

Post-Entry Struggle for Life and Pre-Exit Shadow of Death from a Financial Perspective

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2012 Comparative Analysis of Enterprise (Micro) Data

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Dynamic Adjustment Post-entry and Pre-exit

- Troske (JLawEcon, 1996) Dynamic employment adjustment to exit/from birth.
- Most studies look at post-entry behaviour
Selection \Rightarrow growth/exit rates tend to fall with age.
- Dunne, Roberts, & Samuelson (QJE, 1988): entry and exit are highly correlated.
- Important to focus on pre-exit dynamics in addition to post-entry dynamics.

Financial Leverage on Firm Performance

- Geroski (IJIO, 1995) “What do we know about entry?”
- Little is known about financial factors such as leverage.
- Why do we care about financial decisions in firm dynamics
 - Cooley & Quadrini (AER, 2001)
 - Albuquerque & Hopenhayn (REStud, 2004)
 - Miao (JF, 2005).
- Lack of **Financial data on small, young and private firms** ⇒ **T2LEAP.**

GOAL of study is to look post-entry/pre-exit with a focus on financial leverage.

T2LEAP Database

Statistics Canada merged two administrative datasets (1985-1997):

- 1 Revenue Canada corporate T2 tax files (T2),
 - 2 Longitudinal Employment Analysis Program (LEAP) T4s.
- Universe of firms filing tax return and hiring employees.
 - Business Number (BN) ensures no false birth/deaths.
 - Observe both Year of Entry and Exit.
 - Information in database includes:
 - Employment (ALU), Sales, Assets, Equity and Debt.
 - 1980 SIC identifier: Study focuses on manufacturing firms.
 - Firm Leverage (debt-to-asset ratio).
 - labour productivity (YN).

Fitness Measures: Relative and Growth

Troske (JLEO, 1996) proposes to use relative variable measure:

$$\hat{X}_{ijt} = X_{ijt} / \bar{X}_{jt} \quad (1)$$

where \bar{X}_{jt} is the average value of X in two-digit industry j at time t and \hat{X}_{ijt} is the relative value of variable X for firm i .

Eliminate any time and industry specific differences.

Growth of variable X is calculated as the change in its logarithm value across years or:

$$\Delta \ln(X_{ijt}) = \ln(X_{ijt+1}) - \ln(X_{ijt}). \quad (2)$$

Empirical Framework

We estimate the following relationship:

$$\hat{X}_{ijt} = \beta z_{ijt} + \alpha_i + e_{ijt}, \quad (3)$$

where:

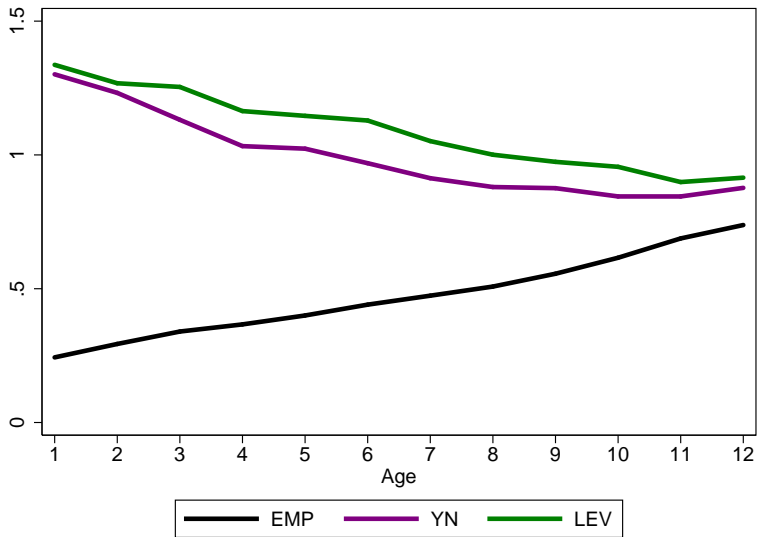
- Post-entry: z_{ijt} includes age dummy variables, two-digit industry dummy variables, entry cohort dummy variables, and α_i is a firm-specific random-effects.
- Pre-exit: z_{ijt} includes Exit Age dummy variables, two-digit industry dummy variables, exit cohort dummy variables, and α_i is a firm-specific random-effects.

