Financial Frictions, Firm Dynamics and Employment Growth

Gorkem Ozdemir
HEC Montréal

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Introduction

Question: What is the relation between borrowing difficulties and employment growth? How:

- Recent empirical literature: Source of employment growth are new and young firms.
- Canadian firm level balance sheet data: New firm survival and employment growth

Motivation

- Job creation and destruction occur in high-growth and rapidly shrinking firms
- Those dynamic firms are mostly young
- Growing firms and young firms are more likely to require external financing
- Entrants faced financing difficulty between 2007-2011
- Share of SMEs which used external financing while starting up
    - In 2007, 51%
    - In 2011 40.9%

Young firms are important for employment growth and they face borrowing challenges

What's new

- Balance sheet of a large sample of new firms
- Dataset covering all incorporated firms from all sectors
- Relation between initial financing and survival
- Relation between initial financing and employment growth

Data

- National Accounts Longitudinal Microdata File(NALMF) 2000 - 2014
  - Covers all incorporated firms in Canada
  - Balance sheet & Employment
  - T2: Tax records
  - PD7: Employment and Remuneration
- Private business sector excluding Agriculture, Health, Education, Food & Accommodation and Other Services

Data

- Identification of entrants: First observations, birth date, incorporation date
- Excluding firms with multiple establishments: possible merges
- Min 5 years observation for each firm: 2001-2010 cohorts

Sample

Table: First and Fifth year statistics of new firms in sample

	First year		Fifth year	
Cohort	Population	Employment	Population	Employment
2001	6,150	52555	5,386	57556
2002	5,720	27190	5,082	46529
2003	5,513	72305	4,754	59254
2004	5,061	51569	4,399	63033
2005	4,418	21060	3,828	31056
2006	4,119	24783	3,571	32434
2007	4,354	24156	3,785	35092
2008	3,830	26065	3,325	39315
2009	3,897	20381	3,398	36064
2010	3,944	16407	3,345	34306
Total	47,006	336471	40,873	434639

Sample

Table: Total Employment in 2014 for firms in sample, by cohort

Cohort	Employment in 2014
2001	41203
2002	34803
2003	49275
2004	53414
2005	26317
2006	29929
2007	33454
2008	37530
2009	35590
2010	34306
Total	375821

- Within a 5 year period, roughly 15% of the new firms fail.
- The firms who do not fail, grow. Roughly by 50%.
  - Average size in first year is around 7, 5th year is around 10
- The high growth of survivors compensates for the job destructions due to exit.
- Which firms survive, which firms grow?

Empirical Strategy

- Initial financing of firms and their survival and growth: New and young firms
  - Survival model of new and young firms based on their initial financing
  - Early(5 years) growth of new and young firms based on initial financing
- Assumption: An entrepreneur would borrow the extra dollar
- Equity ratio in first year balance sheet as variable of interest

Equity Share, Survival, Growth

Table: Share of Equity, Survival and Average Employment Growth

Shareholders equity, %	Survived to Fifth year, %	Average employment growth
<10	85.6	0.194
10 to 20	89.4	0.295
20 to 30	89.3	0.293
30 to 40	88.9	0.278
40 to 50	87.9	0.238
50 to 60	88.1	0.203
60 to 70	86.7	0.126
70 to 80	84.3	0.103
80 to 90	82.6	0.0351
>90	68.9	-0.32

Survival of New Firms

Proportional Hazard function of a firm:

