Corporate performances and market selection. Some comparative evidence

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Background

- Market efficiency: underlying selection process which operates on heterogeneous producers, via reallocation of market shares from the least to the more "efficient" business units
- Definition of fitness: productivity, profitability, growth. Which dimension is the first driver?
- Shortcomings Sectoral decomposition of productivity dynamics or analysis of entrant and exiting firms: only one dimension considered.

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3 issues and 3 lines of investigation

- A first issue regards the possibility that productivity is not the only and the proper fitness measure (cfr. Foster et al., 2008)
- We explore existence and asses the strength of the link between PRODUCTIVITY and PROFITABILITY.
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Outline

Database description

Micro.3: integrated data bank including firms with 20 or more employees over the time period 1989 – 2004. It is based on three different sources

- census of all the Italian firms with more than 20 employees before the 1997 and with more than 100 employees in the period 1998 – 2004
- representative sample of firms with a number of employees included in the range 20 – 99 rotating every five years
- balance-sheet provided by CEBI, the Italian official member of the European Committee of Central Balance-Sheet Data Offices

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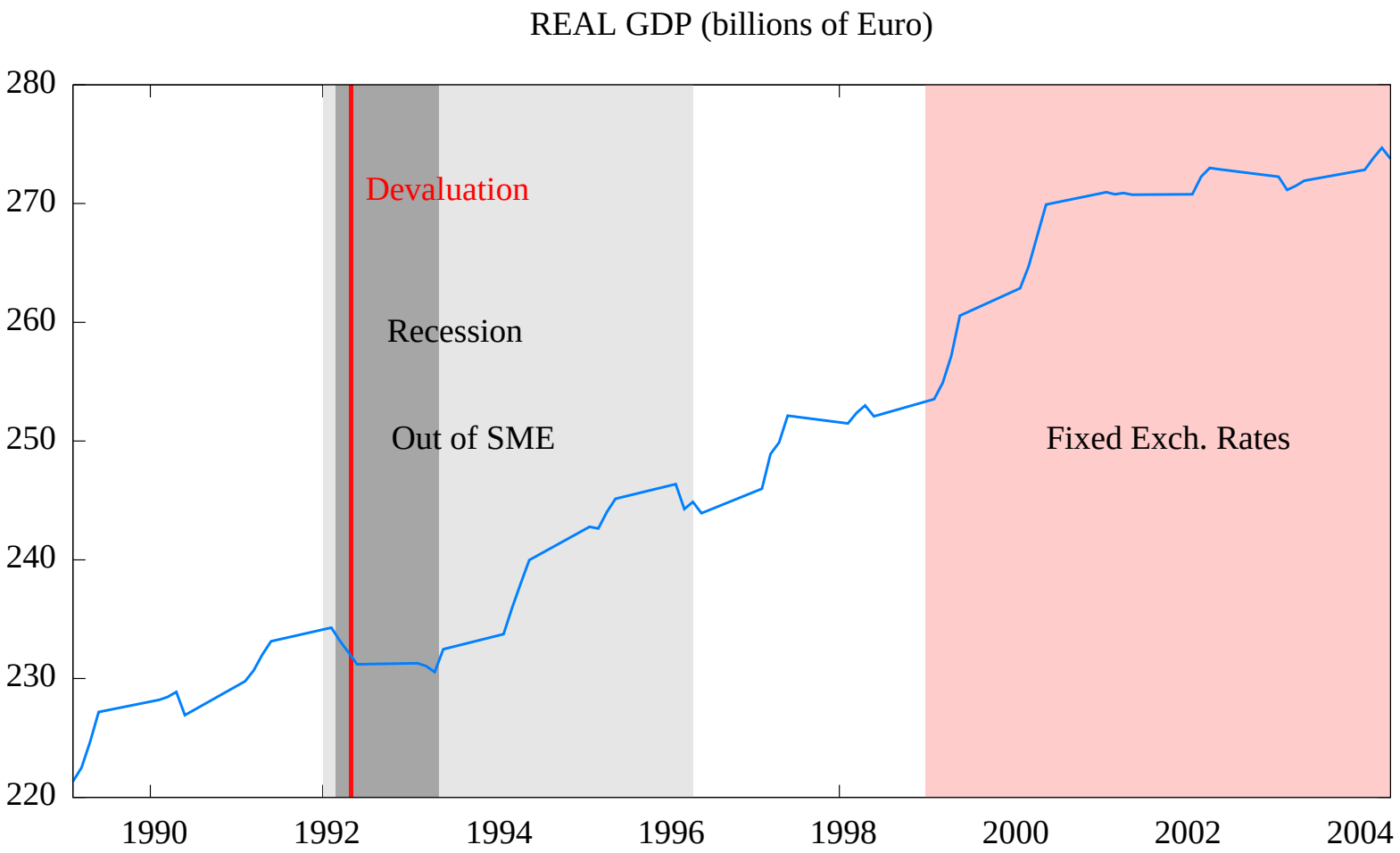
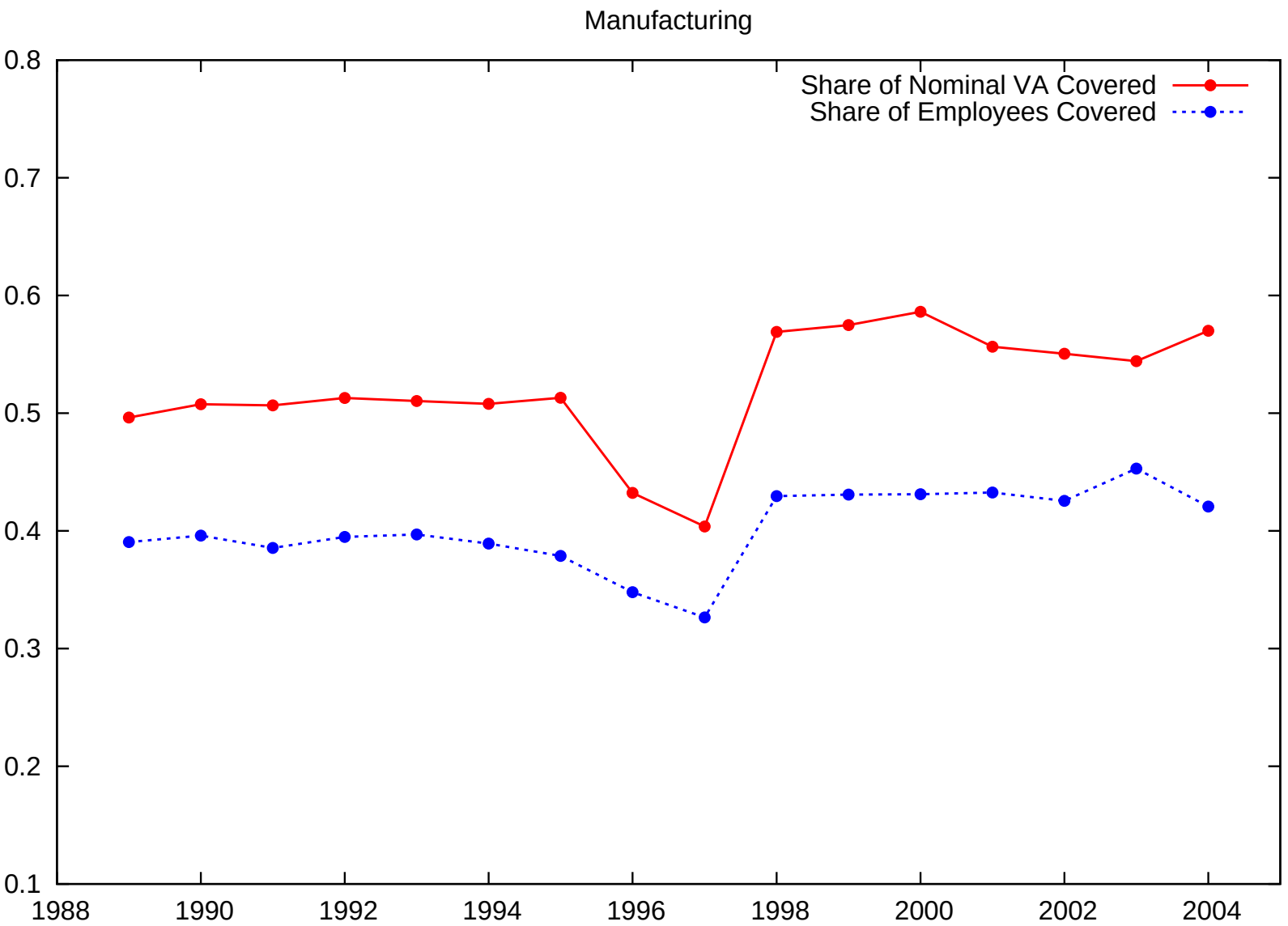
Database time span



