Società italiana di economia pubblica
XVII CONFERENZA

FINANZIAMENTO DEL SETTORE PUBBLICO

Pavia, Università, 15 - 16 settembre 2005

THE DEMAND FOR CINEMA IN EUROPE: IS VAT HARMONIZATION DESIDERABLE?

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pubblicazione internet realizzata con contributo della

COMPAGNIA di San Paolo

The Demand for Cinema in Europe: Is VAT Harmonization Desiderable?[°]

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ABSTRACT

There exists an ongoing debate on the necessity to reduce and harmonise VAT on cultural goods across Europe. The purpose of this paper is to provide new insights on this issue by simulating the effects of three different VAT regimes on movie consumption and tax revenues across Europe. To this aim we first estimate the movie demand by applying a modified version of the Becker and Murphy (1988)'s rational additional model to a panel of thirteen European countries over the period 1989-2002. The short- and long-term demand elasticities to price obtained from this model are then used to simulate the different alternatives in VAT rate. Results show that harmonization induces a modest increase in movie consumption across Europe in two of the three regimes, but with an overall reduction in tax revenues.

Key words: cinema; rational addiction; dynamic panel; harmonization; VAT; Europe.
JEL classification: C2, D2, Z1

10 September 2005

[°] This paper has benefited by helpful discussions with G.Brosio, A.E.Scorcu, J.Sedgwick and V.Ginsburgh. The usual disclaimers apply.
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1. **Introduction**

Although VAT is substantially harmonized within Europe, there are still disparities in VAT rates across European countries. This applies also to the entertainment industry. Hence, proposals for VAT harmonization on cultural goods are advanced. In particular, there are pressures arising from interest groups to harmonize VAT by setting a common low rate. However, there is no consensus among economists about the effects of VAT harmonization.

During the eighties European cinema market experienced a long-standing decline in cinema demand which induced government interventions to face the competition from US major distribution. Policy makers exclusively focused on supply-side policy, subsiding movie production and distribution in order to ensure a more constant access of European films to domestic screens. Moreover, the success of this kind of intervention varied from country to country and the lack of a more market-oriented policy put European films in a niche position (Mediasalles, 1994).

Until recent years, however, economic literature failed to provide both theoretical and empirical evidence in favour of the implementation of a strong demand oriented public policy, resulting in the promotion of cinema audience trough price-incentives. It's only during nineties that empirical research, focusing on different type of performing arts, showed that cultural demand might be price sensitive (Cameron, 1990; Fernandez-Blanco and Banos-Pino, 1997; Cuadrado and Frasquet, 1999; Mcmillan and Smith, 2001; Dewenter and Westermann, 2005; Fernandez-Blanco and Prieto-Rodriguez, 2005).

The purpose of this paper is to provide empirical support for the possibility to carry out a demand-oriented public policy based on pricing policies. In particular, we intend to analyse the response of cinema demand to VAT harmonization, and consequently the effects on government revenues. To this aim, we first estimate the demand for cinema in Europe, and then, using estimated expenditure and price elasticities, we simulate the effects on cinema demand and revenues of three alternativies hypothesis in the VAT rate on entrance tickets to cinemas: 0 per cent, 4 per cent and 10 per cent.

The peculiarity of this paper is to estimate the demand for cinema by using a modified Becker and Murphy's rational addiction model. Although the idea that early exposure to arts or investment in human capital increases interest in art consumption has been supported by various studies (McCain, 1979, 1995; Villani, 1992; Abbé-Deccarraux, 1994; Lévy-Garboua and Montmarquette 1996), only few authors (Cameron, 1999;

Dewenter and Westermann, 2005) have investigated cinema demand. Both these studies have applied the rational addiction model to a single country, respectively UK and Germany, failing to provide support for the rational addiction models, but corroborating the hypothesis of the presence of a habituation effect in cinema consumption. Despite these results, we think that there could be at least two good reasons for reconsidering the question as there could be gains from an empirical dynamic study of state-disaggregated cinema markets. First, it is likely that geography matters for the cinema consumption of a country, such as to justify studying state-disaggregated models. Secondly, applying dynamic panel data models may control for all time-invariant variables or state-invariant variables, whose omission could bias the estimates in a typical cross-section or time-series study.

