The causes and consequences of going public

Firm-level evidence from 12 European countries

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In honor of A. Generale

Disclaimer

The views expressed here are those of the speaker only and do not necessarily represent those of the Bank of Italy

Motivation

- Extensive *theoretical* literature on factors affecting IPO decision
- However, *empirical* evidence still limited
- Information on privately-held firms is generally not available
- Two notable exceptions
  - **Pagano, Panetta, Zingales** (JoF, 1998, PPZ): 2181 private Italian companies , 69 IPOs, 1982-92
  - **Chemmanur, He, Nandy** (RFS, 2010, CHN). Plant-level info on US manufacturing firms (1972-2000); 950k firm-year obs

This paper

- Analyze IPO decision using a firm-level database for European companies (Amadeus, BvD) not yet used in this context
  - Including info on firms remaining private
  - 12 EU countries between 1995-2003
  - ~175,000 firms; >1,500 IPOs
- First multi-country study
  - Exploit cross-country variability in institutional characteristics to shed new light on IPO determinants
  - Information standardized and highly comparable across countries
- First large-sample analysis of IPO determinants for European firms

Benefits of IPOs…

- Widen the sources of funding and increase investment and market share, innovation, M&As
  - Chemmanur and He, 2011; Carpenter and Pedersen, 2002; Acharya and Xu, 2017; Celikyurt *et al*., 2010
- Reduce leverage and bank dependence
  - PPZ, 2008
- Shareholders' portfolio diversification and change of control
  - Pagano, 1993; Zingales, 2005
- Window of oppotunity / IPO waves
  - Ritter, 1984; Pastor and Veronesi, 2005; Chemmanur and He, 2011

… & costs of IPOs

- Adverse selection and IPO underpricing
  - Leland and Pyle, 1977; Chemmanur and Fulghieri, 1999
- Fixed costs of listing
  - Ritter, 1987; Lee *et al*., 1996
- Loss of confidentiality and disclosure to the tax autority
  - Yosha, 1995; PPZ, 1998
- Loss of managers' decision-making autonomy
  - Boot et al., 2006

What we do

- *Ex-ante* analysis
  - Which firm characteristics affect the likelihood of an IPO?

- *Ex-post* analysis
  - How do public companies' perform relative to firms that remain private?

  - Baseline regression for all countries
  - Country-by-country extension
  - Borrow the methodology from PPZ (1998) and CHN (2010)

Overview of the results (1/2)

1. Size is positively related to the probability of IPO
   - Less so in countries where more info production / in «new» markets
   - ➢ Asymmetric information important obstacle for SMEs

2. IPO firms reduce leverage, bank dependence and diversify investment
   - Ex ante: IPOs more likely in riskier industries
   - Ex-post: higher equity & lower debt; lower share of bank debt
   - Ex-post: higher financial assets, intangibles, lower stake of controlling shareholder

3. IPOs tend to occur during «hot market» periods
   - Ex ante: IPOs more likely in industries with high MTB ratio and when other firms do so

Overview of the results (2/2)

4. IPOs firms exhibit operating underperformance
   - Ex post: ROA declines
   - «Classical» result in IPO literature (e.g. Jain and Kini, 1994)
5. Broadly consistent picture across EU countries…
   - Size important determinant for most countries; in no country IPO firms expand in the long run
   - PPZ (1998): adverse selection; financial factors; bargaining position with banks
6. …and with the US (CHN, 2010)
   - IPO decision is affected by product market characteristics
   - private firms facing less information asymmetry are more likely to go public
   - IPOs occur at peak of profitability cycle

Rest of the talk

- The data
- The empirical strategy
  1. Ex-ante analysis
  2. Ex-post analysis
- Conclusion