Database coverage



Data selection

Sample:

- we select 3-Digit sectors with at least 100 firms in each year
- we apply 3-Digit output deflators

Main variables:

- TS =Total Sales
- L = Number of Employees
- VA = Value Added
- GOM = Gross Operative Margin (*VA-Labour Costs*)

Measures of performance

We define growth, profitability and productivity as

- Productivity

$$\Pi_t = \frac{VA_t}{L_t} \tag{1}$$

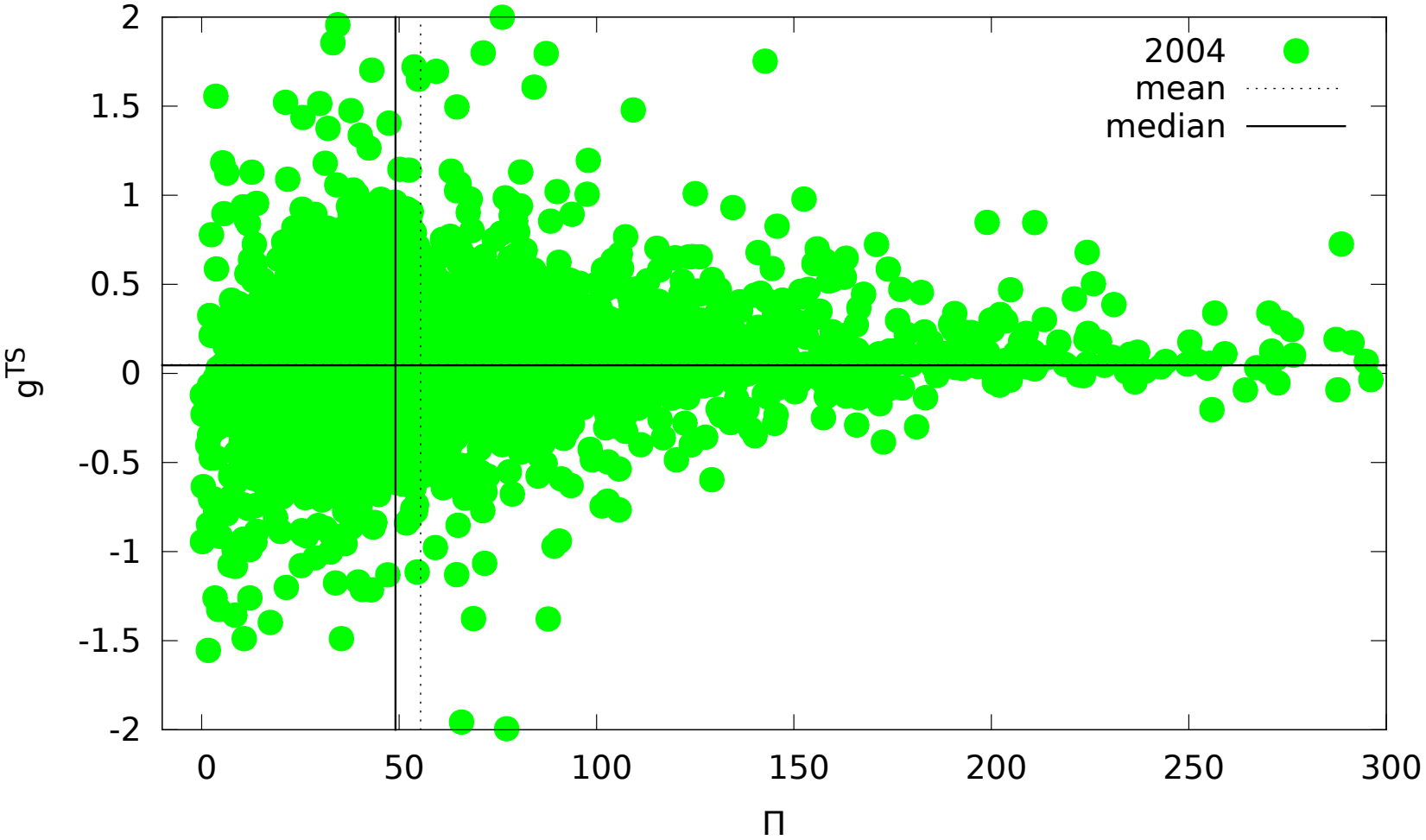
- Profitability

$$P_t = \frac{GOM_t}{TS_t} \tag{2}$$

- Growth

$$G_t = \Delta \log(TS_t) \tag{3}$$

Relation $\Pi \sim$ Growth



Binned Statistics

Simple statistics of dependent variable by quantile of independent variable. For pairs (X_i, Y_i)

