elasticity. Hence, as predicted by Becker et sl. (1994), in the long-run price changes do influence consumption much more than in the short-run.

The second specification includes present tv movie consumption. The third column of Table 4 shows the results of this specification. Also here, both past and future cinema consumption seems to affect present consumption. Thus, this outcome confirms the hypothesis of rational behaviour. This specification also provides evidence on the relationship between cinema consumption and tv movie consumption. The effect of tv movie consumption is positive and statistically significant. This is taken as evidence that, cinema and tv consumption are complements. The short-run and the long-run elasticities are similar to the previous specification, respectively –0.42 and –0.94.

Finally, column 4 of Table 4 shows the results of the most general specification, which includes both past and future tv movie consumption as explanatory variables (Bask and Melkersson, 2004). To check for possible endogeneity of tv movie consumption a C-test has been computed for both past and future tv movie consumption. Findings suggest the endogeneity of past *tv* variable. Hence, this variable has been instrumented with lead and past levels of cinema price, as a positive (negative) correlation between these two variables is expected to exist to the extent that tv movie consumption proves to be a complement (substitute) of cinema going. Results are reported in column 5. Again, past and future cinema consumption are significant and positively related to present cinema consumption. Moreover, despite the inclusion of past and future tv movie consumption findings are still consistent with the evidence that cinema and tv consumption are complements. Finally, the short-run and the long-run elasticities display values that are in the range

---

[3] The short short- and long-run elasticities, respectively η_s e η_l, are computed as $\eta_s = \frac{\theta_3}{\theta_1(1-\lambda_1)\lambda_2}\frac{\overline{p}}{\overline{c}}$ and $\eta_l = \frac{\theta_3}{\theta_1(1-\lambda_1)(\lambda_2-1)}\frac{\overline{p}}{\overline{c}}$, where $\lambda_{1,2}$ are the characteristic roots and $\overline{c}$ and $\overline{p}$ are the sample means (Dewenter, 2003).

of estimates found internationally (Fernández Blanco and Baños Pino, 1997; Dewenter and Westermann, 2003).

In order to better qualify our results, it may be interesting to discriminate between weekday and tv movie consumption. In fact, during weekend a partial substitution effect between tv movie and cinema consumption is likely to exist due to a different tv movie programming targeted on older consumers.

Table 5 displays the results of the weekend tv movie specification.

[TABLE 5]

Accounting for potential endogeneity of tv movie consumption (column 3), estimated coefficients show evidence in favour of a substitution relationship. Both lag and lead value of tv movie consumption exhibit a negative impact on current cinema demand while the coefficients associated with present tv movie consumption does not appear to be statistically significant at all common level. As usual, long-run price elasticity exceeds short-run price elasticity.

Results from Table 6 displays the relationship between weekday tv movie consumption. The coefficients are similar to those estimated in table 4. Again, the presence of a common habit stock accumulation suggests that an increase in weekday tv movie consumption stimulates higher appetite for cinema consumption.

[TABLE 6]

However, a word of caution must be used in interpreting these results. In fact, the strength of this finding is somewhat weakened by the procedure used to deal with ticket prices. Since data are aggregated, prices are built as yearly average admission costs which prevent us from capturing price variation across different days and categories of purchasers. Analogously, the typical seasonal trend registered in box office revenue cannot be captured using annual data.

6. Conclusion

The purpose of this paper was to assess whether cinema demand may be defined as a rational addicted behaviour. To this aim a panel-data GMM methodology is used to estimate a dynamic model of double rational addiction as proposed by Bask and Melkersonn (2004) using a sample of monthly time- and cross-sectional series covering the 20 Italian regions over the period 2000-2002. Results provide strong evidence in favor of a model of cinema demand that emphasizes the role of past and future consumption on current consumption.While at first sight these results seem to be in contrast with empirical findings of economic literature since television is expected to be one of the main causes of cinema consumption decrease during the seventy, however, our estimates are not so surprising since it is likely that tv movie consumption could both reduce time available for cinema consumption (substitution effect) and increase the appetite for cinema consumption (complementary effect).

However, further investigation is still required. In particular, a promising direction for future research might be to explore individual rather than aggregated data in order to capture price variation across different days and categories of purchasers.

References

ABBÉ-DECARROUX, F. (1994) The Perception of Quality and Demand for Services. Empirical Application to the Performing Arts*, Journal of Economic Behavior and Organization,* 23(1), 99-107.