The proceeding of this paper is as follows. Section 2 presents the theoretical framework. To test the rational addiction hypothesis a panel-data GMM methodology is applied to a sample of thirteen European countries over the period 1989-2002. Data is described in Section 3. The econometric specification is shown in Section 4. Section 5 summarises the empirical findings of movie demand. Short- and long-elasticities are then used to simulate the VAT regimes in Section 6. Section 7 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).[1]

Although tolerance appears to be a reasonable assumption in the case of harmful goods (alchool, tabacco, 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, to the extent that the opportunity costs of going to cinema are expected to increase with age, the access to rival

[1] Some consumers, described as being 'myopic', may have such a high rate of preference for present consumption (and discount the future so heavily) that the impact of tolerance effects on current consumption are negligible, and positive reinforcement effects of previous consumption on the marginal

opportunities for the use of time may lead to a future reduction of consumption or at least an increasing at diminishing rates.

Assuming a constant rate of time preference, σ, a concave and time-separable utility is defined as (Becker et al, 1994):

$$U = \sum_{t=0}^{T} \sigma^{t-1} U\left(Y_t, C_t, C_{t-1}, e_t\right) \tag{1}$$

where Y is the consumption of a non-addictive good; C is the consumption of the addictive good; and e is the stock of "addictive capital" built up by consuming C in earlier periods.

Consumer's choices are constrained by the consumer's wealth, W, and the prices of C and Y. Assuming a constant price of the non-addictive good, treated as numeraire, and perfect capital markets, the life-time budget constraint may be written as:

$$\sum_{t=1}^{T} r^{t-1}\left(Y_t + P_t C_t\right) \leq A_0 \tag{2}$$

where r is the constant real interest rate; P is the price of the addictive good; and A_0 is the initial value of assets.

Maximizing equation (1) under this budget constraint, one can obtain the optimal path of consumption for Y and C. A standard technique used in literature to derive a structural demand function for consumption of C 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 preferences equals to the market interest rate, one can derive the following difference equation:

$$C_t = \theta_1 C_{t-1} + \theta_2 C_{t+1} + \theta_3 P_t + \theta_4 e_t + \theta_5 e_{t+1},$$
$$\text{with } \theta_2 = \delta\theta_1 \text{ and } \delta = \frac{1}{1+r}, \tag{3}$$

where the θ's are parameters which depend on the underlying preferences. Testing for rational addiction is testing for forward looking behaviour. An addicted but myopic

utility of current consumption can cause the demand for a habit-forming good to soar to persistently high levels.

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.

3. Data

This section provides a brief description of data used in this paper. Data consists of aggregate national annual time series from 1989 to 2002 for thirteen European countries.[2] 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 year divided by total population size. The data are obtained from *Eropean Cinema Yearbook* published by Mediasalles.

(ii) *Price*: price of admission to cinemas, *pri*, is the ticket price at box-office.[3] The variable is the average expense per film-goer, which is the ratio between the annual total receipts in a year and the number of film-goers, according to the data supplied by the above mentioned publication *European Cinema Yearbook*. 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 annual data (Dewenter and Westermann, 2005).

(iii) *Income*: disposable per capita income, *inc*, is also used, according to the data supplied by *Annual Statistics*, published by *World Bank.* Cinema demand is expected to be positively related to income. However, it is likely that an increase in income level may lead to a reduction of cinema demand due to its time intensiveness which increases opportunity costs of going to cinema. Hence, the net effect of income on cinema demand is, *a priori*, ambiguous.

[2] Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Norway, Netherlands, Spain, Sweden, United Kingdom.

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

(iv) *Other Factors*: in addition to the variables above, we include additional control variables that may exert some influence on cinema demand. More specifically, we analyse the impact of the number of screens and the national movie production, two measures of the supply side, whose influence has not been possible to capture via prices. The number of screens, *scr*, is measured as the number of screens per km squared, as reported in *European Cinema Yearbook*. The progressively substitution of one-canvas theatre with multiplex cinemas has led to an improvement in quality and comfort of cinema experience, with an expected positive effect on cinema demand. The national movie production, *mov,* is captured by the number of national movies per year, according to the data supplied by *European Cinema Yearbook*. As pointed out in Fernández Blanco and Prieto Rodriguez (2003), competition in movie industry is another important determinant to explain cinema demand. Both production and distribution side of European cinema market are controlled by Hollywood majors. Nevertheless, in some countries, such as France, Germany, Italy, Spain and UK, there is space for the co-existence of a significant national movie industry, making an effective competition throughout the creation of a national star system or by specializing in those movie fields that American majors are less interested in, such as author's movie.

All monetary variables are deflated at 2002 price level by CPI index. Descriptive statistics are reported in Table 1.

