Money Laundering in the Real Estate sector:

evidence from the Italian market at a provincial level

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Talk overview

- Introductory remarks
- Theoretical characteristics
- Variables' issues
- Implementation of the model and main results
- Conclusions

Facts about Real Estate and Unobservable Economy in Italy

Reasons behind this choice:

- relevance of the real estate sector
- dimension of criminal/shadow economy and money laundering (see *Ardizzi et al., 2014*)

Presence of Crime in the Real Estate literature

Micro literature:

- *Diaz-Serrano* (2005)
- *Kiel and Zabel* (2008)
- *Stadelmann* (2010)
- *Kiefer* (2011)

Macro literature:

- *Potepan* (1996)
- *Scafidi et al.* (1998)
- *Schneider* (2004)
- *Yan et al.* (2007)

The Model

Errors peculiarities:

- time autocorrelation (Prais-Winsten)
- heteroscedasticity (PCSE)
- spatial correlation (PCSE)

Dataset construction

Hypotheses about the determinants of real estate market prices:

- per capita wages: *pil_pc*
- population distribution: *pop_25*
- wealth distribution: *u*
- rents (and their determinants): *aff*
- cost of capital: *INT*
- market efficiency: *IMI*
- supply regulation: *stock_pop*
- hedonic aspects: *verde_pc*, *tras_pc* and *rdiff*
- crimes connected to ML: *ENTERPRISE* and *POWER*
- probability of being prosecuted for ML: *sos_pop*
- tax evasion: *evas_comm* and *evas_impr*

Complete Regression

$$
\begin{gathered}
\text{Pimm}_{it} = \alpha_0 + \alpha_1 \text{pil\_pc}_{it} + \alpha_2 \text{pop\_25}_{it} + \alpha_3 \text{u}_{it} + \\
+ \alpha_4 \text{aff}_{it} + \alpha_5 \text{INT}_{it} + \alpha_6 \text{IMI}_{it} + \alpha_7 \text{stock\_pop}_{it} + \\
+ \alpha_8 \text{verde\_pc}_{it} + \alpha_9 \text{tras\_pc}_{it} + \alpha_{10} \text{rdiff}_{it} + \\
+ \alpha_{11} \text{ENTERPRISE}_{it} + \alpha_{12} \text{POWER}_{it} + \alpha_{13} \text{sos\_pop}_{it} + \\
+ \alpha_{14} \text{evas\_comm}_{it} + \alpha_{15} \text{evas\_impr}_{it} + \varepsilon_{it}
\end{gathered}
$$

Starting Regressions

regressor	*Model 1*		*Model 2*		*Model 4*	
pil_pc	4.368	**	0.951		2.001	
pop_25	1630.781	***	1975.031	***	2184.802	***
u	119.170		118.543		-379.681	
aff	18.391	***	17.765	***	16.792	***
INT	-4.620		0.639		-17.596	
IMI	-4759.76	**	-5008.203	**	-5783.491	**
stock_pop	866.916	***	687.330	***	670.346	***
verde_pc	-		0.086	***	0.084	***
tras_pc	-		0.393	***	0.299	**
rdiff	-		0.583		1.133	**
ENTERPRISE	-		-		207.825	***
POWER	-		-		12.479	
sos_pop	-		-		36.915	
evas_comm	-		-		-50.503	**
evas_impr	-		-		-4.837	
constant	-1441.960	***	-1549.069	***	-1798.419	***

Baseline model - Coefficients

regressor	coefficient	z value	
pil_pc	2.307	(0.83)	
pop_25	2321.452	(4.30)	***
aff	16.894	(35.64)	***
IMI	-5023.302	(-2.95)	***
stock_pop	658.431	(5.07)	***
verde_pc	0.083	(4.76)	***
tras_pc	0.327	(2.60)	***
rdiff	1.155	(1.96)	**
ENTERPRISE	189.081	(3.97)	***
POWER	11.641	(0.80)	
evas_comm	-59.152	(-2.18)	**
evas_impr	-3.480	(-0.49)	
constant	-1951.982	(-4.31)	***