Similarly, the following regression equation examines the post-entry growth dynamics:

$$\Delta \ln(X_{ijt}) = \gamma y_{ijt} + \alpha_i + e_{ijt}, \quad (4)$$

where y_{ijt} includes regressors from equation 3 plus $\ln(X_{ijt})$.

Figure 1: Post-Entry Dynamics - Average Relative Values by Age



Survivor/Selection Decomposition

- Separate overall changes into survivor and selection effects:

$$\begin{aligned} & \underbrace{\frac{1}{N(S_\tau)} \sum_{i \in S_\tau} \hat{X}_{i,\tau} - \frac{1}{N(S_1)} \sum_{i \in S_1} \hat{X}_{i,1}}_{\text{Overall}} \\ &= \underbrace{\frac{1}{N(S_\tau)} \sum_{i \in S_\tau} \hat{X}_{i,\tau} - \frac{1}{N(S_\tau)} \sum_{i \in S_\tau} \hat{X}_{i,1}}_{\text{Survivor}} \\ &+ \underbrace{\frac{N(D_\tau)}{N(S_1)} \left(\frac{1}{N(S_\tau)} \sum_{i \in S_\tau} \hat{X}_{i,1} - \frac{1}{N(D_\tau)} \sum_{i \in D_\tau} \hat{X}_{i,1} \right)}_{\text{Selection}}, \end{aligned}$$

where τ is the firm's age, $\hat{X}_{i,\tau}$ is the variable of interest for firm i in period τ , S_τ is the set of surviving firms at age τ , and D_τ is the set of non-surviving firms at age τ .