ARELLANO, M., (1989), A note on the Anderson-Hsiao Estimator for Panel Data, *Economics Letters,* 31(4), 337-41.

BASK, M. and MELKERSSON, M., (2004), Rationally Addicted to Drinking and Smoking?, *Applied Economics*, 36(4), 373-381.

BECKER, G. S. and MURPHY, K. M., (1988), A Theory of Rational Addiction, *Journal of Political Economy*, 96(4), 675-700.

BECKER, G. S., GROSSMAN, M. and MURPHY, K. M., (1994), An Empirical Analysis of Cigarette Addiction, *American Economic Review*, 84(3), 396-418.

CAMERON, S., (1999) Rational Addiction and the Demand for Cinema, *Applied Economic Letters,* 6(9), 617-620.

DECKER, S.L and SCHWARTS, A.E., (2000), Cigarettes and Alcohol: Substitutes or Complements?, NBER WP 7535.

DEWENTER, R., (2003), Rational Addiction to News? Habit Formation and Print Media Usage, University FAF, Economics Discussion Paper 2.

DEWENTER, R. and WESTERMANN, M. (2005), Cinema Demand in Germany, *Journal of Cultural Economics* (forthcoming).

FERNÁNDEZ BLANCO, V. and BAÑOS PINO, J. (1997), Cinema Demand in Spain: A Cointegration Analysis, *Journal of Cultural Economics,* 21, 57-75.

HAMILTON, J., (1995), *Time Series Analysis,* Princeton University Press.

HEINESEN, E., (2004), Determinants of local public school expenditure: a dynamic panel data model, *Regional Science and Urban Economics,* 34, 429-453.

IM, K.S., PESARAN, M.H. and SHIN, Y. (2003), Testing for Unit Roots in Heterogeneous Panels, *Journal of Econometrics,* 115, 53-74.

LEVAGGI, R. and ZANOLA, R., (2003), Flypaper Effect and Sluggishness: Evidence from Regional Health Expenditure in Italy, *International Tax and Public Finance,* 10, 535-547.

LÉVY-GARBOUA, L. and MONTMARQUETTE, C., (1996), A Microeconomic Study of Theatre Demand, *Journal of Cultural Economics,* 20, 25-50.

MCCAIN, R.A., (1979), Reflection on Cultivation of Taste, *Journal of Cultural Economics,* 3, 30-52.

MCCAIN, R.A., (1995), Cultivation of taste and bounded rationality: Some computer simulations, *Journal of Cultural Economics,* 19, 1-15.

PALACIOS-HUERTA, I., (2003), Multiple addiction, Brown University, mimeo.

SARGAN, J.D., (1958), The estimation of Economic Relationships using Instrumental Variables, *Econometrica*, 26, 393-415.

SISTO, A. and ZANOLA, R., (2004), Rational Addiction to Cinema? A Dinamic Panel Analysis of European Countries, wp. n. 41, P.O.L.I.S., University of Eastern Piedmont.

VILLANI, A., (1992), Rational Addiction in the Arts, *Ricerche Economiche,* 46, 41-54.

WATERS, T. M., and SLOAN, F. A., (1995), Why do People Drink? Tests of the Rational Addiction Model, *Applied Economics,* 27, 727-736.

Table 1. Definition of the variable used in the study

Variable	Definition and Source	Mean	Std.Dev.	Min	Max
adm	*Regional monthly cinema ticket sold per capita* S.I.A.E., Lo spettacolo in Italia (2001); Mediasalles, European Cinema Yearbook (2001-2003); Istat, Statistiche demografiche (2000-2002)	0.146	0.094	0.011	0.532
p	*Regional monthly average cinema ticket price at 1995 price levels* S.I.A.E., Lo spettacolo in Italia (2001); Mediasalles, European Cinema Yearbook (2001-2003);	4.558	0.600	2.952	6.728
tv	*Regional average prime time movies audience* Media Consultants, AUDITEL data elaboration	0.084	0.062	0.062	0.310

Table 2. Testing pooling restrictions

Variable	F-test	P-value
Test for pooling[1]:		
$DY^{*}p_{i,t}$	0.77	0.823
$DY^{*}tv_{i,t}$	0.48	0.995
DY	0.22	1.000

Notes: for testing the hypothesis of pooling the following augmented models have been estimated:

$$ADM_{i,t} = \beta_0 + \beta_1 P_{ADMi,t} + \Sigma\beta_{1i} DY^{*} P_{ADMi,t} + \beta_2 TV_{i,t} + \Sigma\beta_{2i} DY^{*} TV_{i,t} + \beta_3 \Sigma DY + \varepsilon_{i,t,} \quad (6)$$

by adding T-1 monthly dummy for each variable that take the value 1 if observation belongs to the monthconsidered. The F test is performed on the coefficient of these variables.

