Corporate income taxation, entrepreneurial firm leverage, and growth dynamics

Marco Da Rin
Tilburg University

Marina Di Giacomo
University of Turin

Alessandro Sembenelli
University of Turin and CCA

Outline of the presentation

- Motivation
- Literature
- Preview of the results
- Data sources and sample construction
- Descriptive evidence
- Econometric results
- Future agenda

Motivation

- The creation of new firms is a fundamental force for economic growth: innovation, productivity, competition, employment
- Economic policy puts entry of new companies high on the agenda
- Corporate taxation is known to affect entry rates and entrants' characteristics
- From our previous work
  - higher corporate income taxation decreases entry (Da Rin, Di Giacomo, Sembenelli (J. Pub. Ec. 2011))
  - but also leads to larger entrants (Da Rin, Di Giacomo, Sembenelli (JEEA 2010))

Motivation

- Financial decisions at entry are likely to affect long term firms' prospects. In particular we ask whether:
  - Corporate taxation affects leverage of newly incorporated companies
  - What are the long-term effects of initial leverage on company survival/growth
- Broader research agenda on:
  - Effects of taxation/regulation on entry and corporate growth
  - Effects of taxation on leverage dynamics of private companies
  - Entrepreneurial firm dynamics

Literature

- We build on two strands of recent empirical literature on listed firms:
- The long-term dynamics of leverage
  - Lemmon, Roberts and Zender (JF 2008)
  - De Angelo and Roll (JF *forthcoming*)
- The effect of various forms of taxation on leverage
  - Faccio and Xu (JFQA *forthcoming*)

Preview of the results

- Corporate income taxation at entry has a positive relation with (a positive effect on) initial leverage
  - A 10% increases in taxation causes initial leverage to increase by 0.63-3.65 pp
- Initial leverage has a negative relation with (a negative effect on) survival and conditional growth
  - Conditional on suvival a 1 pp increase in leverage at entry causes lower size after 9 years by slightly more than 0.75%

Data sources and sample

- We obtain our data from two main sources:
  - Data on companies from the Amadeus database by Bureau van Dijk (BvD)
  - Data on taxation from Ernst&Young (E&Y)

Data: Companies

- The analysis is based on the 2009 and 2001 December issues of the BvD database
- We use the following criteria:
  - 38 two-digit Industries: manufacturing and industry-related services
  - 12 European Countries: EU15 except A, DK, Lux
  - Companies that incorporated in 1998 to 2001, followed for 9 years
  - Total 1.2m companies, fairly evenly distributed across the 4 years the 12 EU countries

Data: Companies

- We focus on:
  - firms with available data on total assets and leverage at entry;
  - conditional on data availability, firms with total assets at entry above the median
- Total 0.21m companies, fairly evenly distributed across the 4 years but not across the 12 EU countries

Table 2: Country coverage

	All Entrants		Final Sample	
Country	Firms	%	Firms	%
Belgium	55,750	*4.77*	19,100	*9.12*
Finland	14,432	*1.24*	227	*0.11*
France	125,830	*10.77*	40,919	*19.53*
Germany	156,044	*13.35*	938	*0.45*
Greece	4,184	*0.36*	2,900	*1.38*
Ireland	23,361	*2.00*	3,342	*1.60*
Italy	144,501	*12.37*	13,483	*6.44*
Netherlands	40,919	*3.45*	7,133	*3.40*
Portugal	57,923	*4.96*	2,890	*1.38*
Spain	201,808	*17.27*	48,514	*23.16*
Sweden	30,625	*2.562*	9,608	*4.59*
UK	313,169	*26.80*	60,464	*28.86*
Total	1,168,546	*100.00*	209,518	*100.00*

Data: Leverage

- Key variable is leverage
- We use two definitions:
  - Financial Leverage (FinLev):

    (non-current + loans)/(non-current + loans + total shareholders' funds)

  - Leverage (Lev):

    (non-current + curren)/(non-current + current + total shareholders' funds)

Descriptive evidence on leverage

- Substantial mass at zero for financial leverage. Reality or aggregation problem?
- Decreasing trend and mild "convergence from above" for all leverage measures
- High persistence. Entrants above (below) the median are found to stay above (below) the median over time

Table 4: Distribution of initial leverage

	Mean	St.Dev.	Q1	Median	Q3	Obs.
FinLev(1)						
1998	.415	.376	0	.379	.793	38,927
1999	.424	.380	0	.400	.807	48,669
2000	.407	.381	0	.351	.797	58,657
2001	.419	.382	0	.379	.810	63,265
Total	.416	.380	0	.377	.802	209,518
Lev(1)						
1998	.753	.254	.648	.844	.942	38,181
1999	.758	.253	.657	.851	.944	47,594
2000	.754	.256	.649	.848	.945	57,134
2001	.772	.245	.679	.863	.952	61,518
Total	.760	.252	.660	.852	.946	204,427
FinLev(1) – restricted						
1998	.501	.359	.117	.559	.842	18,994
1999	.513	.361	.122	.584	.853	24,710
2000	.499	.366	.085	.562	.849	28,698
2001	.519	.363	.131	.593	.862	28,311
Total	.509	.363	.112	.576	.853	100,713