[TABLE 1]

4. Empirical Specification

According to the theoretical model and the variables suggested in the previous sections, the empirical specification of the demand function for cinema is:

$$adm_{i,t} = \alpha_0 + \alpha_1 adm_{i,t-1} + \alpha_2 adm_{i,t+1} + \alpha_3 pri_{i,t} + \alpha_4 inc_{i,t} + \alpha_5 scr_{i,t} + \alpha_6 mov_{i,t} + \varepsilon_{i,t}, \qquad (4)$$

where subscript *i* and *t* stand respectively for the country and the period 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 test the stationarity of the variables included in the model. In order to determine the presence of panel unit root we employ the IPS t-bar tests (Im et al., 2003), that includes a heterogeneous time trend in its specification. Table 3 shows that the null of unit root could not be rejected and hence the series are I(1) processes. When testing the series in first differences all time series appear to be stationary or I(0) processes.

[TABLE 3]

Therefore, equation (6) is estimated in first differences, such that:

$$\Delta adm_{i,t} = \alpha_0 + \alpha_1 \Delta adm_{i,t-1} + \alpha_2 \Delta adm_{i,t+1} + \alpha_3 \Delta pri_{i,t} + \alpha_4 \Delta inc_{i,t} + \alpha_5 \Delta scr_{i,t} + \alpha_6 \Delta mov_{i,t} + \varepsilon_{i,t} \quad (5)$$

where Δ is the first difference operator.

5. Econometric 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 with lagged and led levels three periods or more of each variables in (6). 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

differences in Sargan test for over-identifying restrictions (Sargan, 1958; Hensen, 1982)[4]. Table 4 summarizes the main results.

[TABLE 4]

Results provide a strong evidence that cinema consumption conforms to a rational addiction hypothesis. Both the coefficient on past and future consumption are positive and significantly different from zero, so that past and future changes impact on current consumption. Furthermore, we also notice that $\alpha_1 > \alpha_2$ as expected. This finding supports 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 coefficient is positive, but smaller than that associated to past consumption.

The other estimated coefficients are statistically significant at all common levels and display the expected signs. In particular, the coefficient on price is negative and significantly different from zero. Moreover, the coefficient on income variable shows a positive and statistically significant impact on consumption. However, the estimated model specification doesn't allow us to compute the long-run relationship between disposable income and current consumption, so that we cannot investigate the potential luxury nature of cinema. The coefficient associated to screens exhibits a positive and significant impact on present admission, leading to the conclusion that the change in distribution during nineties, with the introduction of multiplex cinemas, has effectively contributed to partially reverse the negative trend in cinema demand. Finally, the coefficient associated to movie production too shows a positive impact on cinema demand, leading to the conclusion that the presence of a national movie industry or the development of a domestic star system contributes to increase cinema consumption.

6. Simulation

In this section we simulate the effects of three VAT regimes, where each regime consists of applying uniformly across Europe a 0, 4 and 10 per cent VAT rate to movie

[4] The statistic is the difference between the Sargan statistic computed using the instruments tested in the set of exogenous instruments (restricted model) and the Sargan statistic computed excluding the variable checked from the set of instruments (unrestricted model). The results, together with a complete list of instruments are reported in Appendix.

consumption. In order to proceed we compute the short-run and long-run demand elasticity, η_s and η_l, measured at sample means as follows:

$$\eta_s = \frac{\theta_3}{\theta_1(1-\lambda_1)\lambda_2}\frac{\overline{p}}{\overline{c}} \tag{6}$$

and

$$\eta_l = \frac{\theta_3}{\theta_1(1-\lambda_1)(\lambda_2-1)}\frac{\overline{p}}{\overline{c}}, \tag{7}$$

where $\lambda_{1,2}$ are the characteristic roots and $\overline{c}$ and $\overline{p}$ are the sample means (Dewenter, 2003).[5]

The estimated demand elasticities are presented in Table 4. While cinema demand exhibits a relative inelastic response to price change during short-run, (–0.24), the long-run elasticity shows a value that exceeds the short-run elasticity, as usual in similar studies (Fernández Blanco and Baños Pino, 1997; Dewenter and Westermann, 2003). However, despite these findings, a word of caution is necessary to interpreter them due to 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.

After the demand elasticities have been calculated, it is possible to simulate the effects of different VAT regimes on movie consumption. To this aim, it can be proved that, ceteris paribus, the variation in the movie consumption is equal to (Prieto-Rodriguez et al., 2004):

$$\Delta adm_{i,t} = adm_{i,t}(\eta_s)\frac{\Delta P_t}{P_t} \tag{8}$$

where $\frac{\Delta P_t}{P_t}$ is approximately the VAT rate change.