The dataset

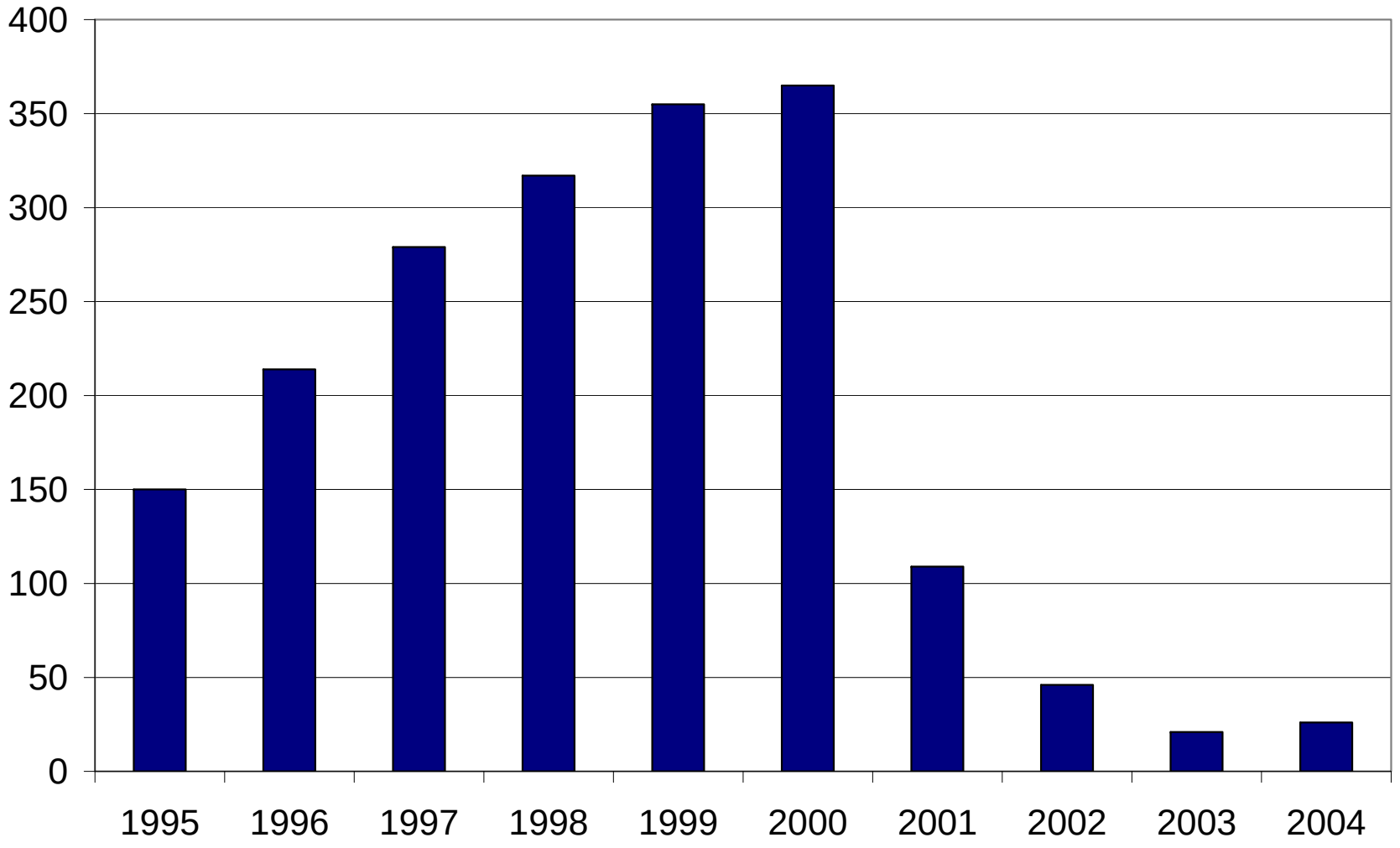
Two main sources of data

- AMADEUS-BVD TOP200,000
  - √ +200,000 NFCs from 36 European countries; 26 balance-sheet and 26 income-statement items
  - √ Many countries; comparable data; best accounting practices
  - x Medium and large size firms
  - x Unbalanced coverage across countries
- IFR-Thomson Financial: IPO information
  - 10,000 equity operations in the main industrial countries since 1991
  - Info on IPO year and market (New *vs* traditional)

Final sample

- 12 EU countries
  - AT, BE, DE, FR, ES, IT, IE, GR, UK, PT, NL, FI
- Estimation period: 1995-2004; yearly data
- 176,437 companies and 747,378 firm-year observations
- 1,541 IPOs

Number of IPOs, All countries



Summary statistics

Whole Sample

	N	Median	Mean	Std Dev	p10	p90
Assets (€mln)	861,868	16.73	102.70	1,206.88	3.74	126.83
Sales (€mln)	799,135	21.24	81.16	542.85	6.69	115.17
Inv / $Assets_{t-1}$	629,248	0.19	0.41	0.86	-0.03	0.97
ROA	764,187	0.09	0.11	0.12	0.00	0.24
Sales growth	613,752	0.07	0.14	0.42	-0.14	0.43
Leverage	760,051	0.59	0.58	0.28	0.19	0.94