Graph 1. Leverage dynamics over time

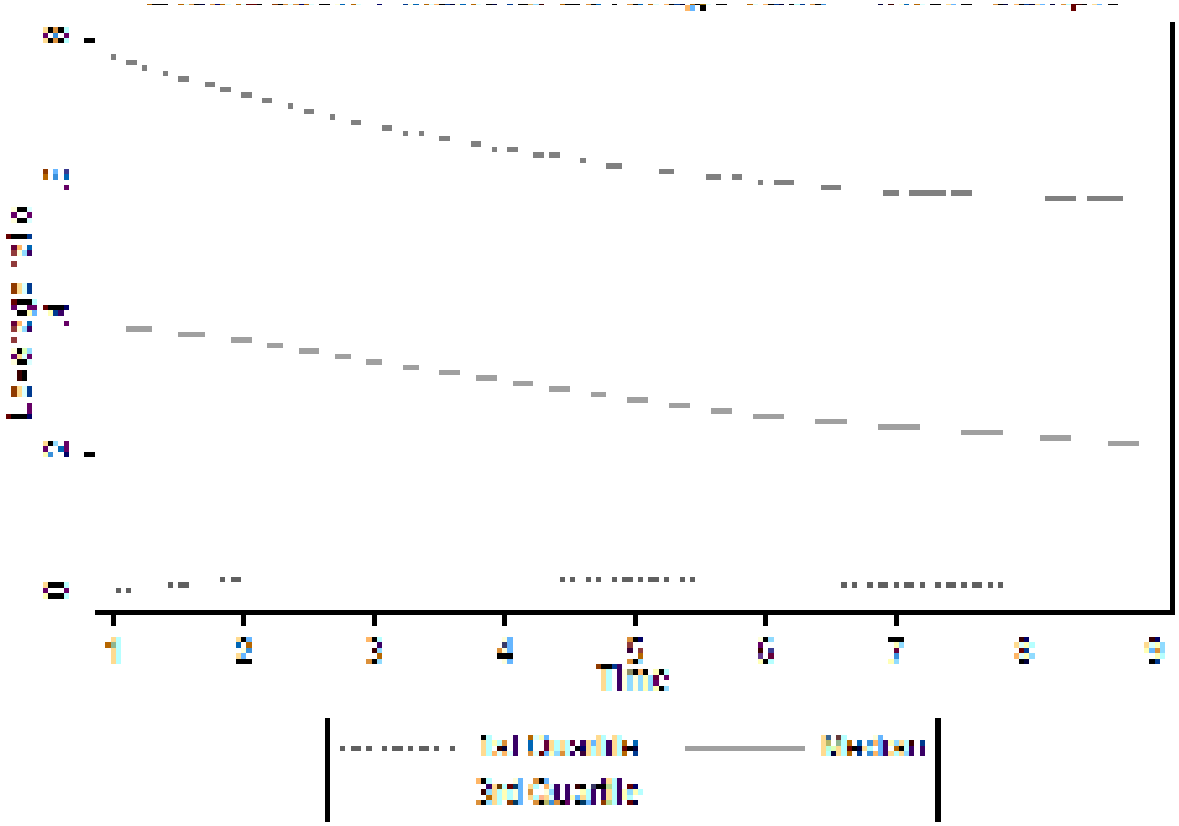


Table 5: Persistence in leverage ratio levels over time

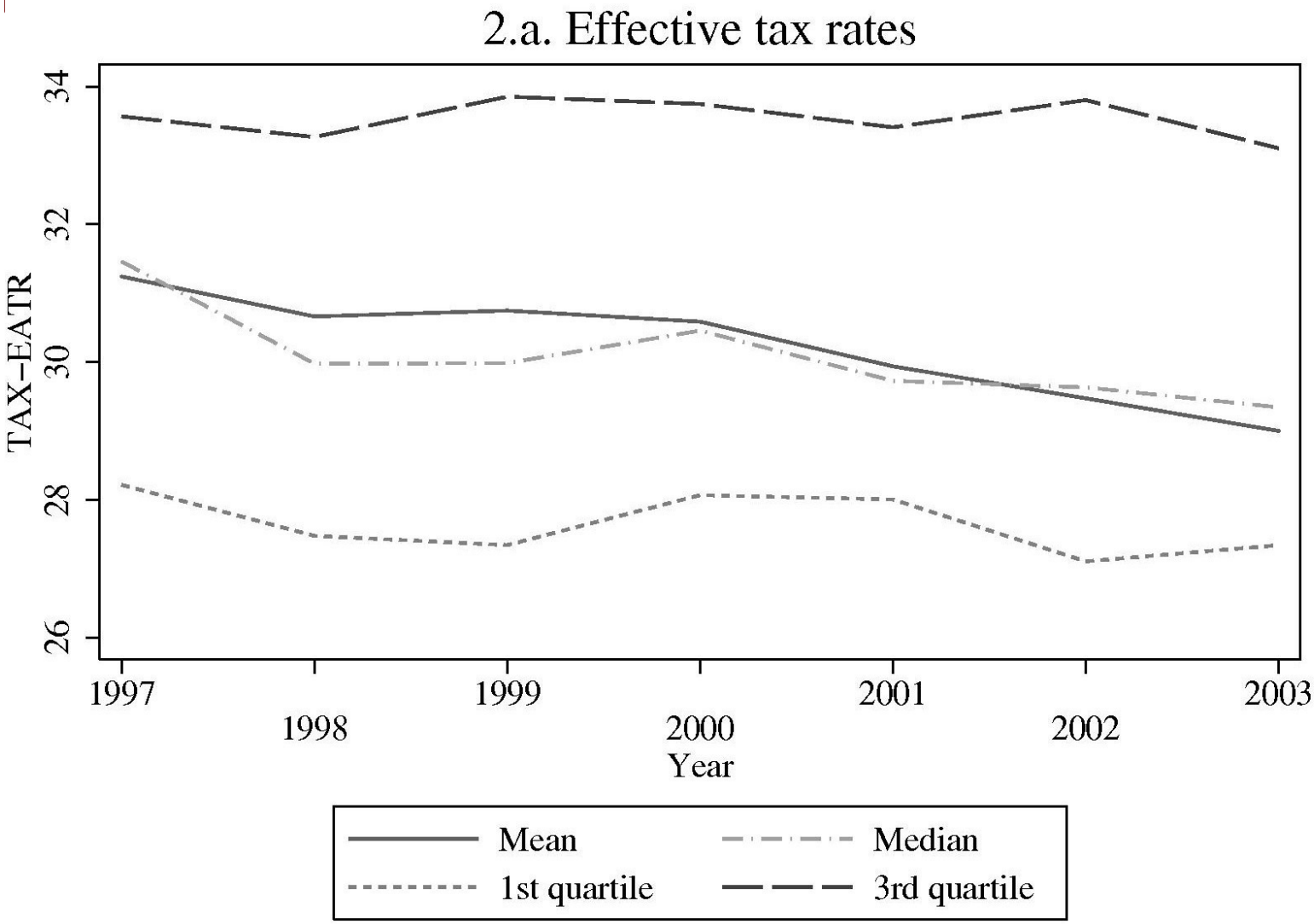
Years from	FinLev		Lev		FinLev–Restricted	
incorporation	Firms	%	Firms	%	Firms	%
1	43,639	100	43,364	100	13,520	100
2	37,169	85.2	36,569	84.3	11,290	83.5
3	34,640	79.4	34,104	78.6	10,443	77.2
4	32,963	75.5	32,336	74.6	9,937	73.5
5	31,564	72.3	31,024	71.5	9,494	70.2
6	30,378	69.6	30,046	69.3	9,050	66.9
7	29,522	67.7	29,183	67.3	8,818	65.2
8	28,952	66.3	28,562	65.9	8,612	63.7
9	28,500	65.3	27,999	64.6	8,439	62.4

Data: Taxation

- Our aim is obtaining a meaningful measure of actual corporate taxation. Not a trivial task
  - The statutory corporate tax rate does not incorporate any information on the tax base
  - The ratio of tax payments to taxable income reflects the effect of taxation on past corporate decisions
  - "Effective" tax measures have been proposed as forward-looking measures that overcome the above limitations (King and Fullerton (1984))

Data: Taxation

- Devereux and Griffith (1998) propose a methodology to build the effective average tax rate (TAX-EATR) relevant in corporate decision making
- TAX-EATR is defined as the fall in the rate of return of an investment created by corporate taxation. It accounts for industry characteristics


2.a. Effective tax rates
TAX–EATR
26
28
30
32
34
1997
1998
1999
2000
2001
2002
2003
Year
Mean
Median
1st quartile
3rd quartile

Methodology

- Bernoulli quasi-ML estimator proposed by Papke and Wooldridge (1996) to take into account the fractonal nature of our leverage variables
- Two-step Heckman estimator allowing sample selection and other causes of endogeneity of the leverage variables in our growth equation
  - "Active ratio" as proposed solution for sample selection.
  - "Generalized residuals" as proposed solution for other causes of endogeneity, including unobserved quality

