



Patenting and High Growth Firms

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Delivering insight through data for a better Canada

Context

Before the pandemic, Global Affairs Canada, Immigration, Refugee and Citizenship Canada, Canadian Intellectual Property Office and Innovation, Science and Economic Development Canada supported the linkage of the PATSTAT database to other firm-level data at Statistics Canada (2001 to 2016)

These other firm-level data are included in the Business Research Microdata

This presentation shows Canadian evidence on the effect of making a patent application on firm performance

- Eckert, Langinier and Zhao (2019) – determinants of locational patenting behavior
- Hanel (2008) – characteristics of firms that patent, patenting on the propensity to innovate

PATSTAT

- Worldwide patent data
- Includes information on: Applications, grants, patent families, citations, patent classifications, applicants, inventors, legal status

Data for Canadian-resident firms

- Applications to CIPO and other patent offices
- Roughly 400,000 applications between 1875 and 2018 where the applicant or inventor has a Canadian address
- Between 2001 to 2016, there are approximately 265,000 applications. These are associated with 230,000 companies.



Data and sample analyzed

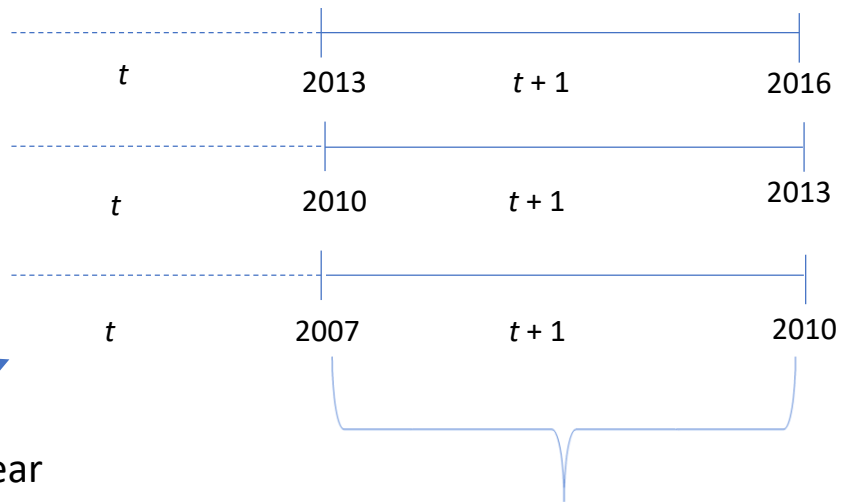
PATSTAT data linked to firm-level data at Statistics Canada

- 2001 to 2016
- Patent information for Canadian-resident firms

Effect of filing a patent application in previous year (2012, 2009 and 2007, respectively) on the probability of being a high growth firm in the subsequent three years examined