IPO Sample

	N	Median	Mean	Std Dev	p10	p90
Assets (€mln)	14,747	61.30	751.23	4,266.89	11.66	902.62
Sales (€mln)	14,282	42.29	450.31	2,360.44	5.92	544.00
Inv / $Assets_{t-1}$	11,129	0.24	0.55	1.13	-0.07	1.36
ROA	13,476	0.10	0.10	0.13	-0.02	0.25
Sales growth	10,935	0.11	0.24	0.57	-0.16	0.70
Leverage	13,792	0.42	0.43	0.26	0.11	0.76

Empirical strategy

1. Ex-ante analysis
   - Probit estimation of the probability of IPO

2. Ex-post analysis
   2. Compare public firm performance to performance of firms remaining private

Ex-ante analysis: baseline regression

$$\Pr(IPO_{i,t} = 1) = \Phi(aX_{i,t-1} + \beta Country_{j,t} + \gamma Sector_{s,t} + \eta_t YEAR_t)$$

- Each firm *i* is in country *j* and Sector *s*
- $X_{t,i}$ = firm characteristics =>next slide
- $Country_{j,t}$ and $Sector_{s,t}$ include also FEs
- Dependent var:

num. impresa	anno	anno_quo	**ipo**
164830	1995	1999	**0**
164830	1996	1999	**0**
164830	1997	1999	**0**
164830	1998	1999	**0**
164830	1999	1999	**1**
164830	2000	1999	**.**
164830	2001	1999	**.**
164830	2002	1999	**.**

Ex-ante analysis: explanatory variables

- Firm-level *(i,t)*
  - Size [log of sales]
  - Capital expenditure [*Gross fixed investment / fixed assets*]
  - Sales growth
  - ROA
  - Leverage [*book value of debt/(debt+ equity)*]
  - Bank debt [*as a ratio to total financial liabilities*]
- Sector level (*s,t*)
  - Hi-tech industry dummy
  - Industry market-to-book (MTB) ratio
  - Industry riskiness [*cross-sectional std dev of ROA in industry s*]
- County level (*j,t*)
  - Stock market capitalization [*as a ratio to GDP*]
  - Number of IPOs at t-1
  - Size of institutional investors [*total assets of Inst. Inv. to GDP*]

Ex-ante (1). Baseline regression

Variable	**Baseline regresison**	**Including banking variables**
Size	0.000244***	0.000238***
Capital expenditure	0.000116***	0.000125***
Sales growth	0.000302***	0.000401***
Return on assets	0.00117***	0.00146***
Leverage	-0.000705***	-0.000781***
Share of bank debt		2.91e-05**
Intangibles		3.07e-05***
Hi-tech dummy	0.00131***	0.00103***
Industry market-to-book ratio	1.99e-05***	7.03e-05***
Country's stock market capitalization	0.000294	-0.000952***
Industry riskiness	0.00959***	0.0185***
Number of IPOs at t-1	0.000226**	0.000117**
Observations	422,770	403,524
FE	Time, industry, country	Time, industry, country
Clustering SE	Country*Sector	Country*Sector
Pseudo R2	0.117	0.0917
Observed Prob.	0.00140	0.00131

Ex-ante (2). Exploring the role of size

	Baseline regression	Adding Institutional Investors-to-GDP ratio	Baseline regression: only New Markets	Adding country market cap
Size (sales)	0.000244***	0.000416***	-1.18e-05	0.000422***
Size * Institutional Investors/GDP		-0.000177***		-0.000140**
Size * Country Market Cap				-5.55e-05
Institutional Investors/GDP		0.000105		-2.47e-05
		Same controls as in baseline regression		
Observations	422,770	422,770	352,951	422,770
Fixed effects	Time, industry, country	Time, industry, country	Time, industry, country	Time, industry, country
Clustering SE	Country*Sector	Country*Sector	Country*Sector	Country*Sector
Pseudo R2	0.117	0.119	0.167	0.119
Observed Prob.	0.00140	0.00140	0.000300	0.00140
Predicted Prob.	0.000619	0.000611	6.54e-05	0.000610