$$S[\ Y_i \mid X_i \in \text{ bin }] \quad \text{S} = \text{E, V, } \ldots$$

Account for noise in both variables. Let

$$Y_i = f(X_i) + \epsilon_i \quad ,$$

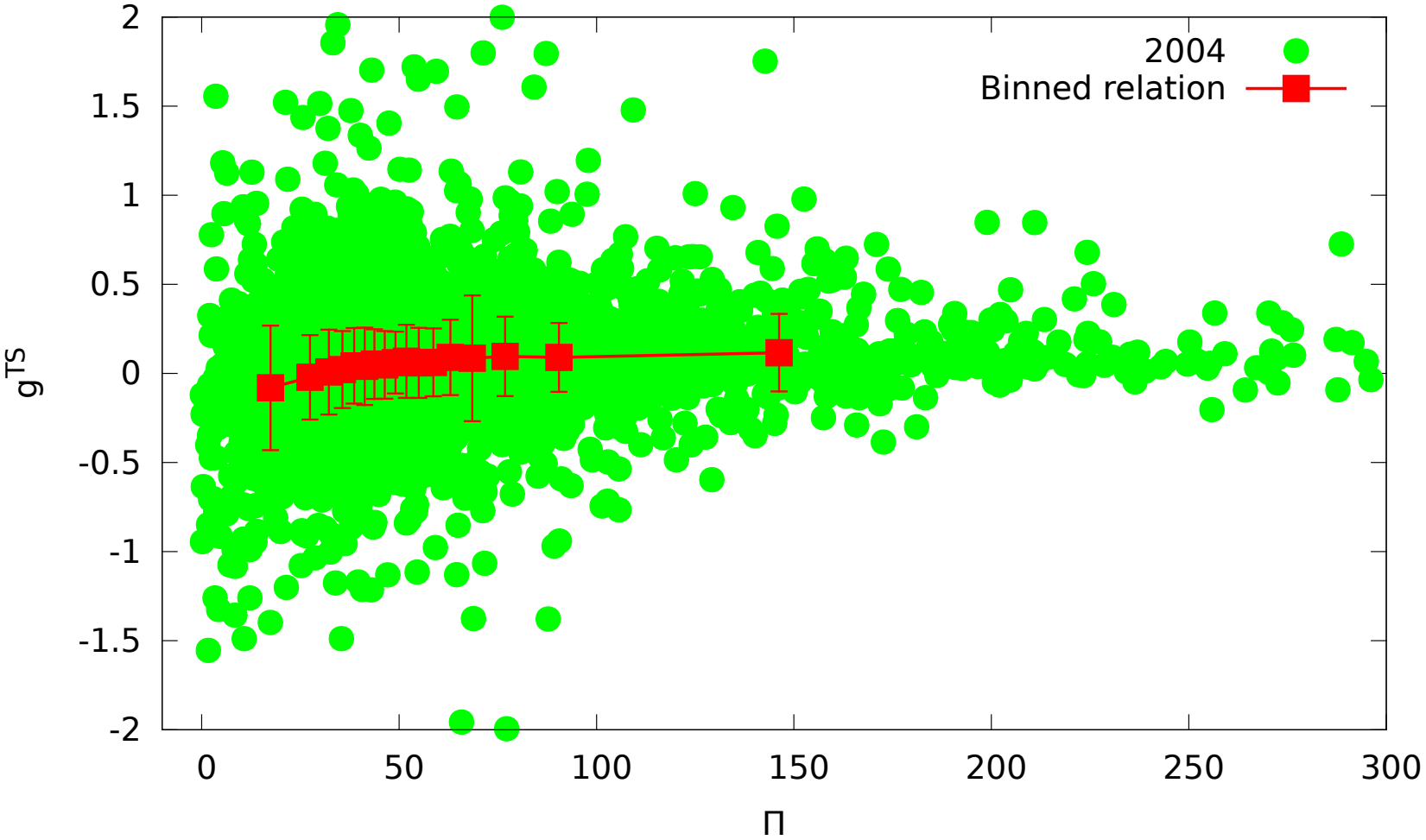
if $X_i = \bar{X} + \eta_i$ and $\eta_i \ll \bar{X}$ then

$$Y_i = f(\bar{X}) + f'(\bar{X})\eta_i + \epsilon_i$$

and hence

$$\begin{aligned} E[\ Y_i \mid X_i \in \text{ bin }] &= f(\bar{X}) \\ V[\ Y_i \mid X_i \in \text{ bin }] &= f'^2\sigma_\eta^2 + \sigma_\epsilon^2 \quad . \end{aligned}$$

Relation $\Pi \sim$ Growth



Kernel Regresssion

- Generalization of Binned Statistics: smooth weighting of observation pairs
- From the definition of Conditional Expectation:

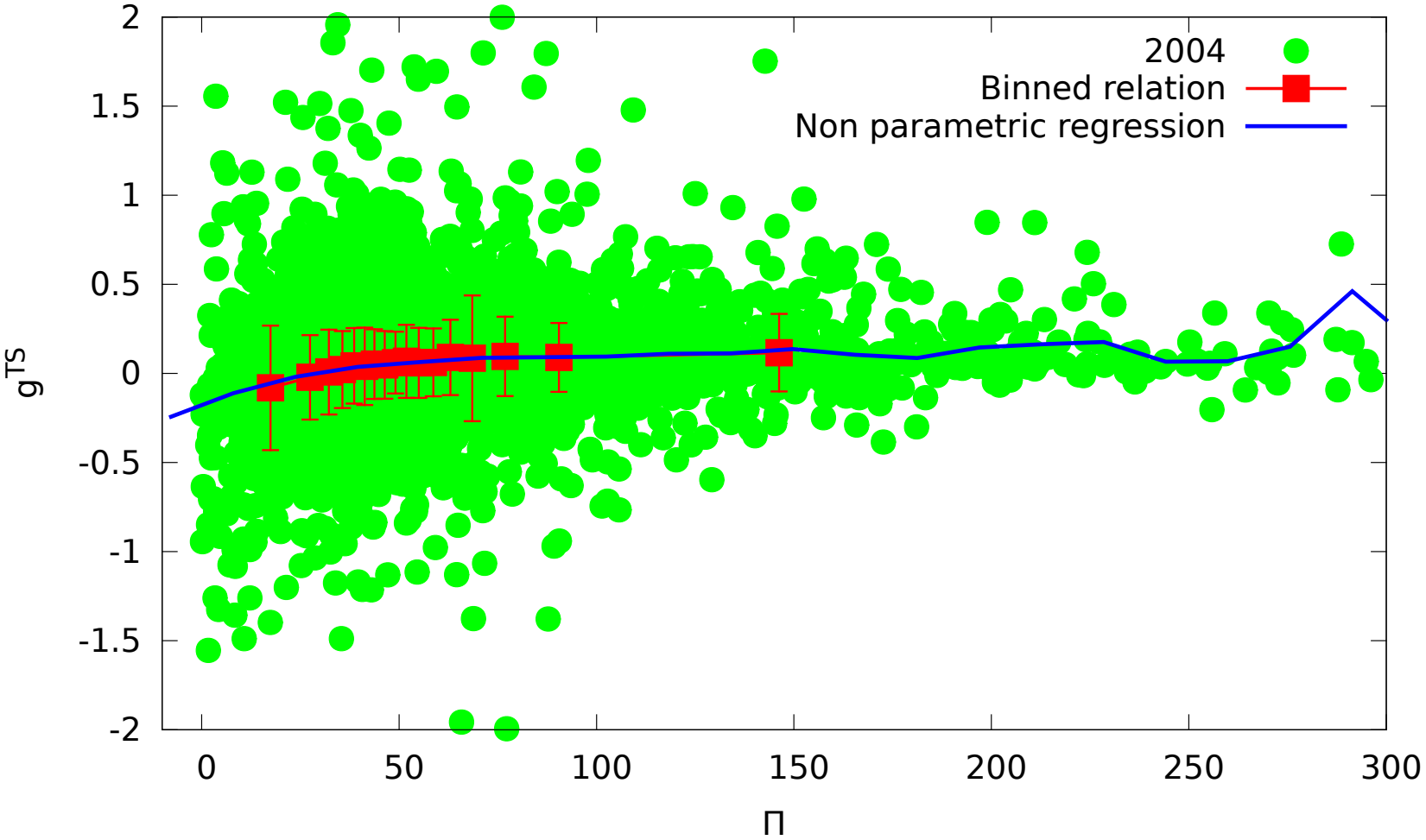
$$E[Y \mid X] = \int dY\ Y P(Y \mid X) = \int dY\ Y \frac{P(Y,X)}{P(X)}$$