Figure 2: Survivor/Selection - Employment

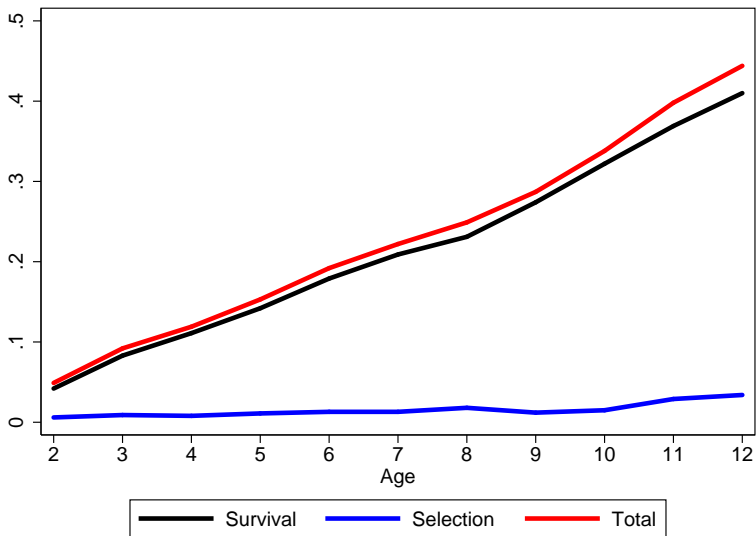


Figure 3: Survivor/Selection: Productivity

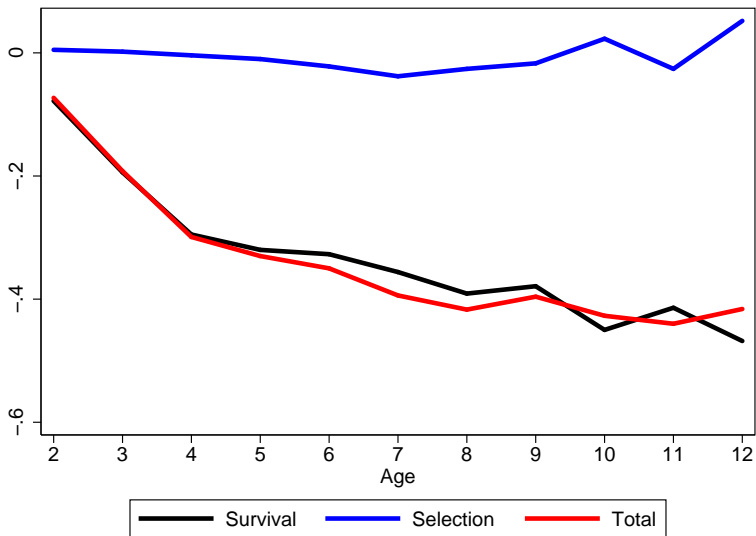


Figure 4: Survivor/Selection - Leverage

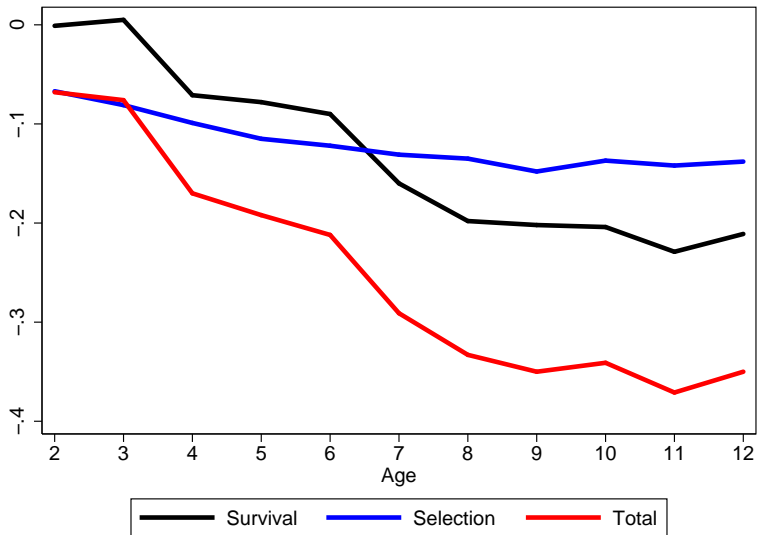
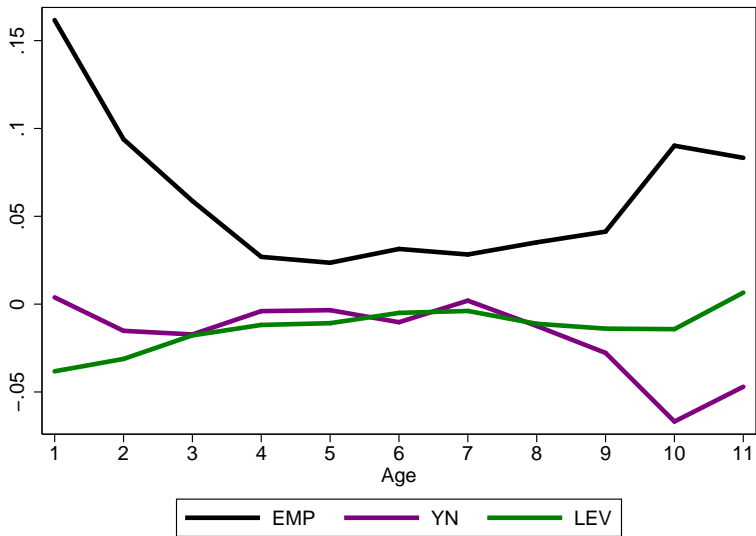


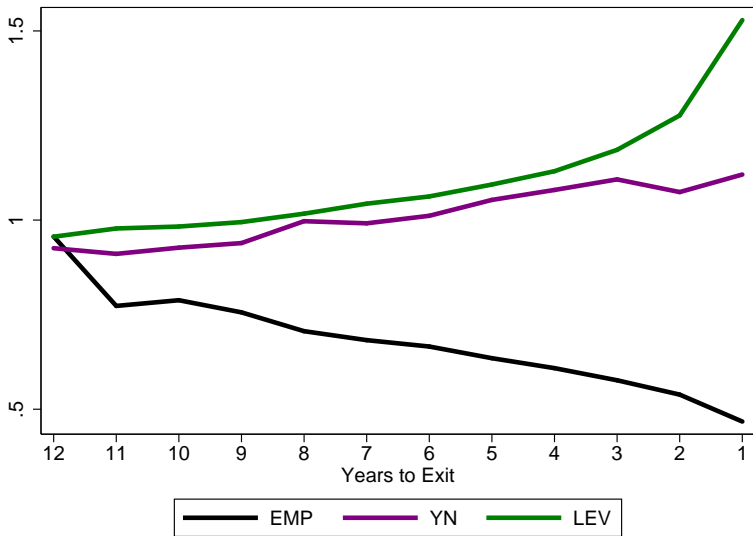
Figure 5: Post-Entry Dynamics - Estimated Growth by Age