Table 3. Unit root tests for panel

Variable	t-bar	p-value	Trend
adm[1]	-2.463	0.071	Yes
p [1]	-2.819	0.001	Yes
tv[1]	-3.416	0.000	Yes
adm[2]	-0.3699	0.024	Yes
p [2]	-0.3492	0.000	Yes
tv[2]	-0.6515	0.000	Yes

Notes: [1] Im-Pesaran-Shin panel unit root test (2003). [2] Levin-Lin-Chu test (2002). Both tests involve the null hypothesis that each series has a unit roots against the alternative hypothesis that the series have different persistence. Moreover, while the Im-Pesaran-Shin test allows for heterogeneity in estimated coefficients and the null is tested using the average of the t-ratios for each time series, the Levin-Lin-Chu unit root test assumes homogeneous coefficients. A linear trend is included in both test to allow for trend stationarity.

Table 4. Cinema demand estimates

Variable	GMM(a)	GMM(b)	GMM(c)	GMM(d)
adm(t-1)	0.4604*	0.4702*	0.4488*	0.4331*
	(0.0544)	(0.0586)	(0.0631)	(0.0624)
adm(t+1)	0.2524*	0.2548*	0.2413*	0.2206*
	(0.0353)	(0.0411)	(0.0455)	(0.0461)
tv(t-1)	-	-	0.0359	0.3459**
			(0.0490)	(0.1759)
tv(t)	-	0.1862*	0.2023*	0.2935*
		(0.0702)	(0.0736)	(0.0895)
tv(t+1)	-	-	0.1185***	0.2864**
			(0.0631)	(0.1165)
p	-0.0878*	-0.0989*	-0.1008*	-0.1365*
	(0.0292)	(0.0283)	(0.0269)	(0.0333)
const	0.0011*	0.0378***	0.0097	0.0665*
	(0.0002)	(0208)	(123.94)	(0.0246)
Hansen	30.653	26.930	26.353	22.796
	(0.05995)	(10.628)	(0.12066)	(0.24644)
R-square	0.9098	0.9110	0.9124	0.9021
C test for tv (t-1)	-	-	2.807***	-
C test for tv (t+1)	-	-	0.851	-
η_s	-0.3728	-0.4250	-0.4133	-0.5287
η_l	-0.79621	-0.9367	-0.8471	-1.0266

Notes: Variables are in first-difference to eliminate the common linear trend. Standard error in parenthesis. (a) Becker and Murphy rational addiction model; (b) inclusion of current tv audience; (c) inclusion of both past and future tv audience treated as exogenous regressors; (d) only past tv audience is treated as endogenous. Each GMM estimates use cinema ticket prices (from t-3 to t-13 and from t+3 to t+13) as instruments for endogenous variables. Each regression includes 11 monthly dummies (not in first difference) to capture seasonality, which estimates exhibit a significant negative impact to cinema demand. Moreover, their coefficient has not been reported to save space. C test is a difference in Sargan test based on the null of full exogeneity of instruments checked.

*/**/*** represents, respectively, significance coefficient at 0.01/0.05/0.10.

Table 5. Cinema admission and weekend prime-time tv movie audience

Variable	GMM(a)	GMM(b)	GMM(c)
adm(t-1)	0.5015*	0.5392*	0.6119*
	(0.0713)	(0.0757)	(0.0917)
adm(t+1)	0.2408*	0.2655*	0.2586*
	(0.0489)	(0.0503)	(0.0638)
week(t-1)	-	-0.0413	-0.1550**
		(0.0515)	(0.0740)
week(t)	0.2338*	0.2219*	0.1256
	(0.0607)	(0.0656)	(0.0809)
week(t+1)	-	-0.0694***	-0.2870**
		(0.0358)	(0.1150)
p_{adm}	-0.1342*	-0.1390*	-0.1550*
	(0.0289)	(0.0294)	(0.0317)
const	0.0045	0.0670*	0.0788
	(70.5094)	(0.0213)	(0.0229)
Hansen J stat[2]	25.173	22.175	13.221
	(0.1551)	(0.3311)	(0.8271)
R-square	0.9119	0.9092	0.8973
C test for week(t-1)	-	1.632	-
C test for week(t+1)	-	6.337**	-
λ_s	-0.5364	-0.6123	-0.7042
λ_l	-1.2880	-1.6334	-2.1960