- Using the "plug-in" principle: $P \rightarrow \hat{P}$

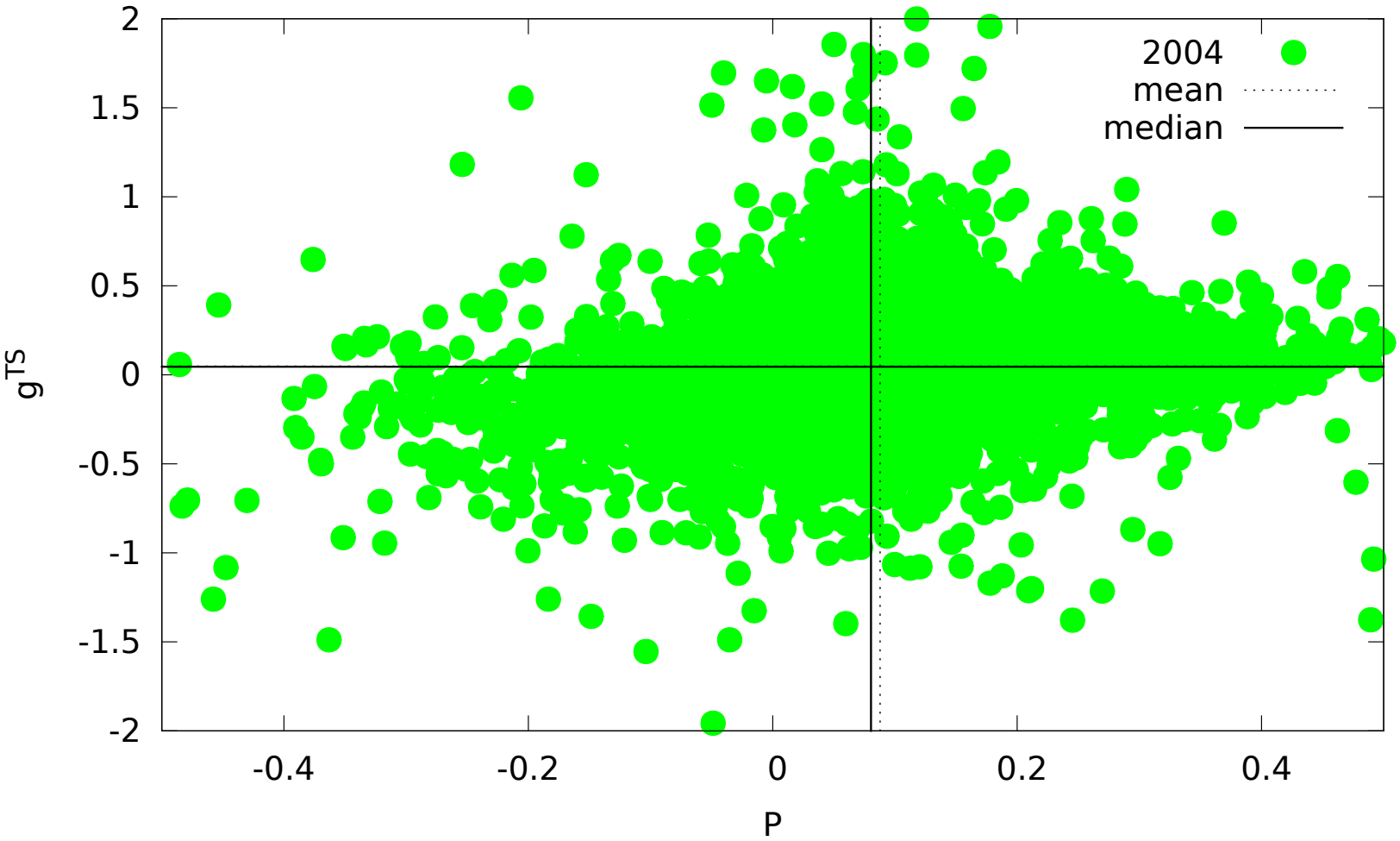
$$E[Y \mid X] = \int dY\ Y \frac{\sum_i K\left(\frac{Y-Y_i}{h_Y}, \frac{X-X_i}{h_X}\right)}{\sum_i K\left(\frac{X-X_i}{h_X}\right)} = \frac{\sum_i Y_i K\left(\frac{X-X_i}{h_X}\right)}{\sum_i K\left(\frac{X-X_i}{h_X}\right)}$$

with symmetric kernel function $K(\cdot)$.

Relation $\Pi \sim$ Growth



Relation P ∼ Growth



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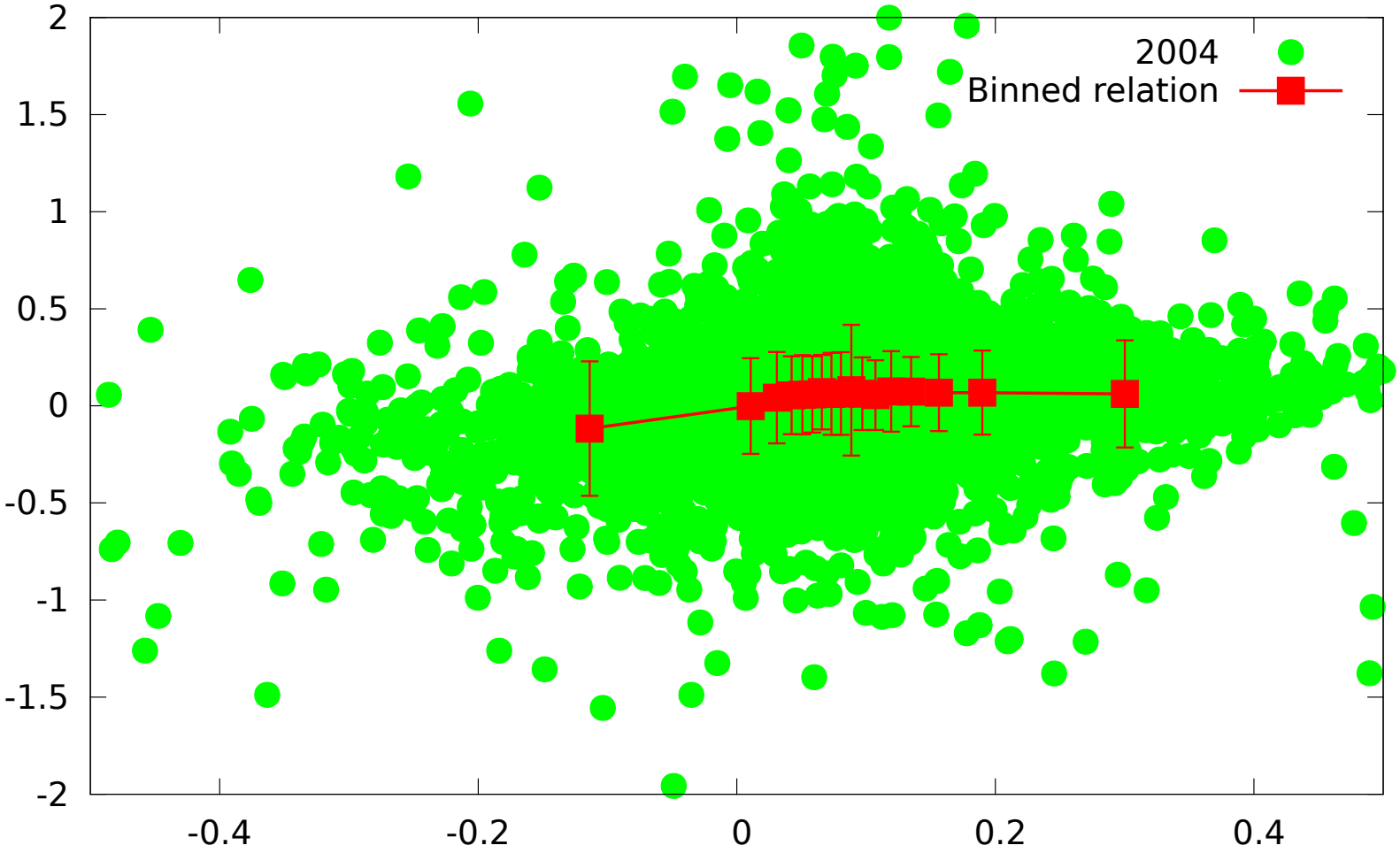

