



Age effects, leverage and firm growth

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ABSTRACT

Recent theories of firm dynamics emphasize the role of financial variables as determinants of firm growth. Empirically examining these relationships has been difficult, since there is a lack of financial data on the small, young, and private firms. Using a unique administrative data set, this paper considers the growth of new firms in Canadian manufacturing from a financial perspective. We find that financial factors, such as leverage and initial financial size, impact growth rates for new firms. Further, the inclusion of leverage has little impact on the economic significance of the conditional age and size relationships with firm growth.

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1. Introduction

Recent theories highlight the impact of financial considerations in firm dynamics, especially for young firms. These theories suggest that financial variables contain relevant information regarding firm growth. Very little is known about the financial state of new firms. Empirically examining these relationship has been difficult because of the lack of financial data on the small, young, and private firms. This paper considers the role of financial variables in the growth process of new firms in manufacturing using administrative corporate tax files. Once controlling for firm age and size, we find that financial factors, such as leverage and initial financial size, have significant, positive effects on growth of new firms.

Previous empirical firm growth studies by Evans (1987a, b) and Dunne et al. (1989) find a negative correlation between firm growth with size and age. Further, conditional on age, firm growth remains negatively related to size, while conditional on size, firm growth continues to have a negative relationship with age. In response to these empirical findings, theoretical models use alternative mechanisms to try to explain the size and age effects on firm growth. In these models, there is typically one source of heterogeneity across firms. Learning and productivity shocks provide devices which generate different dynamics across firms. Given the simultaneous age and size dependence, a second heterogeneity is needed to better understand growth dynamics.

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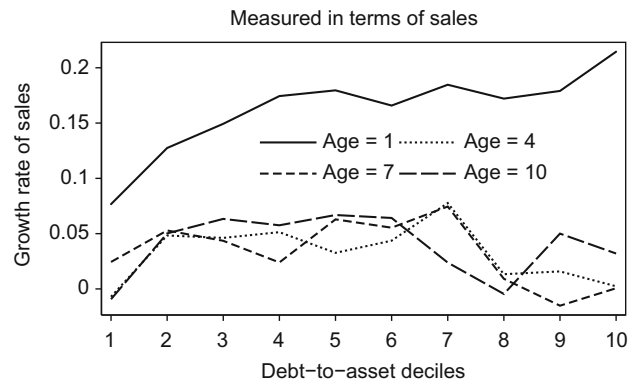


Fig. 1. Growth and leverage. Note: The figure shows the median firm growth rate across the three age groups and 10 leverage (debt-to-asset ratio) classes. Age one leverage decile points are used as cutoff values. Firms are then placed into leverage classes at a particular age given these cutoff values. Firm growth is calculated as $\Delta \log(\text{size}_{it})$, where sales is used to measure size.

As a result, newer models, such as Cooley and Quadrini (2001), were built to explain the conditional size and age correlations with growth.¹ This model extends Hopenhayn (1992) by making financial considerations relevant for firm dynamics. In Hopenhayn (1992), size captures productivity differences across firms, which makes growth independent of age. The addition of financial heterogeneity means a conditional relationship between firm growth and age occurs, as age captures the omission of a firm's financial state measured in terms of the debt-to-asset ratio.

There are alternative reasons for age effects to remain even after controlling for financial variables. Theoretical work by Jovanovic (1982) proposes a 'passive'-learning model of industry dynamics. Firms enter an industry with incomplete information regarding their own productivity but gain information through production.² Although the model deals with selection (exit) and not explicitly with growth, the learning effect generates a negative conditional firm growth-age dependence under certain general conditions, see Evans (1987b). Whereas, Klepper and Thompson (2006) suggest conditional age effects in firm growth are due to the creation and destruction of submarkets combined with selection effects.

This paper's main avenue of assessment is the hypothesis that age effects occur because of financial factors; financial measures, such as the debt-to-asset ratio and initial financial size (assets), augment the conditional firm growth relationship. Firm growth relationships with financial aspects are investigated using a new unique universal database compiled by Statistics Canada called T2LEAP. Financial and balance sheet information is collected from corporate tax files. This information allows us to establish firm growth patterns for young firms related, not only to size and age, but also to financial variables. If age effects occur mainly because of financial frictions, as suggested by Cooley and Quadrini (2001), then the inclusion of financial variables in the firm growth regression should reduce the economic significance of age.

The correlation between growth and leverage (debt-to-asset ratio) is positive as suggested by Fig. 1. This figure shows median firm growth across leverage classes and four age groups. For entrant firms at age one, there is a positive correlation between leverage and growth. Further, Fig. 2 compares growth across size and leverage classes for age: one, four, seven, and ten firms. For age one, firms in the top leverage decile have higher growth than firms in the lowest leverage decile. Across the age and leverage deciles, firms in the lowest size classes have the highest growth rates. At age four, little difference occurs for firm growth rates across leverage classes. For ages seven and ten, firms in the smaller size classes (one to four) with low leverage still have the lowest growth, while no clear pattern emerges in the upper leverage classes.

Controlling simultaneously for size, age, and leverage, the findings are as follows:

- A positive and nonlinear relationship occurs between firm growth and leverage.
- Negative conditional relationship occurs between firm growth and firm size.
- Youngest firms are the fastest growers (age effects level off at age seven).
- A firm's future growth exhibits a positive relationship with its initial asset size.

The last result indicates that a firm's ability to obtain financial resources provides some information about its future growth. Zingales (1998) shows deep pockets or fatness have a positive effect on the future success of a firm. Higher initial level of assets may provide a proxy for deeper pockets and these deep pockets allow a firm to easily expand in the future.

¹ Albuquerque and Hopenhayn (2004), Miao (2005) and Arellano et al. (2009) also build on Hopenhayn (1992) by incorporating a role for financial decisions in firm dynamics. Cabral and Mata (2003) investigate the effect of financial constraints on within-industry size dynamics. These papers do not explicitly consider financial reasons as sources of age effects in firm dynamics.

² Ericson and Pakes (1995) endogenize the learning process by allowing firms to engage in 'active' research and development in order to improve their relative productivity within an industry.

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