N.B. week is measured as average monthly holiday prime-time movie audience (Saturday, Sunday and international holiday (Christmas and Easter holiday, 6 January, 25 April, 1 May, 15 August, Halloween and All Saint, 8 December)

Notes: Variables are in first-difference to eliminate the common linear trend. Standard error in parenthesis. (a) Becker and Murphy rational addiction model with the inclusion of current tv audience; (b) inclusion of both past and future tv audience treated as exogenous regressors; (c) only future tv audience is treated as endogenous, (d) both past and future tv audience are treated as endogenous. Each GMM estimates use cinema ticket prices (from t-3 to t-13 and from t+3 to t+13) as instruments for endogenous variables. Each regression includes 11 monthly dummies (not in first difference) to capture seasonality, which estimates exhibit a significant negative impact to cinema demand. Moreover, their coefficient has not been reported to save space. C test is a difference in Sargan test based on the null of full exogeneity of instruments checked.

[2] p-value in parenthesis.

*/**/*** represents, respectively, significance coefficient at 0.01/0.05/0.10.

Table 6. Cinema admission and weekday prime-time tv movie audience

Variable	GMM(a)	GMM(b)	GMM(c)
adm(t-1)	0.4670*	0.4427*	0.4434*
	(0.0545)	(0.0653)	(0.0642)
adm(t+1)	0.2589*	0.2480*	0.2174*
	(0.0370)	(0.0458)	(0.0476)
daily(t-1)	-	0.0333	0.3111**
		(0.0318)	(0.1295)
daily(t)	0.0785*	0.1054**	0.2333*
	(0.0528)	(0.0571)	(0.0814)
daily(t+1)	-	0.2003*	0.2914*
		(0.0667)	(0.0797)
p_{adm}	-0.0911*	-0.1025*	-0.1444*
	(0.0289)	(0.0268)	(0.0329)
const	0.0287	0.0401*	0.0716*
	(0.0210)	(0.0198)	(0.0245)
Hansen J stat[3]	29.203	25.572	20.151
	(0.0838)	(0.1805)	(0.3855)
R-square	0.9101	0.9120	0.8971
C test for daily(t-1)	-	5.046**	-
C test for daily(t+1)	-	0.597	-
λ_s	-0.3752	-0.4045	-0.5294
λ_l	-0.8219	-0.8192	-1.0688

N.B. daily is measured as average daily movie audience excluding weekend and international holiday.

Notes: Variables are in first-difference to eliminate the common linear trend. Standard error in parenthesis. (a) Becker and Murphy rational addiction model with the inclusion of current tv audience; (b) inclusion of both past and future tv audience treated as exogenous regressors; (c) only past tv audience is treated as endogenous. Each GMM estimates use cinema ticket prices (from t-3 to t-13 and from t+3 to t+13) as instruments for endogenous variables. Each regression includes 11 monthly dummies (not in first difference) to capture seasonality, which estimates exhibit a significant negative impact to cinema demand. Moreover, their coefficient has not been reported to save space. C test is a difference in Sargan test based on the null of full exogeneity of instruments checked.

[3] p-value in parenthesis

*/**/*** represents, respectively significant coefficient at 0.01/0.05/0.10.

Working Papers

The full text of the working papers is downloadable at http://polis.unipmn.it/

***Economics Series** ****Political Theory Series** **ε Al.Ex Series**

2005 n.52* Andrea Sisto and Roberto Zanola, *Rationally addicted to cinema and TV? An empirical investigation of Italian consumers*.

2005 n.51* Luigi Bernardi and Angela Fraschini, *Tax system and tax reforms in India*

2005 n.50* Ferruccio Ponzano, *Optimal provision of public goods under imperfect intergovernmental competition.*

2005 n.49* F.Amisano A.Cassone, *Proprieta' intellettuale e mercati: il ruolo della tecnologia e conseguenze microeconomiche*

2005 n.48* Tapan Mitra e Fabio Privileggi, *Cantor Type Attractors in Stochastic Growth Models*

2005 n.47ε Guido Ortona, *Voting on the Electoral System: an Experiment*

2004 n.46ε Stefania Ottone, *Transfers and altruistic Punishments in Third Party Punishment Game Experiments.*

2004 n.45* Daniele Bondonio, *Do business incentives increase employment in declining areas? Mean impacts versus impacts by degrees of economic distress*.