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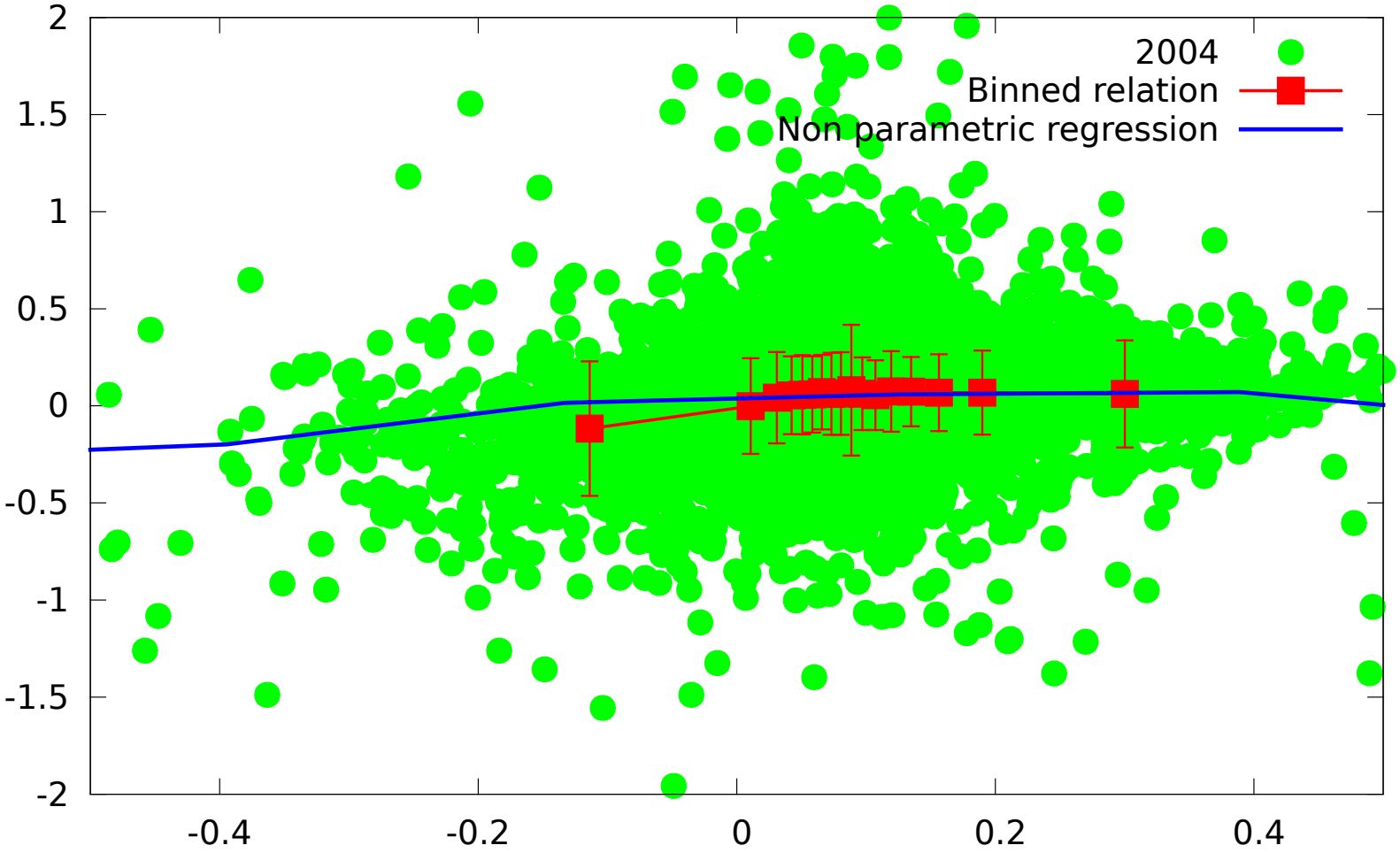
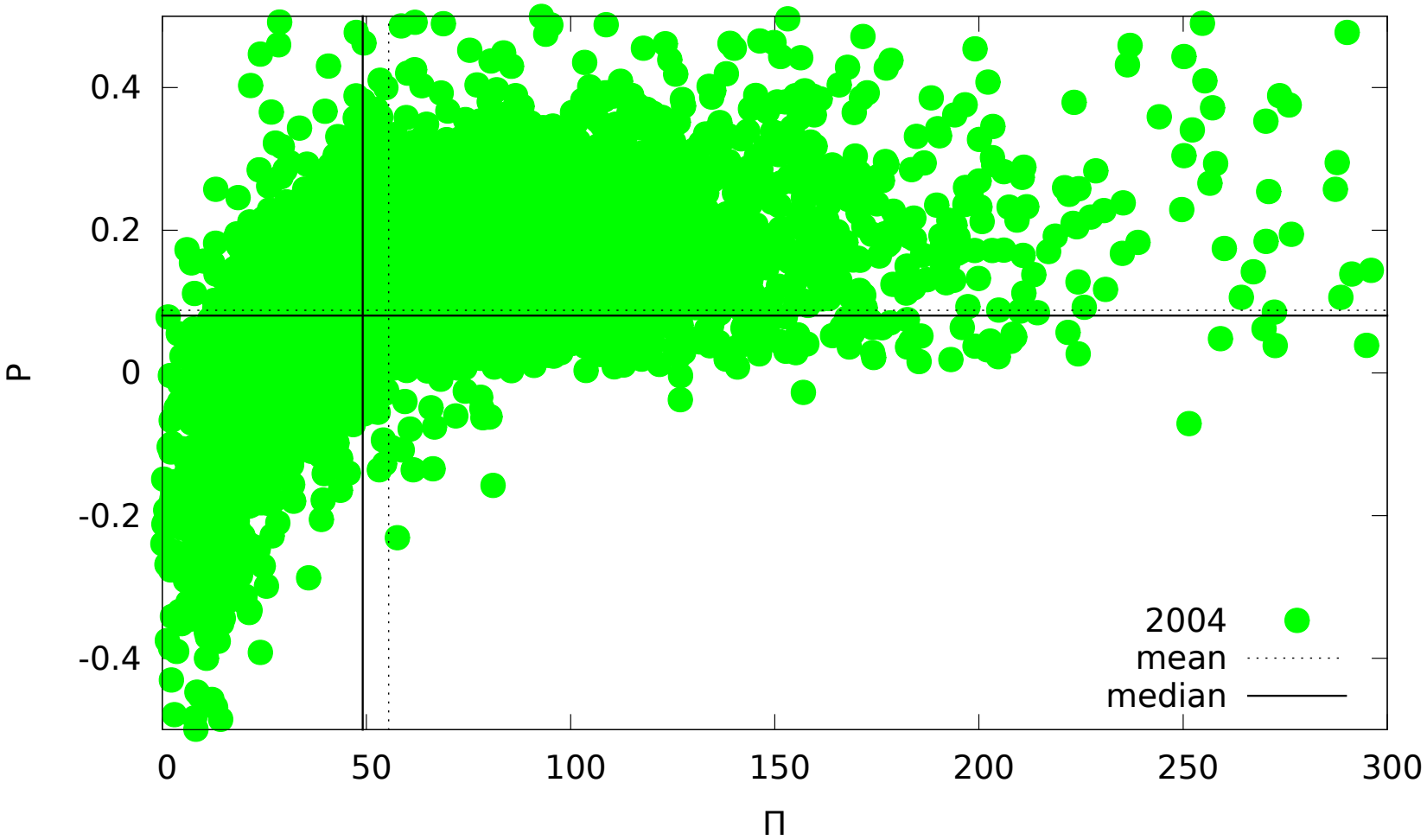