Post-Entry Findings

- 1 The average and variance of firm growth tend to initially fall with age. However, average growth tends to be flat between ages four and nine, and begins to rise after age nine.
- 2 The mean and variance of relative firm size rise with age.
- 3 Firm leverage falls with age, so that debt becomes a smaller portion of firm financing with age. Leverage growth tends to be negative at early ages but rises towards zero.
- 4 Entrants tend to be relatively more productive than the average firm within an industry.
- 5 These post-entry size and financial dynamics are an artifact of both selection due to exit of initially small, highly leveraged firms and transition effects due to changes occurring to surviving new firms.

Figure 6: Pre-Exit Dynamics - Average Relative Values



Turnover/Transition Decomposition

Separate overall changes as moving towards exit:

$$\begin{aligned} & \underbrace{\frac{1}{N(E_{-1})} \sum_{i \in E_{-1}} \hat{X}_{i,-1} - \frac{1}{N(E_{-\tau})} \sum_{i \in E_{-\tau}} \hat{X}_{i,-\tau}}_{\text{Overall}} \\ &= \underbrace{\frac{1}{N(E_{-\tau})} \sum_{i \in E_{-\tau}} \hat{X}_{i,-1} - \frac{1}{N(E_{-\tau})} \sum_{i \in E_{-\tau}} \hat{X}_{i,-\tau}}_{\text{Transition}} \\ &+ \underbrace{\frac{N(D_{-\tau})}{N(E_{-1})} \left(\frac{1}{N(D_{-\tau})} \sum_{i \in D_{-\tau}} \hat{X}_{i,-1} - \frac{1}{N(E_{-\tau})} \sum_{i \in E_{-\tau}} \hat{X}_{i,-1} \right)}_{\text{Turnover}} \end{aligned}$$

where τ is the number of years prior to a firm's exit, $\hat{X}_{i,-\tau}$ is the variable of interest for firm i in period $-\tau$, $E_{-\tau}$ is the set of pre-existing firms τ years prior to exit, and $D_{-\tau}$ is the set of entrants who exit in τ years.