Ex-ante analysis: summing up

- The probability of IPO is positively related to size
  - Asymmetric info problems for SMEs
- IPO firms have higher investment, growth and ROA
  - Consistent with IPO as a means to finance growth
- IPOs more likely for bank-dependent firms and in riskier industries
  - Diversification motive?
- IPOs more likely when other firms do so
  - …and in industries with higher MTB ratio
  - «IPO waves»

Ex-ante analysis: further robustness checks

- Alternative definitions of size and growth
- Exclusion of single variables or countries
- Cox-regression, using pooled time series data
- Drop the *dot-com bubble* (1998-2000) period
- Use only the sample of "eligible" firms
  - assets>1mln and age>3y
  - drop firms with negative profits ($ROA_{t-1}>0$)

Ex-post analysis

- Fixed-effects linear regression:

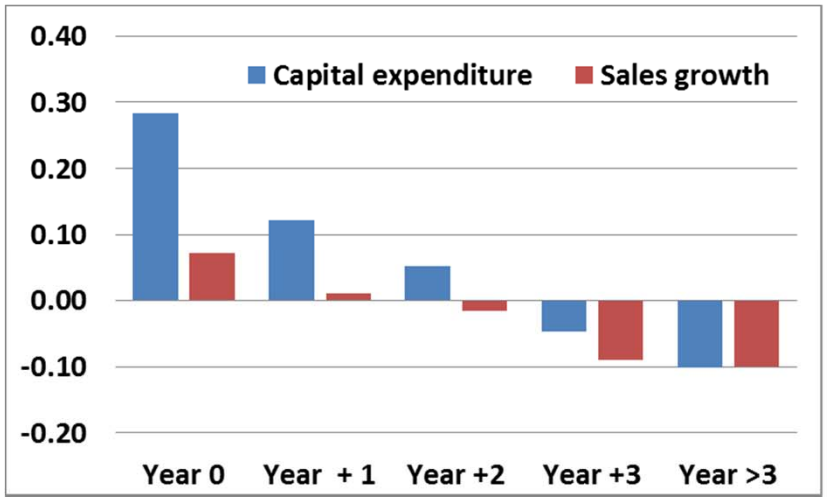
$$y_{i,t} = \alpha + \sum_{j=0}^{3} \beta_j IPO_{i,t}^{t-j} + \beta_4 IPO_{i,t}^{t-n} + u_i + d_t + \varepsilon_{i,t}$$

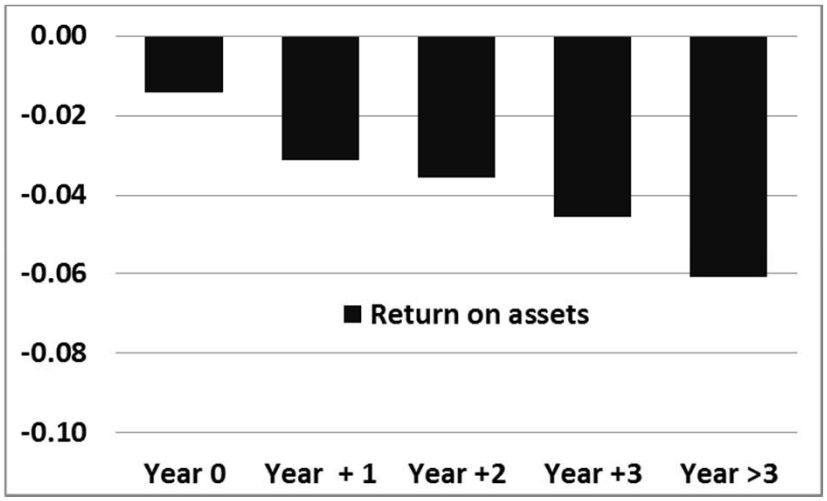
- $Y_{i,t}$ = [ROA, Investment, Sales growth, leverage, debt, bank debt, equity, taxes, financial assets, intangibles, share of first shareholder]
- $IPO^{t-j}_{i,t}$= dummy if IPO at year t-j; j={1,2,3,>3}
- Time (d_t) and firm (u_i) fixed effects