Relation P ∼ Π



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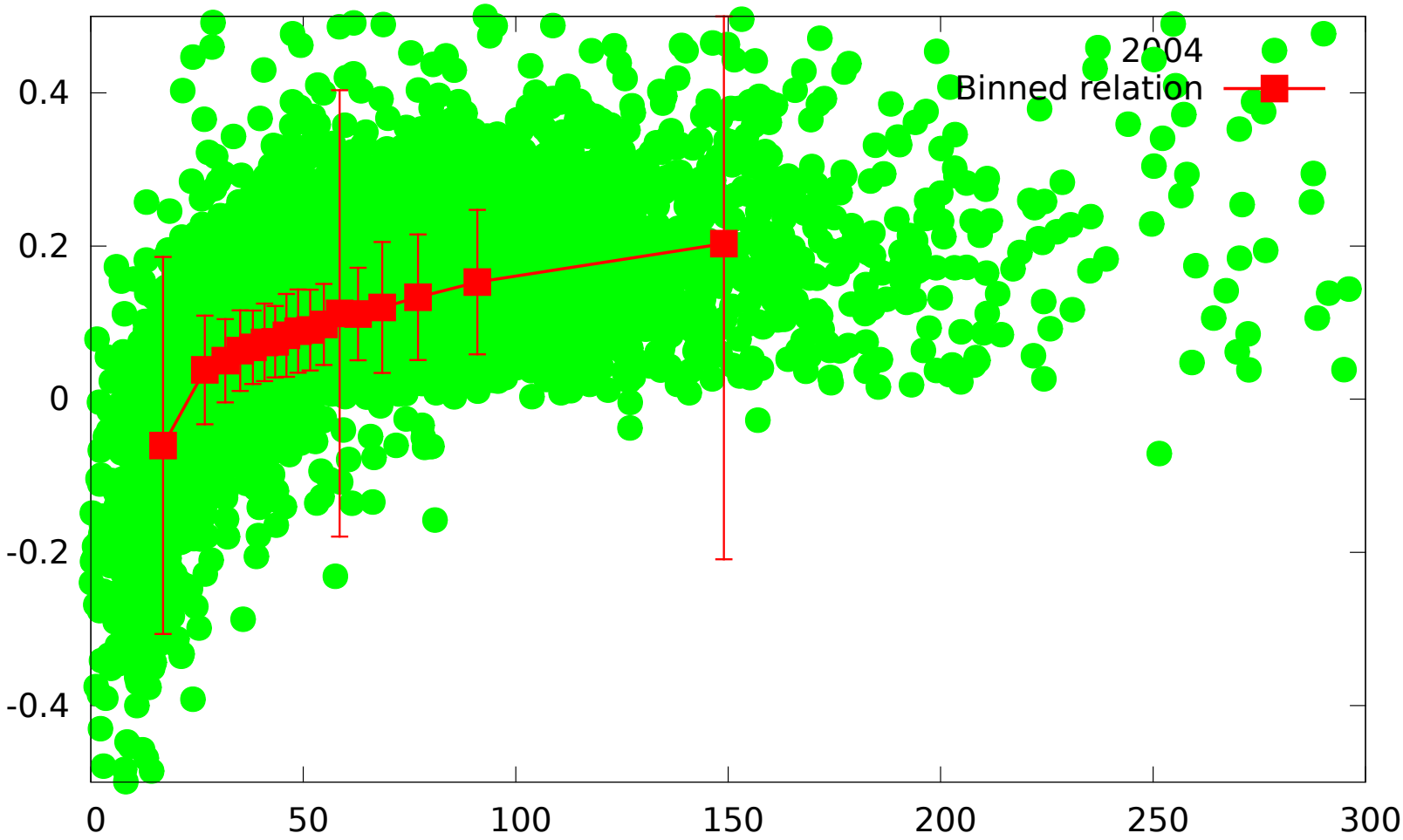
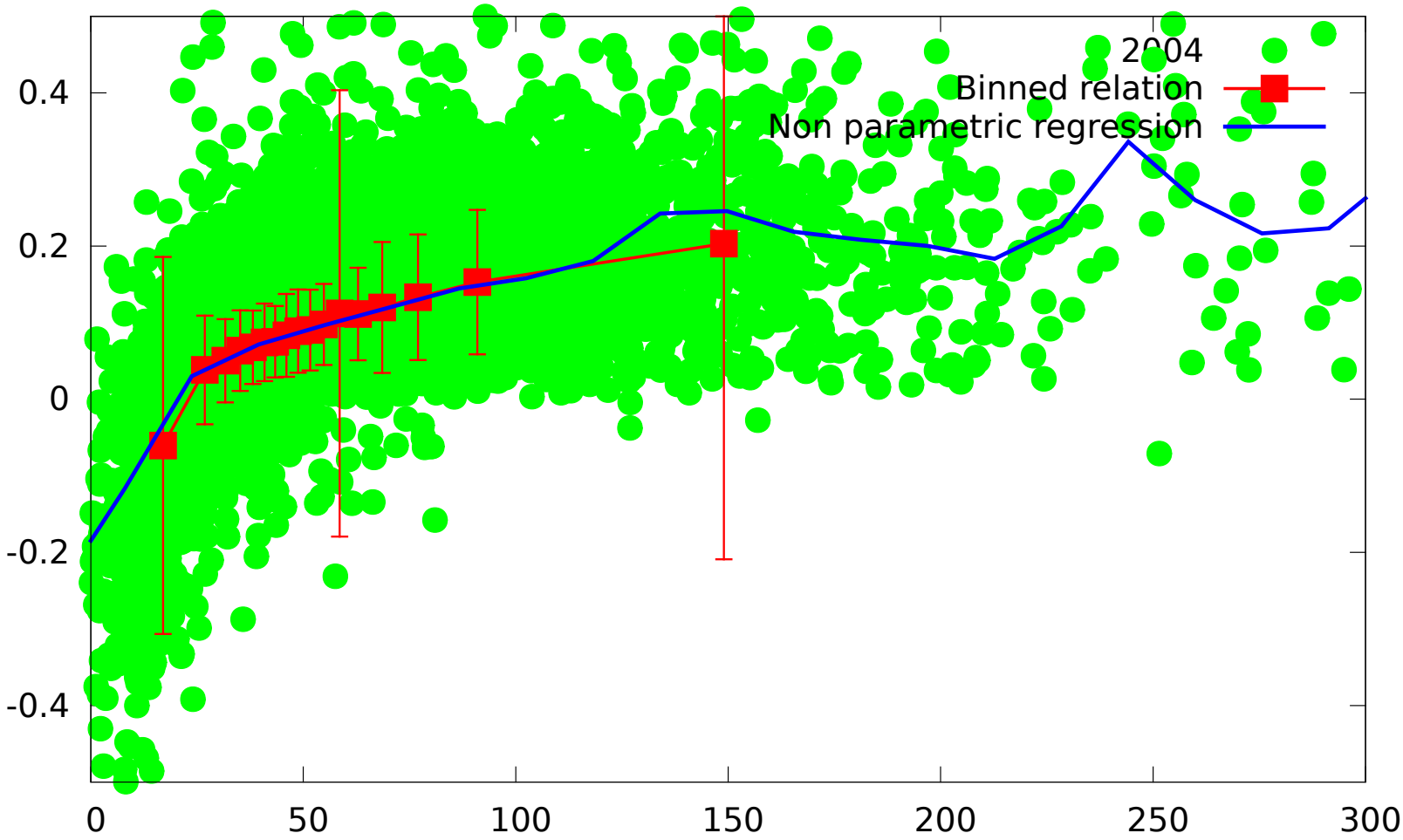
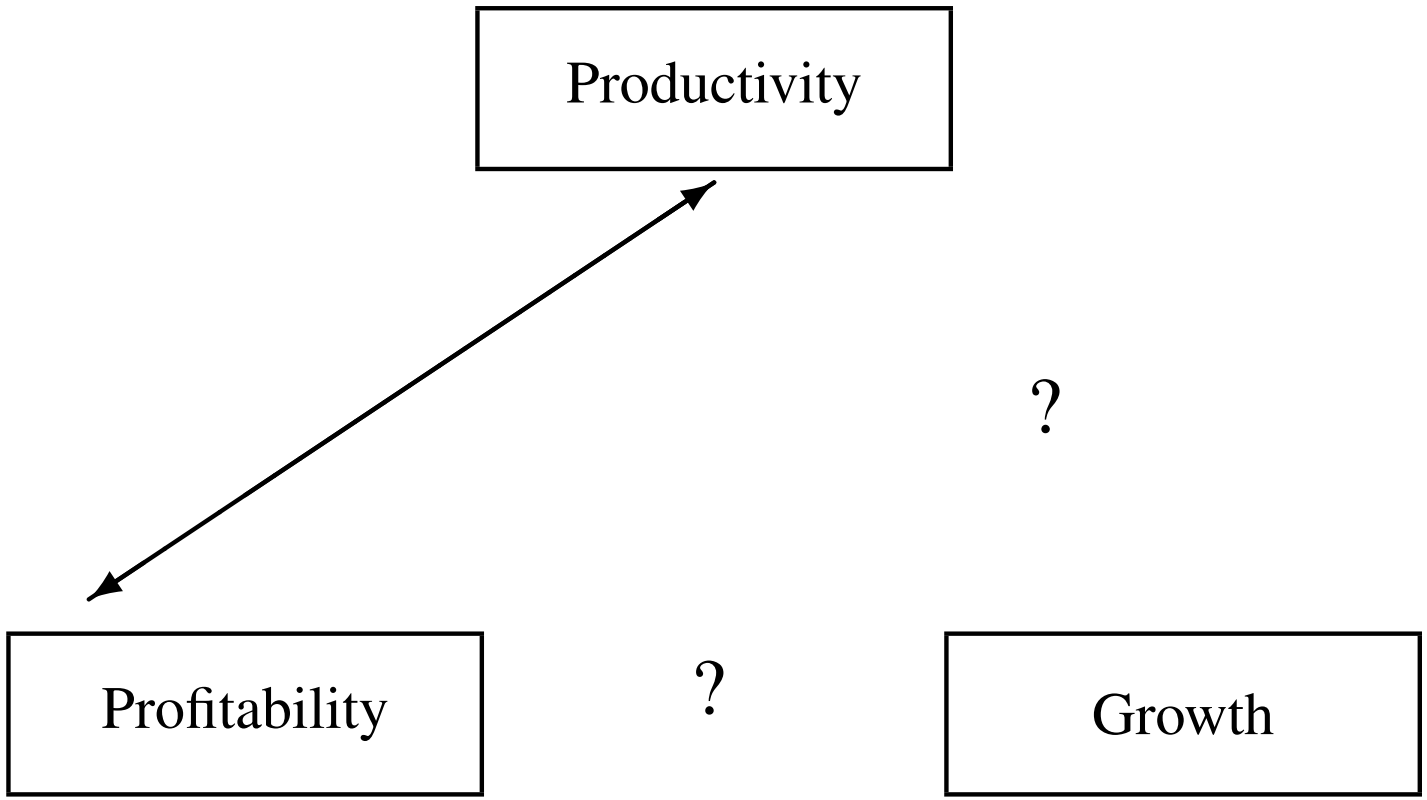