Baseline model - Percentage contribution of the variables

	Italy	*north*	*centre*	*south*
pimm	100	100	100	100
Positive contribution				
pop_25	154.89	142.45	135.17	204.45
aff	72.05	68.47	74.81	75.82
stock_pop	30.51	28.55	24.98	41.31
ENTERPRISE	13.90	11.01	11.65	22.52
pil_pc	5.05	5.54	4.48	4.77
rdiff	2.69	3.68	2.03	1.50
tras_pc	2.04	2.20	1.74	2.08
POWER	1.31	0.58	0.80	3.41
verde_pc	1.01	0.96	1.04	1.06
Negative contribution				
constant	-170.12	-151.28	-145.46	-238.73
IMI	-11.48	-11.16	-9.88	-14.11
evas_comm	-1.43	-0.73	-0.99	-3.37
evas_impr	-0.40	-0.27	-0.36	-0.72

Disaggregated model - Coefficients

Model 5 (disaggregated)

regressor	*coefficient*	*z value*	
pil_pc	3.547	(1.22)	
pop_25	2192.742	(4.76)	***
aff	16.413	(37.96)	***
IMI	-4625.375	(-2.80)	***
stock_pop	669.045	(5.50)	***
verde_pc	0.082	(5.09)	***
tras_pc	0.352	(2.58)	***
rdiff	1.246	(2.01)	**
ENT_a	66.664	(2.67)	***
ENT_b	146.367	(3.78)	***
POWER	7.183	(0.56)	
evas_comm	-70.817	(-2.54)	**
evas_impr	-10.893	(-1.58)	
constant	-1892.47	(-4.80)	***

Model 5 (baseline)

regressor	*coefficient*	*z value*	
pil_pc	2.307	(0.83)	
pop_25	2321.452	(4.30)	***
aff	16.894	(35.64)	***
IMI	-5023.302	(-2.95)	***
stock_pop	658.431	(5.07)	***
verde_pc	0.083	(4.76)	***
tras_pc	0.327	(2.60)	***
rdiff	1.155	(1.96)	**
ENT	189.081	(3.97)	***
POWER	11.641	(0.80)	
evas_comm	-59.152	(-2.18)	**
evas_impr	-3.480	(-0.49)	
constant	-1951.982	(-4.31)	***

Disaggregated model - Percentage contribution of the variables

	Italy	*north*	*centre*	*south*
pimm	100	100	100	100
Positive contribution				
pop_25	146.13	134.49	127.62	193.43
aff	70.03	66.50	72.65	73.78
stock_pop	30.94	29.00	25.38	42.05
ENTERPRISE_b	10.63	8.51	8.90	17.26
pil_pc	7.76	8.51	6.88	7.35
ENTERPRISE_a	5.81	3.93	5.37	10.23
rdiff	2.91	3.97	2.19	1.62
tras_pc	2.19	2.36	1.87	2.25
verde_pc	1.00	0.95	1.04	1.06
POWER	0.80	0.36	0.49	2.10
Negative contribution				
constant	-164.71	-146.61	-140.97	-231.84
IMI	-10.57	-10.27	-9.10	-13.01
evas_comm	-1.70	-0.88	-1.19	-4.04
evas_impr	-1.24	-0.83	-1.14	-2.25