$$\lambda(t|X,\beta) = \lambda_0(t,\alpha)\phi(X,\beta) \tag{1}$$

$$\phi(X,\beta) = e^{X'\beta+\kappa eq_i}$$

eq_i : Share of equity in total assets at first year

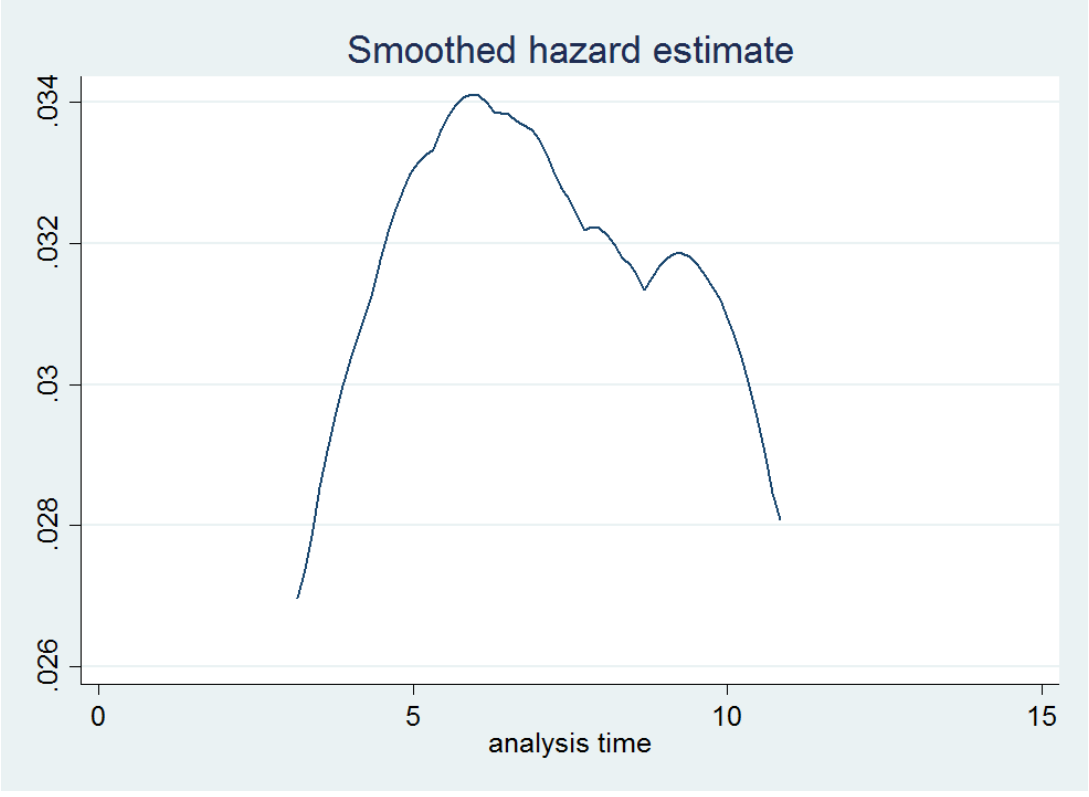

Figure: *Smoothed Estimate of the hazard function*

Survival of New Firms

Canadian firms have initially increasing, then decreasing hazard
No straightforward parametric baseline hazard would fit except lognormal/loglogistic.
To have proportional hazard instead of accelarated failure time, adopted piecewise Weibull:

$$\lambda_0(t, \alpha_1, \alpha_2) = \begin{cases} \gamma\alpha_1 t^{\alpha_1 - 1}, & \textit{if } t \leq 5 \\ \gamma\alpha_2 t^{\alpha_2 - 1}, & \textit{if } t > 5 \end{cases}$$