Figure 7: Transition/Turnover - Employment

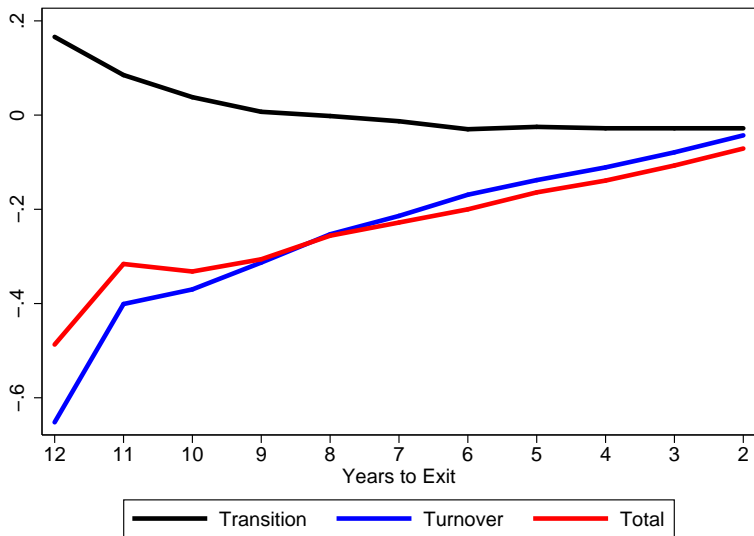


Figure 8: Transition/Turnover - Productivity

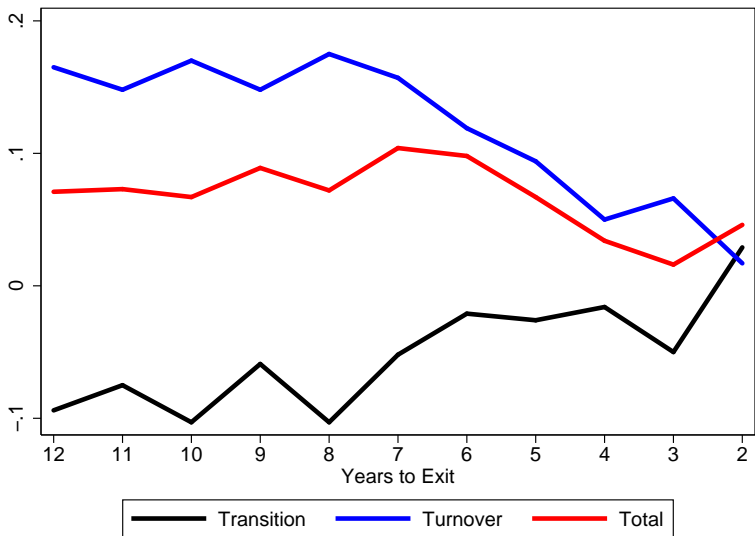


Figure 9: Transition/Turnover - Leverage

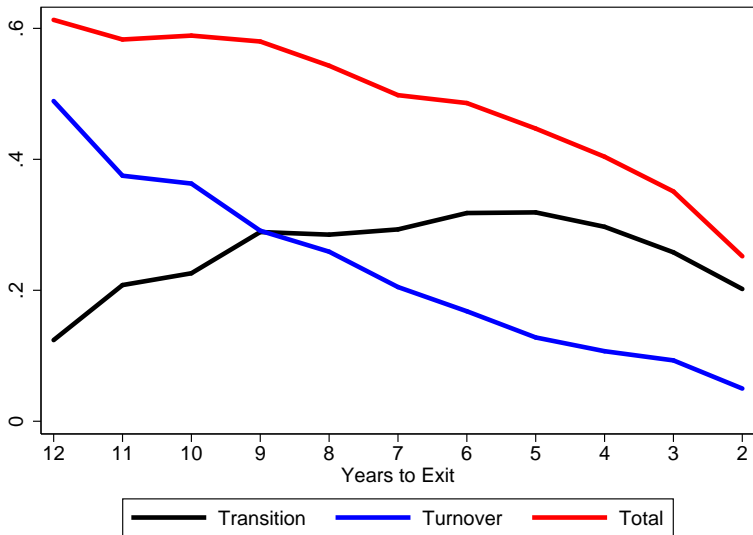
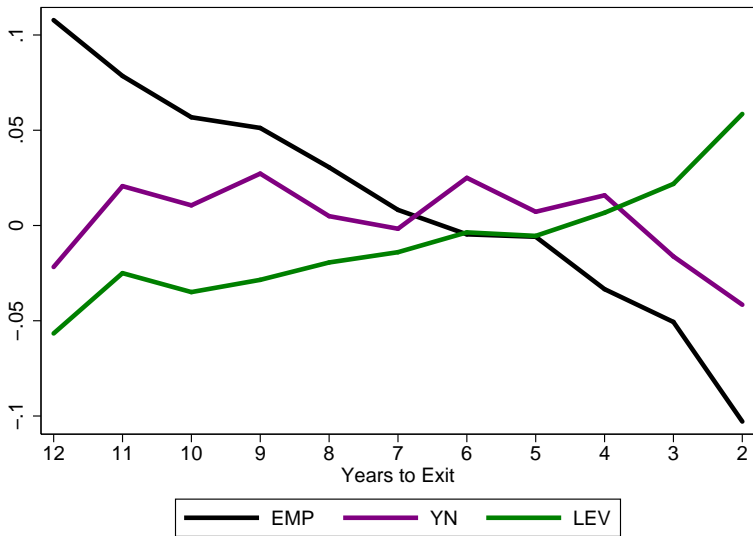


Figure 10: Pre-Exit Dynamics - Estimated Growth



Pre-Exit Findings

- 1 The average and variance of firm growth and relative firm size fall as firm exit approaches.
- 2 Average relative leverage rises in the last two years prior to death, but is flat over time prior to two years before death.
- 3 Relative labour productivity rises slightly as exit approaches.
 - Result reverses when conditioning on industry and exit year.
- 4 Matching a previous finding, leverage growth increases in the two years prior to exit.
 - Assets and debt fall as death approaches but assets fall faster.
 - Selling down of assets \Rightarrow increase sales (productivity increase) and leverage
 - **Shadow of Death.**
- 5 Standard Deviation of Leverage and Labour Productivity increases as exit approaches
 - Relative and Growth variables