Simulations - northern Italy

province	quotation	theoretical value	difference	difference %
Rimini	2290.39	1951.50	−338.89	-14.80%
Genova	2290.15	1964.90	−325.25	-14.20%
Savona	2600.82	2301.91	−298.91	-11.49%
Bologna	2445.12	2152.63	−292.50	-11.96%
Imperia	2070.42	1783.57	−286.85	-13.85%
Ravenna	1501.35	1264.53	−236.82	-15.77%
Torino	1670.69	1447.31	−223.38	-13.37%
Milano	2063.36	1843.77	−219.59	-10.64%
Parma	1726.33	1531.50	−194.83	-11.29%
Padova	1207.95	1021.61	−186.34	-15.43%
Rovigo	927.92	814.31	−113.61	-12.24%
Cremona	947.22	835.71	−111.51	-11.77%
Cuneo	1192.45	1082.31	−110.14	-9.24%
Udine	918.93	820.47	−98.46	-10.71%
Treviso	1282.79	1184.82	−97.97	-7.64%
Mantova	1091.94	994.97	−96.97	-8.88%
Pordenone	969.70	877.38	−92.32	-9.52%
Lecco	1434.42	1342.67	−91.74	-6.40%
Biella	822.88	737.58	−85.30	-10.37%
Sondrio	1140.44	1055.72	−84.72	-7.43%

Simulations - central Italy

province	*quotation*	*theoretical value*	*difference*	*difference %*
Lucca	2099.46	1817.07	−282.39	-13.45%
Pistoia	1664.95	1414.35	−250.59	-15.05%
Massa	1814.19	1567.20	−247.00	-13.61%
Pescara	966.65	728.21	−238.44	-24.67%
Firenze	2653.18	2416.38	−236.80	-8.93%
Livorno	2330.46	2100.14	−230.32	-9.88%
Roma	2893.34	2664.50	−228.85	-7.91%
L'Aquila	901.71	694.70	−207.01	-22.96%
Teramo	904.30	698.94	−205.36	-22.71%
Latina	1398.89	1197.28	−201.61	-14.41%
Pisa	1473.80	1306.13	−167.67	-11.38%
Viterbo	1070.55	904.21	−166.34	-15.54%
Pesaro	1233.45	1068.49	−164.96	-13.37%
Terni	1002.84	849.49	−153.36	-15.29%
Ancona	1489.97	1339.46	−150.50	-10.10%
Arezzo	1317.35	1169.82	−147.53	-11.20%
Chieti	1011.99	871.04	−140.95	-13.93%
Macerata	1260.73	1122.28	−138.44	-10.98%
Frosinone	887.97	763.30	−124.67	-14.04%
Siena	2258.58	2142.25	−116.33	-5.15%

Simulations - southern Italy

province	*quotation*	*theoretical value*	*difference*	*difference %*
Napoli	1811.02	1291.39	−519.63	-28.69%
Caserta	1077.96	662.22	−415.75	-38.57%
Catania	1040.04	685.38	−354.66	-34.10%
Palermo	1226.76	885.86	−340.90	-27.79%
Trapani	691.78	443.14	−248.64	-35.94%
Reggio Calabria	668.05	429.04	−239.01	-35.78%
Brindisi	781.43	543.24	−238.19	-30.48%
Salerno	1385.60	1151.57	−234.03	-16.89%
Catanzaro	727.82	501.43	−226.39	-31.10%
Siracusa	665.62	446.55	−219.07	-32.91%
Lecce	759.78	553.74	−206.04	-27.12%
Messina	806.46	603.75	−202.71	-25.14%
Taranto	726.82	526.08	−200.74	-27.62%
Ragusa	766.16	567.98	−198.18	-25.87%
Agrigento	653.00	459.91	−193.09	-29.57%
Cosenza	580.46	404.29	−176.17	-30.35%
Benevento	828.58	671.68	−156.89	-18.94%
Avellino	790.36	654.55	−135.81	-17.18%
Campobasso	816.89	714.46	−102.43	-12.54%

Conclusions

- relevance of ENTERPRISE
- macro-areas comparisons
- effects on real economy
- effects on equity

Limits

- number of analyzed provinces
- aggregation data procedures
- county town variables
- space and time restrictions in ML
- connection between crimes and related profits
- weight of crimes
- proportion between observed/occurred crimes

Further improvements

- quantification of the capitals laundered through real estate
- extension of the time series up to recent years
- application of the procedure to other goods