Methodology

- Active Ratio
  - The share of active firms with no accounting data over the total number of active firms in a particular country-year couple
  - This variable is expected to enter the selection equation (availability of information on assets after nine years) but not the primary equation (the level of assets after nine years)
- Generalized residuals
  - Corporate taxation at entry affects assets after nine years (conditional on initial assets) only through the choice of initial leverage

Table 6: Leverage Equations

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable:			FinLev(1)		Lev(1)	FinLev(1)–Restr.
Size(1)	0.102***	0.043***	0.102***	0.042***	-0.067***	0.035***
	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
EATR(1)	0.979**	0.772*	26.153***	25.735***	15.787**	19.617***
	(0.43)	(0.46)	(7.52)	(6.61)	(6.79)	(6.79)
EATR(1)-SQ			-3.710***	-3.688***	-2.109**	-2.865***
			(1.10)	(0.96)	(1.00)	(1.01)
Tangibility(1)		0.628***		0.625***	-0.136	0.880***
		(0.20)		(0.20)	(0.17)	(0.08)
Profitability(1)		-0.789***		-0.795***	-0.786***	-0.889***
		(0.09)		(0.09)	(0.12)	(0.11)
Constant	-4.464***	-2.979**	-47.154***	-45.212***	-28.143**	-33.789***
	(1.43)	(1.55)	(12.90)	(11.38)	(11.70)	(11.46)
Observations	209,518	153,442	209,518	153,442	150,866	89,910
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Incorp. Year Dum.	Yes	Yes	Yes	Yes	Yes	Yes
AIC	232,464	166,463	232,324	166,341	122,892	93,456
BIC	233,039	167,040	232,908	166,928	123,478	94,011
Deviance	146,045	96,071	145,902	95,947	44,223	48,052
Distribution of Marginal Effects for EATR						
Mean	0.365	0.287	0.212	0.063	0.344	0.002
Std. Dev.	0.031	0.027	0.287	0.299	0.158	0.238
Q1	0.350	0.279	-0.054	-0.174	0.235	-0.115
Median	0.376	0.297	0.264	-0.043	0.312	0.036
Q3	0.387	0.305	0.423	0.287	0.425	0.128

Table 8: Growth Equations

Panel A: Regression Estimates

	(1) OLS	(2) OLS	(3) Heckman	(4) IV–Heckman	(5) IV–Heckman
FinLev(1)	-0.163***	-0.222***	-0.221***	-0.765***	-0.769***
	(0.04)	(0.02)	(0.01)	(0.21)	(0.23)
Size(1)	0.840***	0.850***	0.850***	0.859***	0.859***
	(0.02)	(0.01)	(0.00)	(0.01)	(0.01)
Profitability(1)		0.175***	0.173***	0.033	0.032
		(0.05)	(0.03)	(0.07)	(0.07)
Tangibility(1)		0.083***	0.082***	0.216***	0.217***
		(0.03)	(0.02)	(0.05)	(0.06)
Generalized residuals(1)				0.336**	0.339**
				(0.13)	(0.14)
Constant	1.021	1.626***	1.021***	1.196***	1.199***
	(n.a.)	(0.36)	(0.06)	(0.10)	(0.10)
SELECTION EQUATION					
Active Ratio(9)			-0.024***	-0.023***	-0.023***
			(0.00)	(0.00)	(0.00)
FinLev(1)			-0.043***	-0.026**	-0.776***
			(0.01)	(0.01)	(0.22)
Size(1)			0.012***	0.011***	0.023***
			(0.00)	(0.00)	(0.00)
Profitability(1)			0.508***	0.533***	0.322***
			(0.02)	(0.02)	(0.07)
Tangibility(1)			0.266***	0.253***	0.430***
			(0.01)	(0.01)	(0.05)
Generalized residuals(1)					0.464***
					(0.14)
Constant			0.419***	0.406***	0.671***
			(0.04)	(0.04)	(0.09)
Mill's λ			-0.009	0.012	0.011
			(0.05)	(0.05)	(0.05)
sigma			1.104	1.100	1.100
rho			-0.008	0.011	0.010
R^2	0.49	0.54			
N. Obs	137,183	99,246	153,442	150,373	150,373
N. Obs. Cens.			54,196	53,093	53,093
Country Dummies	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Incorp. Year Dummies	Yes	Yes	Yes	Yes	Yes

Tentative Roadmap

- Including personal taxation (Miller Model)
- Exploring interaction with initial ownership choices, to identify channels of transmission of the effect of taxation through leverage
- Exploring the role of institutional variables, also to identify transmission channels
- Examine the effect of taxation on different components of Lev