Ex-post results

Investment sales and profitability

Variables	Year 0	Year + 1	Year +2	Year +3	Year >3	No. Obs.
Capital expenditure	**0.284** ***	**0.122** **	0.0518	-0.0468	**-0.102** **	690,436
Sales growth	**0.0706** ***	0.0109	-0.0168	**-0.0902** ***	**-0.0995** ***	673,537
Return on assets	**-0.0143** **	**-0.0312** ***	**-0.0357** ***	**-0.0456** ***	**-0.0609** ***	900,673

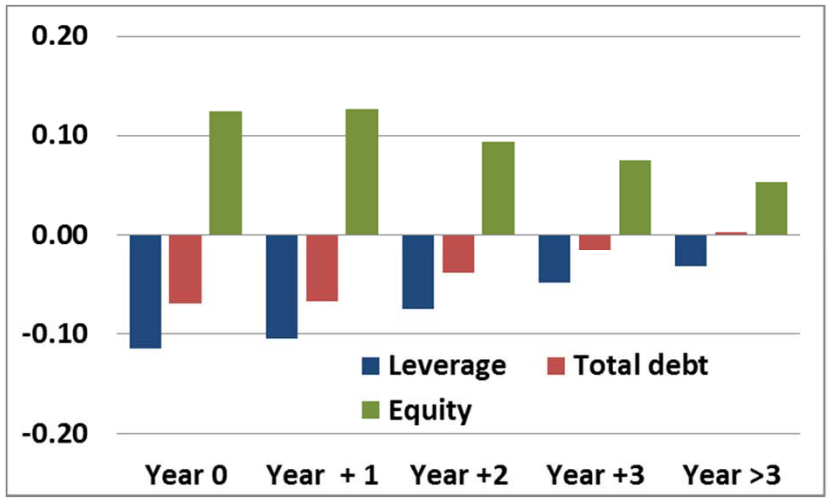


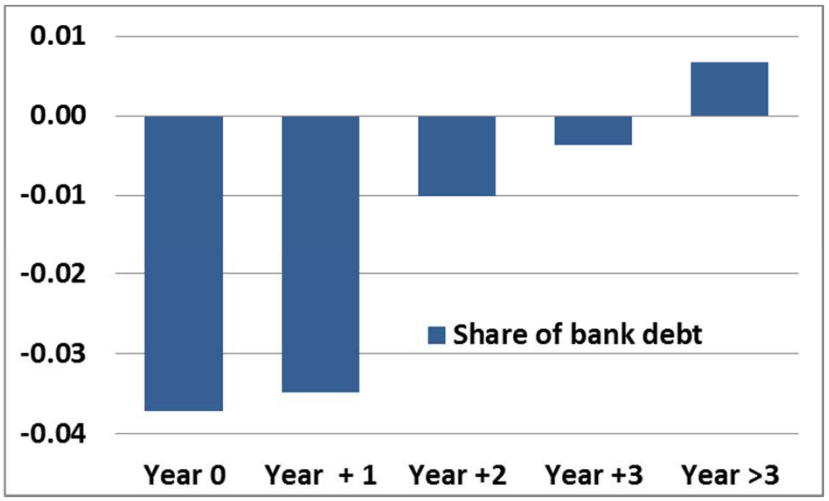


Ex-post results

Leverage and debt

Variables	Year 0	Year + 1	Year +2	Year +3	Year >3	No. Obs.
Leverage	**-0.115** ***	**-0.105** ***	**-0.0749** ***	**-0.0483** ***	-0.0324	691,219
Total debt	**-0.0695** ***	**-0.0679** ***	**-0.0388** **	-0.0157	0.00259	698,738
Share-holders' equity	**0.125** ***	**0.127** ***	**0.0942** ***	**0.0747** ***	**0.0531** **	747,331
Share of bank debt	**-0.0372** ***	**-0.0348** **	-0.0102	-0.00377	0.00608	704,677