$$\Pr(HGF_{t+1} = 1 \mid application_t, X_t)$$

Three cohorts are analysed



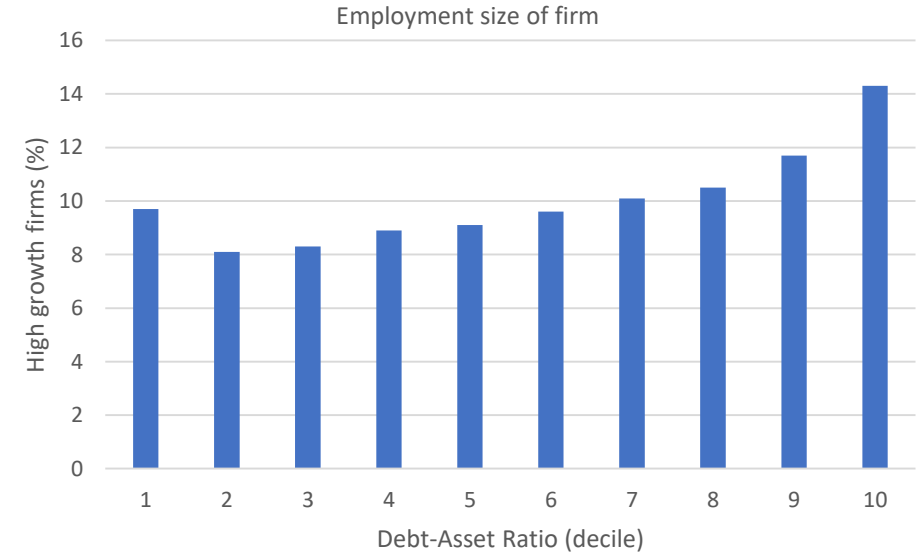
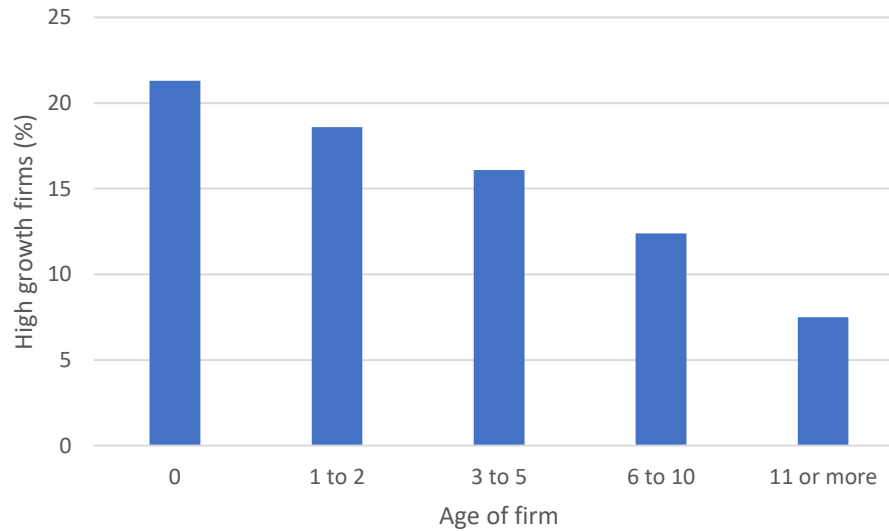
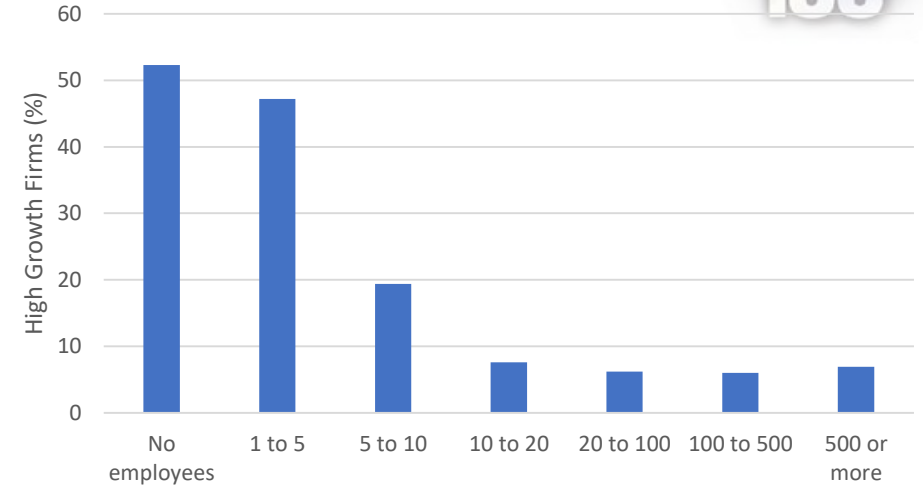
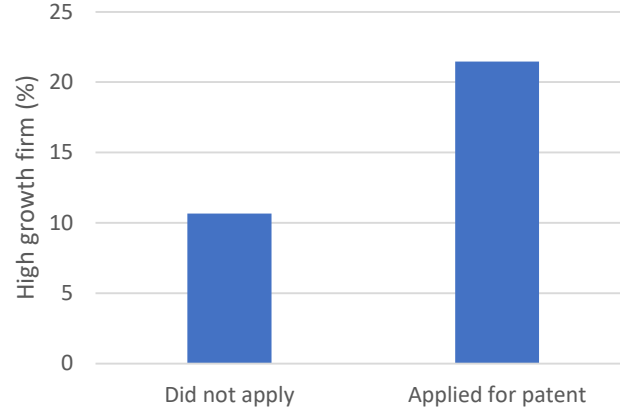
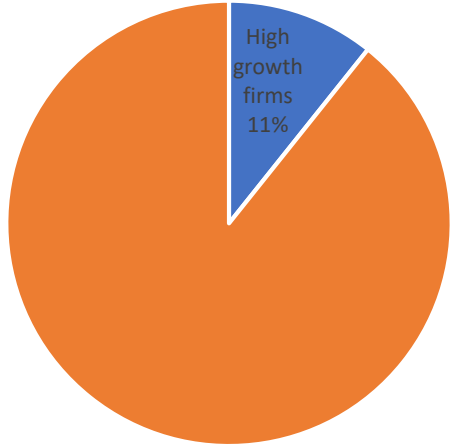
High growth is defined as having at least a 20% compound annual growth rate in revenue over the three-year period