Table 5 displays the short and long-run effects of VAT harmonization on cinema demand as well as on VAT revenues across Europe. Such changes are the consequence of the direct effects on consumption induced by these regimes, while cross effects on

movie consumption (i.e. the effects induced by complementary or substitute goods consumption) are excluded here.

[TABLE 5]

Both the 0 and 4 per cent VAT regimes induce a modest increase in movie consumption across Europe, but with an overall reduction in tax revenues. By contrast, the 10 per cent VAT rate is the only regime which increases tax revenues with a low reduction in movie consumption. Short- and long-run effects display the same results.

7. Conclusion

This paper simulated the effects of three different VAT regimes on movie consumption and tax revenues across Europe. To this aim a pooled cross-section and time-series data on thirteen European countries over the period 1989-2002 has been used to estimate whether cinema demand may be defined as a rational addicted behaviour. The results from dynamic panel analysis provided strong evidence in favor of a model of cinema demand that emphasizes the role of past and future consumption on current consumption.

From this demand model, the effects of three different VAT regimes have been simulated, where each regime consists of applying uniformly across Europe a 0, 4 and 10 per cent VAT rate to movie consumption. Econometric estimation of the rational addiction model provided the short- and long-run demand elasticities used for simulation. The 0 and 4 per cent VAT rate regimes induce an increase in movie consumption across Europe, while the 10 per cent VAT rate implies a reduction in overall consumption. At first sight this would appear to be argument against its application. However, the increase in movie consumption always implies an overall reduction in tax revenues. Hence, further investigation is still required since the distributive impact of these regimes as well as the effects of them on individual well-being are also crucial to (eventually) justify their application. To this aim, a cost-benefit analysis of these regimes on individual basis is necessary, which represents a promising direction for a future extension of this paper.

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Table 1. Summary Statistics

Variable	Mean	Std.Dev.	Min	Max
adm	1.9569	0.5700	0.8912	3.48
pri	6.0405	0.8954	4.0618	8.7556
inc	24433.82	5535.534	12125.05	39600
scr	7.6496	4.5504	0.9497	17.2691
mov	48.0439	46.5208	0	204

Table 2. F-tests for pooling data

Variable	F-test
Test for pooling[1]:	
pri	0.54
inc	0.19
scr	0.14
mov	0.12
YrDum	0.23

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

$adm_{i,t} = \beta_0 + \beta_1 pri_{i,t} + \Sigma\beta_{1i}\ YrDum*pri_{i,t} + \beta_2 inc_{i,t} + \Sigma\beta_{2i}\ YrDum*inc_{i,t} + \beta_3 scr_{i,t} + \Sigma\beta_{3i}\ YrDum*scr_{i,t} + \beta_4 mov_{i,t} + \Sigma\beta_{4i}\ YrDum*mov_{i,t} + YrDum + \varepsilon_{i,t,}$

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

Table 3. Im-Pesaran-Shin test for unit roots

Variable	t-bar	p-value	Trend
adm	-2.307	0.307	Yes
pri	-1.838	0.887	Yes
inc	-2.287	0.333	Yes
scr	-1.738	0.942	Yes
mov	-1.897	0.839	Yes
Δadm	-4.309	0.000	Yes
Δpri	-3.265	0.000	Yes
Δinc	-2.377	0.095	Yes
Δscr	-2.083	0.019	Yes
Δmov	-3.612	0.000	Yes

Notes: The Im-Pesaran-Shin test (2003) involves the null hypothesis that each series has a unit roots against the alternative hypothesis that the series have different persistence. The null hypothesis is tested using the average of the t-ratios for each time series. Δ is the first difference operator.

Table 4. Results

Variable	Coefficient	Standard error
adm(t-1)	0.2848*	(0.0817)
adm(t+1)	0.1993**	(0.0907)
pri	-0.0585*	(0.0217)
inc	0.0000446	(0.0000388)
scr	0.0129	(0.0316)
mov	0.0041*	(0.0010)
const	0.2122*	(0.0279)
R-sq	0.5712	0.6326
Sargan	24.912	4.7911
λ_1	0.2121	
λ_2	3.2996	
η_s	-0.2443	
η_l	-0.3506	

Notes: instrument used are 3 lagged (from t-2 to t-4) and one lag of both dependent and explicative variables.
*/**/*** represents significant coefficient at 0.01, 0.05, 0.1.