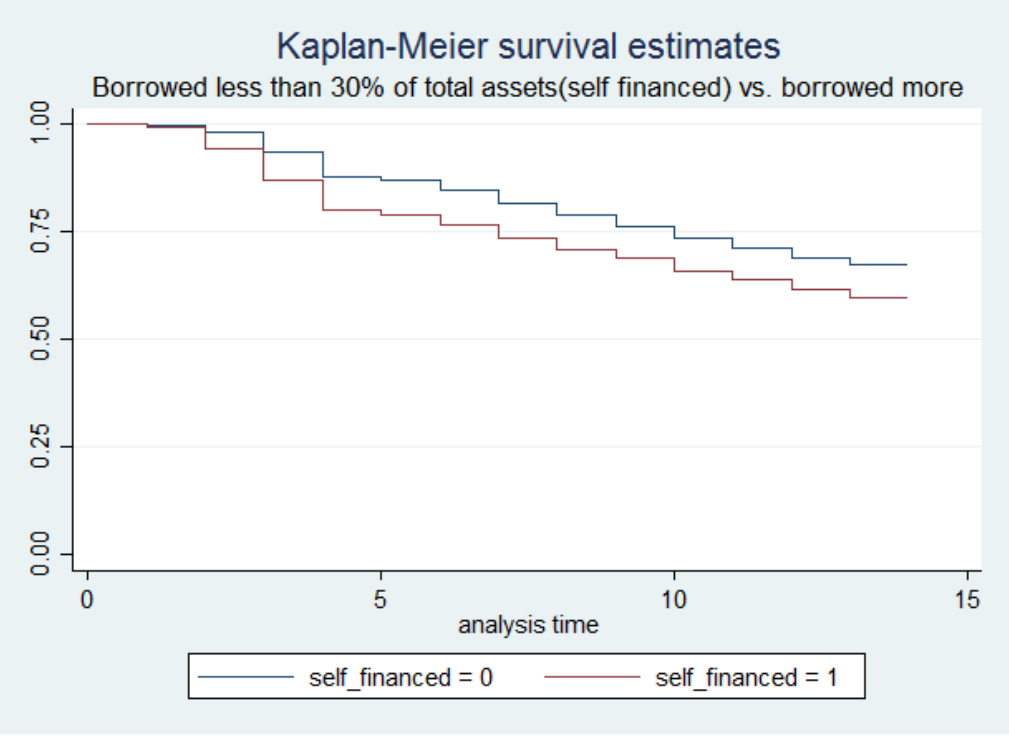

Figure: *Kaplan-Meyer survival function estimates for firms borrowed less than 30% of total assets and firms borrowed more.*

Early growth of new firms

Size and annual growth definition:

$$X_{i,t} = \frac{E_{it} + E_{i,t-1}}{2}$$

$$g_{i,t} = \frac{X_{i,t} - X_{i,t-1}}{X_{i,t}} \tag{2}$$

I will use a 5-year growth measure, instead of annual. Then the following equation will be estimated:

$$g_{i,t} = \alpha + \omega \cdot eq_i + \Lambda Z \tag{3}$$

Survival Results

Table: Weibull regression results, hazard ratios: Borrowing less than 30 %

VARIABLES	(1) Borrowed <30%
Borrowed less than threshold	1.235***
	(0.0676)
log of revenue	0.901***
	(0.0152)
log of total assets	0.853***
	(0.0166)
log of labor input	1.047*
	(0.0240)
Constant	0.260***
	(0.0836)
Observations	84,182
Sector FE	YES
First Year Size	YES
Clustered SE by Region&Sector	YES
Stratified by firstyear&young	YES

*** p<0.001, ** p<0.01, * p<0.05

Survival Results

Table: Weibull regression results, hazard ratios: different thresholds

VARIABLES	(1) Borrowed <30%	(2) Borrowed <40%	(3) Borrowed <50%
Borrowed less than threshold	1.235***	1.125**	1.041
	(0.0676)	(0.0513)	(0.0397)
log of revenue	0.901***	0.900***	0.900***
	(0.0152)	(0.0154)	(0.0156)
log of total assets	0.853***	0.850***	0.847***
	(0.0166)	(0.0169)	(0.0171)
log of labor input	1.047*	1.048*	1.047*
	(0.0240)	(0.0238)	(0.0239)
Constant	0.260***	0.276***	0.291***
	(0.0836)	(0.0891)	(0.0945)
Observations	84,182	84,182	84,182
Sector FE	YES	YES	YES
First Year Size	YES	YES	YES
Clustered SE by Region& Sector	YES	YES	YES
Stratified by Cohort & Age	YES	YES	YES

*** p<0.001, ** p<0.01, * p<0.05

Employment Growth Results

Table: First year financing and employment growth - All Sample

	(1)	(2)
VARIABLES		
shareholders equity	-0.0175***	
	(0.00370)	
Borrowed less than 30%		-0.221***
		(0.0241)
log of revenue	0.107***	0.104***
	(0.0120)	(0.0120)
log of labor input	-0.309***	-0.309***
	(0.0206)	(0.0205)
log of total assets	0.125***	0.126***
	(0.0112)	(0.0105)
Constant	-2.399***	-2.410***
	(0.205)	(0.198)
Sector FE	YES	YES
Clustered SE by Region&Sector	YES	YES
Observations	47,006	47,006
R2	0.137	0.139

*** p<0.001, ** p<0.01, * p<0.05

Employment Growth Results: Only Survivors

Table: First year financing and employment growth - Firms who survived at least 5 years

	(1)	(2)
VARIABLES		
shareholders equity	-0.0153***	
	(0.00216)	
Borrowed less than 30%		-0.101***
		(0.0122)
log of revenue	0.0769***	0.0748***
	(0.00841)	(0.00828)
log of labor input	-0.345***	-0.344***
	(0.0124)	(0.0125)
log of total assets	0.0623***	0.0652***
	(0.00703)	(0.00669)
Constant	-0.753***	-0.804***
	(0.0999)	(0.0980)
Sector FE	YES	YES
Clustered SE by Region&Sector	YES	YES
Observations	40,820	40,820
R2	0.280	0.279

*** p<0.001, ** p<0.01, * p<0.05

Conclusion

- Analysis of employment growth with balance sheet variables at large firm level dataset
- Relation of initial financing with survival and early growth.
- Early results are promising in the direction that financial frictions may have harmed employment growth