Sample analysed:

- Ten employees in last year
- Positive revenue in both the first and last year
- Firms that are in NAICS industry 61,62, 91 and unclassified are excluded



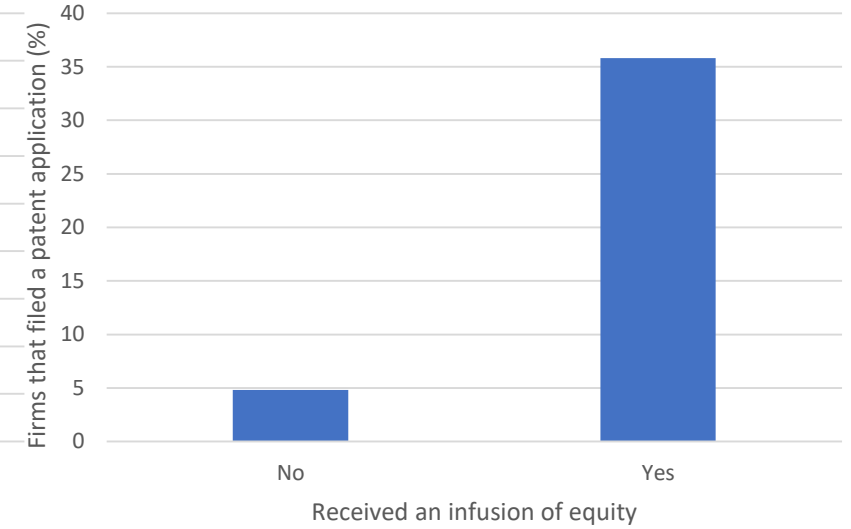
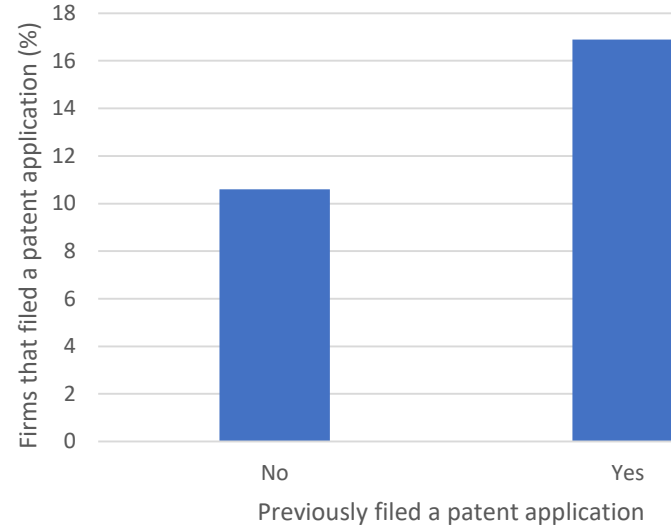
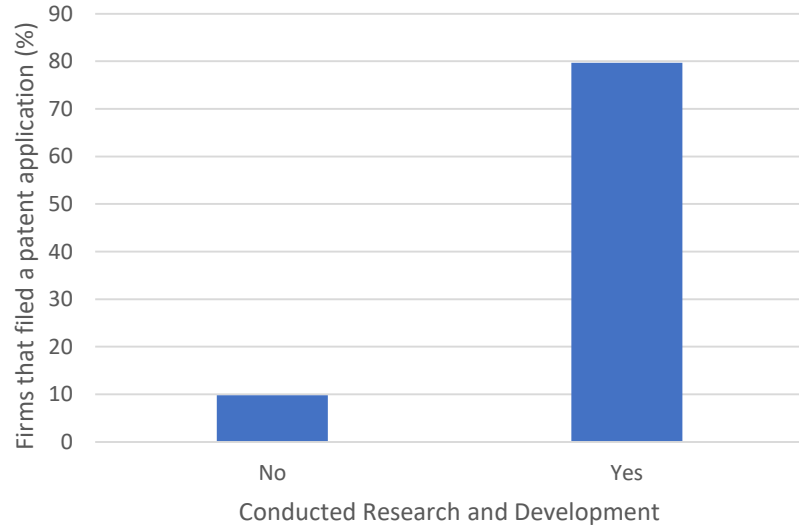
High growth firms (%), by firm characteristics



Firms that patent are twice as likely to be high growth, but there are other important factors.