2004 n.44** Joerg Luther, *La valorizzazione del Museo provinciale della battaglia di Marengo: un parere di diritto pubblico*

2004 n.43* Ferruccio Ponzano, *The allocation of the income tax among different levels of government: a theoretical solution*

2004 n.42* Albert Breton e Angela Fraschini*, Intergovernmental equalization grants: some fundamental principles*

2004 n.41* Andrea Sisto, Roberto Zanola, *Rational Addiction to Cinema? A Dynamic Panel Analisis of European Countries*

2004 n.40** Francesco Ingravalle, *Stato, große Politik ed Europa nel pensiero politico di F. W. Nietzsche*

2003 n.39ε Marie Edith Bissey, Claudia Canegallo, Guido Ortona and Francesco Scacciati, *Competition vs. cooperation. An experimental inquiry*

2003 n.38ε Marie-Edith Bissey, Mauro Carini, Guido Ortona, *ALEX3: a simulation program to compare electoral systems*

2003 n.37* Cinzia Di Novi, *Regolazione dei prezzi o razionamento: l'efficacia dei due sistemi di allocazione nella fornitura di risorse scarse a coloro che ne hanno maggiore necessita'*

2003 n. 36* Marilena Localtelli, Roberto Zanola, *The Market for Picasso Prints: An Hybrid Model Approach*

2003 n. 35* Marcello Montefiori, *Hotelling competition on quality in the health care market.*

2003 n. 34* Michela Gobbi, *A Viable Alternative: the Scandinavian Model of "Social Democracy"*

2002 n. 33* Mario Ferrero, *Radicalization as a reaction to failure: an economic model of islamic extremism*

2002 n. 32[ε] Guido Ortona, *Choosing the electoral system – why not simply the best one?*

2002 n. 31** Silvano Belligni, Francesco Ingravalle, Guido Ortona, Pasquale Pasquino, Michel Senellart, *Trasformazioni della politica. Contributi al seminario di Teoria politica*

2002 n. 30* *Franco Amisano, La corruzione amministrativa in una burocrazia di tipo concorrenziale: modelli di analisi economica.*

2002 n. 29* Marcello Montefiori, *Libertà di scelta e contratti prospettici: l'asimmetria informativa nel mercato delle cure sanitarie ospedaliere*

2002 n. 28* Daniele Bondonio, *Evaluating the Employment Impact of Business Incentive* Programs in EU Disadvantaged Areas. A case from Northern Italy

2002 n. 27** Corrado Malandrino, *Oltre il compromesso del Lussemburgo verso l'Europa federale. Walter Hallstein e la crisi della "sedia vuota"(1965-66)*

2002 n. 26** Guido Franzinetti, *Le Elezioni Galiziane al Reichsrat di Vienna, 1907-1911*

2002 n. 25[ε] Marie-Edith Bissey and Guido Ortona, *A simulative frame to study the integration of defectors in a cooperative setting*

2001 n. 24* Ferruccio Ponzano, *Efficiency wages and endogenous supervision technology*

2001 n. 23* Alberto Cassone and Carla Marchese, *Should the death tax die? And should it leave an inheritance?*

2001 n. 22* Carla Marchese and Fabio Privileggi, *Who participates in tax amnesties? Self-selection of risk-averse taxpayers*

2001 n. 21* Claudia Canegallo, *Una valutazione delle carriere dei giovani lavoratori atipici: la fedeltà aziendale premia?*

2001 n. 20* Stefania Ottone, *L'altruismo: atteggiamento irrazionale, strategia vincente o amore per il prossimo?*

2001 n. 19* Stefania Ravazzi, *La lettura contemporanea del cosiddetto dibattito fra Hobbes e Hume*

2001 n. 18* Alberto Cassone e Carla Marchese, *Einaudi e i servizi pubblici, ovvero come contrastare i monopolisti predoni e la burocrazia corrotta*

2001 n. 17* Daniele Bondonio, *Evaluating Decentralized Policies: How to Compare the Performance of Economic Development Programs across Different Regions or States*.