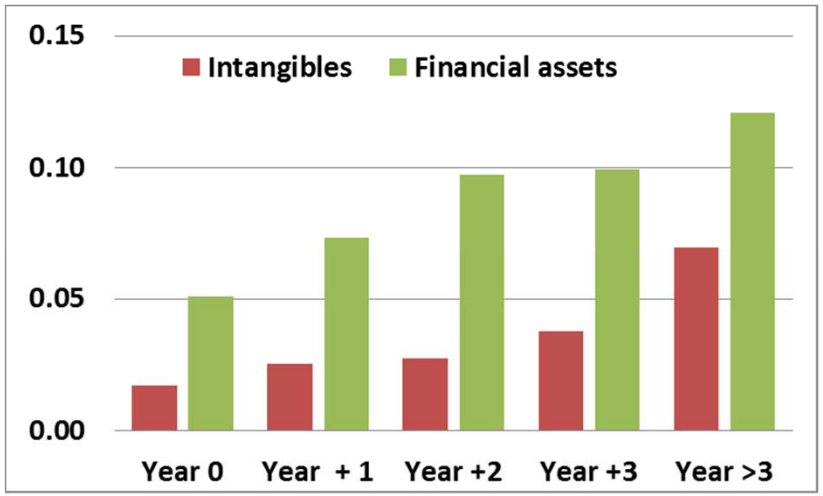


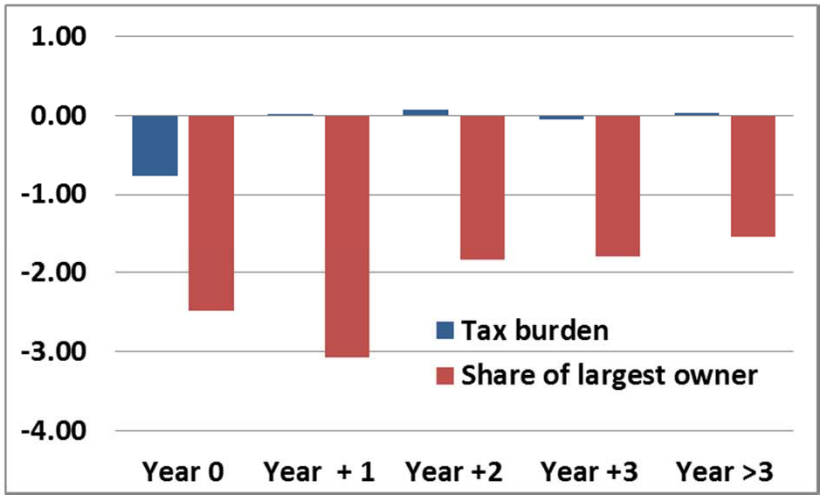


Ex-post results

Diversification and tax burden

Variables	Year 0	Year + 1	Year +2	Year +3	Year >3	No. Obs.
Share of largest owner	**-2.476** ***	**-3.069** ***	**-1.838** **	**-1.795** **	-1.538	366,321
Intangibles	**0.017** ***	**0.0254** ***	**0.0274** *	**0.0376** **	**0.0699** **	698,909
Financial assets	**0.0509** ***	**0.0734** ***	**0.0975** ***	**0.0995** ***	**0.121** ***	724,708
Tax burden	-0.0763	0.0106	0.0737	-0.0514	0.0264	743,896





Ex-post analysis: summing up

- Long-run investment, sales growth and ROA decline
  - IPO has little effect on firm production and growth
  - IPO «operating underperformance»
- Equity increases and (bank) debt decline
  - IPOs strengthen financial position and reduce bank dependence
- Main shareholder’s share decline; financial assets increase
  - Original owners diversify investment
- No evidence of increase in the tax burden
  - Not consistent with fear of incrase in visibility to the tax authority

Ex-post analysis
Robustness checks

- Propensity score matching method
- Control by size
- Decline in ROA not affected by accounting manipulation
  - Use ROS instead of ROA
  - Check Asset growth
  - No significant difference between high- and low corporate disclosure countries
  - Use ROA percentiles instead of levels
- Results hold if re-run on a sample matched on size and industry

Country-by-country regressions

Overall consistent picture across EU countries

- Ex-ante
  - Size important in most countries
  - Ex-ante higher growth increases IPO probability

- Ex-post
  - In none of the countries investment and sales growth increase in the long-run; ROA declines in all countries
  - Leverage decreases everywhere except Spain
  - Reduction of bank dependence driven by GR and IT

Concluding remarks

- First multi-country and large-sample study of IPO determinants in Europe
  - Dataset with info on private companies for 12 EU countries
- Large firms are more likely to go public reflecting adverse selection
- IPO firms reduce investment and production and deleverage
- With IPOs owners diversify their investment

➢ Results underscore importance of removing obstacles for small, fast-growing firms => positive effects on the real economy

Thanks