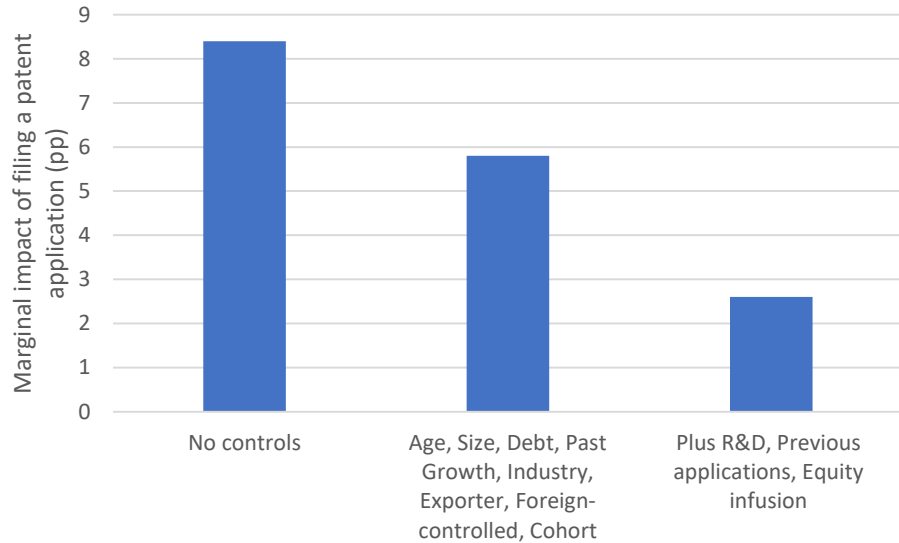


Probability of filing a patent (%), by firm characteristics



Filing a patent application is correlated to other firm characteristics associated with high growth