2000 n. 16* Guido Ortona**,** *On the Xenophobia of non-discriminated Ethnic Minorities*

2000 n. 15* Marilena Locatelli-Biey and Roberto Zanola**,** *The Market for Sculptures: An Adjacent Year Regression Index*

2000 n. 14* Daniele Bondonio**,** *Metodi per la valutazione degli aiuti alle imprse con specifico target territoriale*

2000 n. 13* Roberto Zanola, *Public goods versus publicly provided private goods in a two-class economy*

2000 n. 12** Gabriella Silvestrini, *Il concetto di «governo della legge» nella tradizione repubblicana.*

2000 n. 11** Silvano Belligni, *Magistrati e politici nella crisi italiana. Democrazia dei guardiani e neopopulismo*

2000 n. 10* Rosella Levaggi and Roberto Zanola, *The Flypaper Effect: Evidence from the Italian National Health System*

1999 n. 9* Mario Ferrero, *A model of the political enterprise*

1999 n. 8* Claudia Canegallo, *Funzionamento del mercato del lavoro in presenza di informazione asimmetrica*

1999 n. 7** Silvano Belligni, *Corruzione, malcostume amministrativo e strategie etiche. Il ruolo dei codici*.

1999 n. 6* Carla Marchese and Fabio Privileggi, *Taxpayers Attitudes Towaer Risk and Amnesty Partecipation: Economic Analysis and Evidence for the Italian Case.*

1999 n. 5* Luigi Montrucchio and Fabio Privileggi, *On Fragility of Bubbles in Equilibrium Asset Pricing Models of Lucas-Type*

1999 n. 4** Guido Ortona, *A weighted-voting electoral system that performs quite well.*

1999 n. 3* Mario Poma, *Benefici economici e ambientali dei diritti di inquinamento: il caso della riduzione dell'acido cromico dai reflui industriali.*

1999 n. 2* Guido Ortona, *Una politica di emergenza contro la disoccupazione semplice, efficace equasi efficiente.*

1998 n. 1* Fabio Privileggi, Carla Marchese and Alberto Cassone, *Risk Attitudes and the Shift of Liability from the Principal to the Agent*

Department of Public Policy and Public Choice *"Polis"*

The Department develops and encourages research in fields such as:

- theory of individual and collective choice;
- economic approaches to political systems;
- theory of public policy;
- public policy analysis (with reference to environment, health care, work, family, culture, etc.);
- experiments in economics and the social sciences;
- quantitative methods applied to economics and the social sciences;
- game theory;
- studies on social attitudes and preferences;
- political philosophy and political theory;
- history of political thought.

The Department has regular members and off-site collaborators from other private or public organizations.

Instructions to Authors

Please ensure that the final version of your manuscript conforms to the requirements listed below:

The manuscript should be typewritten single-faced and double-spaced with wide margins.

Include an abstract of no more than 100 words.

Classify your article according to the *Journal of Economic Literature* classification system.

Keep footnotes to a minimum and number them consecutively throughout the manuscript with superscript Arabic numerals. Acknowledgements and information on grants received can be given in a first footnote (indicated by an asterisk, not included in the consecutive numbering).

Ensure that references to publications appearing in the text are given as follows:
COASE (1992a; 1992b, ch. 4) has also criticized this bias....
and
"...the market has an even more shadowy role than the firm" (COASE 1988, 7).

List the complete references alphabetically as follows:

Periodicals:
KLEIN, B. (1980), "Transaction Cost Determinants of 'Unfair' Contractual Arrangements," *American Economic Review*, 70(2), 356-362.
KLEIN, B., R. G. CRAWFORD and A. A. ALCHIAN (1978), "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process," *Journal of Law and Economics*, 21(2), 297-326.

Monographs:
NELSON, R. R. and S. G. WINTER (1982), *An Evolutionary Theory of Economic Change*, 2nd ed., Harvard University Press: Cambridge, MA.

Contributions to collective works:
STIGLITZ, J. E. (1989), "Imperfect Information in the Product Market," pp. 769-847, in R. SCHMALENSEE and R. D. WILLIG (eds.), *Handbook of Industrial Organization,* Vol. I, North Holland: Amsterdam-London-New York-Tokyo.

Working papers:
WILLIAMSON, O. E. (1993), "Redistribution and Efficiency: The Remediableness Standard," Working paper, Center for the Study of Law and Society, University of California, Berkeley.