Table 5. VAT harmonisation: short- and long-run effects

	VAT 0 %				VAT 4 %				VAT 10%			
	Short-run		Long-run		Short-run		Long-run		Short-run		Long-run	
Country	**Δ adm (%)**	**Δ VAT (%)**	**Δ adm (%)**	**Δ VAT (%)**	**Δ adm (%)**	**Δ VAT (%)**	**Δ adm (%)**	**Δ VAT (%)**	**Δ adm (%)**	**Δ VAT (%)**	**Δ adm (%)**	**Δ VAT (%)**
Austria	2.22	-100.00	3.19	-100.00	1.33	-59.47	1.91	-59.24	0.00	0.00	0.00	0.00
Belgium	1.31	-100.00	1.88	-100.00	0.38	-29.06	0.55	-28.94	-1.00	74.91	-1.44	74.13
Denmark	4.89	-100.00	7.01	-100.00	4.10	-83.34	5.89	-83.06	2.93	-58.83	4.21	-58.32
Finland	1.81	-100.00	2.60	-100.00	0.90	-49.55	1.30	-49.35	-0.45	24.43	-0.65	24.19
France	1.23	-100.00	1.77	-100.00	0.30	-24.44	0.44	-24.34	-1.09	86.27	-1.56	85.38
Germany	1.60	-100.00	2.29	-100.00	0.68	-42.47	0.98	-42.30	-0.68	41.88	-0.98	41.45
Italy	2.22	-100.00	3.19	-100.00	1.33	-59.47	1.91	-59.24	0.00	0.00	0.00	0.00
Luxembourg	0.71	-100.00	1.02	-100.00	-0.24	33.02	-0.34	32.88	-1.66	227.80	-2.38	225.39
Netherland	1.38	-100.00	1.98	-100.00	0.46	-33.03	0.66	-32.89	-0.92	65.13	-1.32	64.46
Norway	0.00	0.00	0.00	0.00	-0.98	-	-1.40	-	-2.44	-	-3.51	-
Spain	1.60	-100.00	2.29	-100.00	0.68	-42.47	0.98	-42.30	-0.68	41.88	-0.98	41.45
Sweden	1.38	-100.00	1.98	-100.00	0.46	-33.03	0.66	-32.89	-0.92	65.13	-1.32	64.46
Uk	3.64	-100.00	5.22	-100.00	2.81	-76.50	4.03	-76.22	1.56	-41.97	2.24	-41.58
Europe	*2.02*	*-100.00*	*2.90*	*-100.00*	*1.13*	*-56.06*	*1.45*	*-55.86*	*-0.22*	*8.39*	*-0.31*	*8.23*

Appendix 1. Cinema ticket prices and VAT rates across Europe (2002)

Country	Ticket price (Euros)	VAT rate (%)
Austria	6.54	10.00
Belgium	5.58	5.66
Denmark	7.72	25.00
Finland	7.19	8.00
France	5.57	5.31
Germany	5.86	7.00
Italy	5.61	10.00
Luxembourg	6.2	3.00
Netherland	6.49	6.00
Norway	8.05	0.00
Spain	4.45	7.00
Sweden	8.05	6.00
Uk	6.71	17.50
Europe	5.84	8.48

Notes: Source: Mediasalles, (2003), *European Cinema Yearbook 2003*, National Reports.

Appendix 2. Differences in Sargan Test for Instruments validity

Instruments	C-stat	P-value
adm(t-2)	0.576	0.44799
adm (t-3)	1.820	0.17734
adm (t-4)	3.099	0.07836
adm (t+2)	0.019	0.88975
adm (t+3)	1.602	0.20557
adm (t+4)	0.509	0.47572
pri(t-2)	0.453	0.50084
pri (t-3)	0.264	0.60710
pri (t-4)	0.036	0.84897
pri (t+2)	1.748	0.18609
pri (t+3)	0.419	0.51731
pri (t+4)	0.003	0.95776
pil(t-2)	0.298	0.58489
pil (t-3)	0.661	0.41622
pil (t-4)	0.008	0.92675
pil (t+2)	0.158	0.69140
pil (t+3)	1.620	0.20309
pil (t+4)	0.178	0.67326
scr(t-2)	1.103	0.29352
scr (t-3)	0.947	0.33052
scr (t-4)	0.000	0.98349
scr (t+2)	1.709	0.19113
scr (t+3)	0.544	0.46061
scr (t+4)	0.248	0.61851
mov(t-2)	2.406	0.12087
mov (t-3)	0.873	0.35008
mov (t-4)	1.411	0.23490
mov (t+2)	0.544	0.46071
mov (t+3)	0.001	0.97501
mov (t+4)	0.066	0.79664

Notes: The C test involves the null hypothesis of exogeneity of each instruments tested. Under the null of exogeneity of instrument, C-statistic has a chi-sq. distribution with degree of freedom equal to the difference of the two Sargan statistics.