Relation P $\sim \Pi$



Relationships: summing up



Structure of the panel analysis

It is necessary to consider omitted firm-specific variables.

We estimate pairwise regressions based on different sets of specifications

Estimates are performed separately by 3-Digit industries.

Contemporaneous relations

Baseline model is a pairwise regression

$$Y_{i,t} = c + u_i + \alpha X_{i,t} + \epsilon_{i,t} \quad , \tag{4}$$

where Y and X can be G, Π_t and P_t respectively, and we include a full set of year dummies to control for common time effects.

Relative strength of the relationships via

$$S^2_{Y,X} = \left(\hat{\alpha} \frac{\sigma_X}{\sigma_Y} \right)^2 \quad , \tag{5}$$

where $\hat{\alpha}$ is the Fixed Effects estimate of α, and σ stands for the standard deviation variance of the two variables included in each regression.

Note: S^2_{YX} has the nature of a standard R^2 measure of fitness, computed ignoring the terms due to annual dummies and firm-specific characteristics

$G_{i,t} = c + \alpha \Pi_{i,t} + u_i + \epsilon_{i,t}$

		ITALY			FRANCE		
NACE	Sector	$\hat{\alpha}$	S^2_{YX}	R^2	$\hat{\alpha}$	S^2_{YX}	R^2
171	Preparation and spinning of textiles	0.0045*	0.0936	0.2561	0.0004*	0.0049	0.1907
172	Textiles weaving	0.0023*	0.0623	0.2916	0.0003*	0.0046	0.2415
175	Carpets, rugs and other textiles	0.0039*	0.2383	0.3585	0.0003*	0.0033	0.1946
182	Wearing apparel	0.0052*	0.1543	0.3269	0.0028*	0.0000	0.0601
193	Footwear	0.0086*	0.2048	0.2859	0.0100*	0.0000	0.1178
212	Articles of paper and paperboard	0.0021*	0.0632	0.2412	0.0026*	0.0388	0.1973
221	Publishing	0.0012*	0.0746	0.3028	0.0005*	0.0640	0.2113
222	Printing	0.0027*	0.1063	0.3688	0.0062*	0.1169	0.1975
241	Production of basic chemicals	0.0006*	0.0158	0.1255	0.0009*	0.1056	0.1470
244	Pharma., med. chemicals, botanical prod	0.0012*	0.0310	0.3863	0.0004*	0.0570	0.2306
246	Other chemical products	0.0023*	0.1166	0.3168	0.0022*	0.1367	0.2317
252	Plastic products	0.0032*	0.1200	0.2789	0.0014*	0.0245	0.1711
266	Concrete, plaster and cement	0.0025*	0.0851	0.3158	0.0011*	0.0210	0.1857
281	Structural metal products	0.0060*	0.1183	0.3131	0.0096*	0.1319	0.2179
284	Forging, pressing, stamping, of metal	0.0059*	0.2009	0.2812	0.0080*	0.1942	0.2391
291	Machinery for prod. & use of mech. power	0.0035*	0.0942	0.2823	0.0052*	0.1671	0.2203
292	Other general purpose machinery	0.0052*	0.1613	0.2626	0.0083*	0.1885	0.1961
294	Machine tools	0.0062*	0.1525	0.3340	0.0099*	0.1932	0.3316
295	Other special purpose machinery	0.0061*	0.1553	0.2389	0.0087*	0.1948	0.2072
311	Electric motors, generators and transform	0.0040*	0.1147	0.3973	0.0097*	0.1518	0.2434
361	Furniture	0.0057*	0.1331	0.2826	0.0119*	0.2633	0.2604
	S^2_{YX} **Statistics**	AVG	MIN	MAX	AVG	MIN	MAX
		0.1186	0.0158	0.2433	0.1268	0.0001	0.2633

$P_{i,t} = c + \alpha \Pi_{i,t} + u_i + \epsilon_{i,t}$

		ITALY			FRANCE		
NACE	Sector	$\hat{\alpha}$	S^2_{YX}	R^2	$\hat{\alpha}$	S^2_{YX}	R^2
171	Preparation and spinning of textiles	0.0033*	0.3358	0.7226	0.0004*	0.0554	0.4612
172	Textiles weaving	0.0023*	0.3378	0.7294	0.0002*	0.0269	0.5069
175	Carpets, rugs and other textiles	0.0031*	0.5200	0.7122	0.0002*	0.0192	0.5238
182	Wearing apparel	0.0033*	0.0570	0.4543	0.0011*	0.1502	0.5231
193	Footwear	0.0043*	0.3193	0.5284	0.0035*	0.2313	0.6318
212	Articles of paper and paperboard	0.0024*	0.5459	0.7218	0.0019*	0.2481	0.6614
221	Publishing	0.0018*	0.3503	0.6948	0.0001*	0.0482	0.6707
222	Printing	0.0026*	0.3479	0.6672	0.0026*	0.3904	0.6153
241	Production of basic chemicals	0.0006*	0.1053	0.5202	0.0004*	0.1312	0.7240
244	Pharma., med. chemicals, botanical prod	0.0011*	0.2682	0.5029	0.0002*	0.0275	0.7751
246	Other chemical products	0.0019*	0.3325	0.4788	0.0009*	0.2170	0.6271
252	Plastic products	0.0023*	0.3510	0.7132	0.0009*	0.1378	0.5832
266	Concrete, plaster and cement	0.0007*	0.0584	0.6106	0.0005*	0.0551	0.6049
281	Structural metal products	0.0033*	0.3410	0.6435	0.0042*	0.6292	0.7275
284	Forging, pressing, stamping, of metal	0.0034*	0.4029	0.5412	0.0040*	0.5303	0.7160
291	Machinery for prod. & use of mech. power	0.0031*	0.3929	0.6945	0.0033*	0.5360	0.7326
292	Other general purpose machinery	0.0029*	0.4341	0.7503	0.0041*	0.6293	0.7198
294	Machine tools	0.0024*	0.3433	0.6764	0.0048*	0.6061	0.7145
295	Other special purpose machinery	0.0035*	0.5164	0.6621	0.0049*	0.6817	0.7104
311	Electric motors, generators and transform	0.0029*	0.4990	0.7598	0.0051*	0.4939	0.7714
361	Furniture	0.0035*	0.4313	0.6371	0.0056*	0.6517	0.7337
	S^2_{YX} **Statistics**	AVG	MIN	MAX	AVG	MIN	MAX
		0.3471	0.0046	0.5588	0.4172	0.0060	0.6753

$G_{i,t} = c + \alpha P_{i,t} + u_i + \epsilon_{i,t}$

		ITALY			FRANCE		
NACE	Sector	$\hat{\alpha}$	S^2_{YX}	R^2	$\hat{\alpha}$	S^2_{YX}	R^2
171	Preparation and spinning of textiles	0.6340*	0.0545	0.2449	0.7440*	0.0923	0.2546
172	Textiles weaving	0.5265*	0.0478	0.2943	1.0546*	0.0923	0.2890
175	Carpets, rugs and other textiles	0.4540*	0.0553	0.3291	1.1378*	0.1048	0.2419
182	Wearing apparel	0.1096*	0.0147	0.3138	0.5653*	0.0757	0.2550
193	Footwear	0.8679*	0.1056	0.2997	1.3384*	0.1159	0.2207
212	Articles of paper and paperboard	0.7236*	0.0747	0.2582	0.5924*	0.0318	0.1946
221	Publishing	0.1706*	0.0121	0.2939	0.0429*	0.0068	0.1875
222	Printing	0.6643*	0.1376	0.3542	0.7332*	0.0438	0.1695
241	Production of basic chemicals	1.4128*	0.3470	0.3491	0.5441*	0.1165	0.1627
244	Pharma., med. chemicals, botanical prod	1.0134*	0.1213	0.4519	0.3796*	0.0829	0.2632
246	Other chemical products	0.8846*	0.2527	0.4737	0.6959*	0.0873	0.2203
252	Plastic products	0.8717*	0.1263	0.2904	0.5802*	0.0285	0.1761
266	Concrete, plaster and cement	0.4693*	0.0200	0.2790	0.8573*	0.0627	0.2035
281	Structural metal products	0.8370*	0.0684	0.3142	1.1263*	0.0544	0.1998
284	Forging, pressing, stamping, of metal	0.8923*	0.1239	0.2989	0.9334*	0.0926	0.2110
291	Machinery for prod. & use of mech. power	0.8954*	0.1487	0.3153	0.8816*	0.0979	0.2170
292	Other general purpose machinery	0.8271*	0.0701	0.2553	1.0287*	0.0832	0.1678
294	Machine tools	0.6543*	0.0382	0.2998	1.1168*	0.1029	0.3195
295	Other special purpose machinery	0.9698*	0.0828	0.2307	1.0194*	0.0995	0.1849
311	Electric motors, generators and transform	0.7281*	0.0628	0.3965	1.0876*	0.1020	0.2356
361	Furniture	0.6915*	0.0546	0.2846	1.0099*	0.0960	0.2312
	S^2_{YX} **Statistics**	AVG	MIN	MAX	AVG	MIN	MAX
		0.1032	0.0095	0.3470	0.0699	0.0000	0.1388

Summing up on panel models

Results confirm conclusions from non-parametric analysis:

- Productivity is robustly associated with Profitability
- Weak link between Productivity and Growth
- Weak link between Profitability and Growth

The explanatory power of the economic regressor considered tends to be much lower than the one associated with the unobserved idiosyncratic characteristics of the firm.

No significant variations across 3-Digit industries. Distribution of estimated S^2_{YX} coefficients do not differ across classes identified by taxonomies on ICT-intensity, labour force composition and Pavitt's patterns of innovation.

Conclusions

Robust evidence on weak efficiency of selection/reallocation mechanisms in both Italian and French manufacturing:

- Productivity-profitability is the only robust link
- Weak relation between productivity and growth
- Weak relation between profitability and growth
- High relevance of idiosyncratic factors beyond firm productivity, profitability, industrial and technological sectoral specificities.

Policy implications

- Transmission mechanism: how and to what extent profits are translated into growth and technical advantages into profits.
- Effectiveness of competition in selecting desirable economic entities
- What drives the accrual of productive capacity: market reallocation seems to have a minor impact.