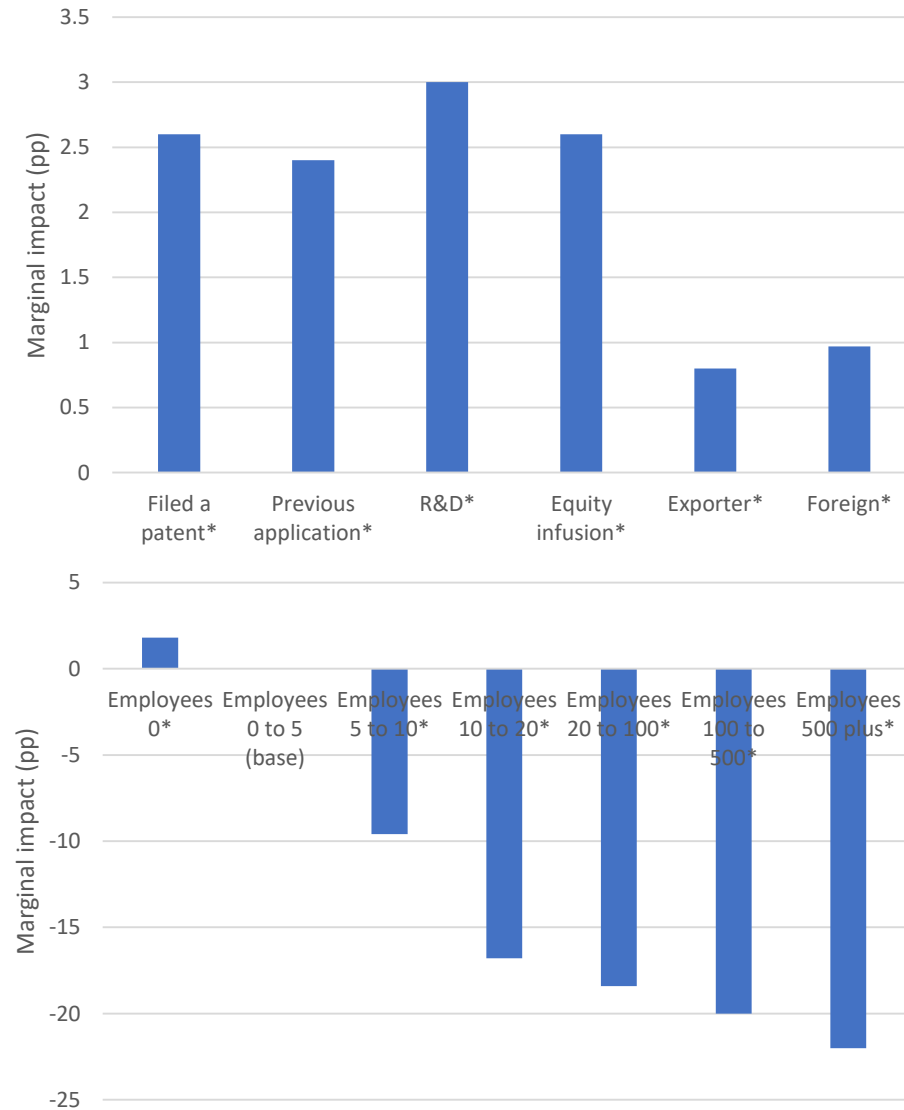
Probit model – Marginal impacts



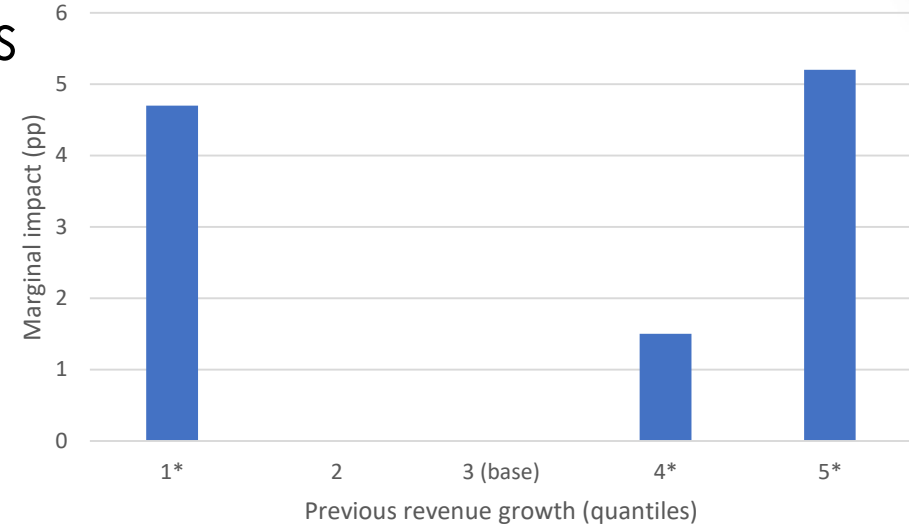
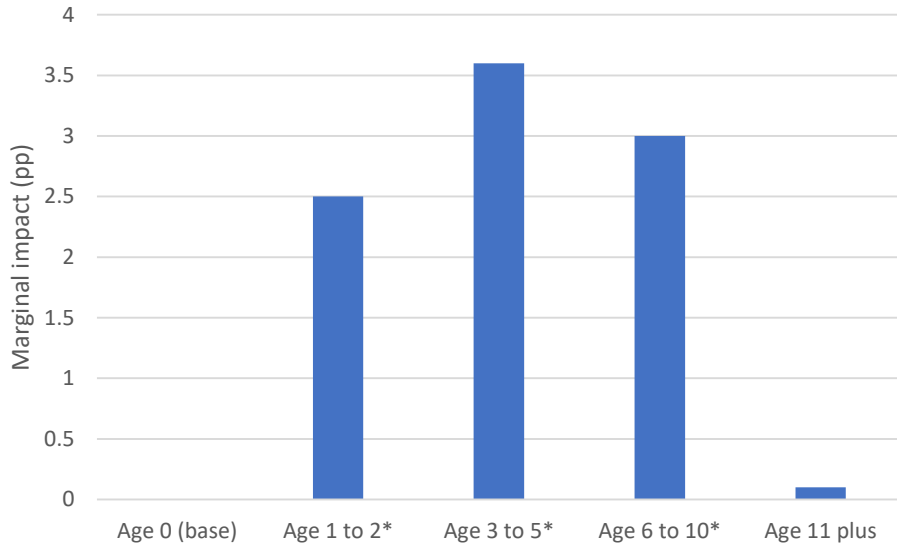
- The marginal effect of filing a patent application is statistically significant, even after controlling for other firm characteristics.
- The magnitude of the effect is comparable to conducting R&D or receiving an infusion of equity.

*Statistically significant at 10 percent level

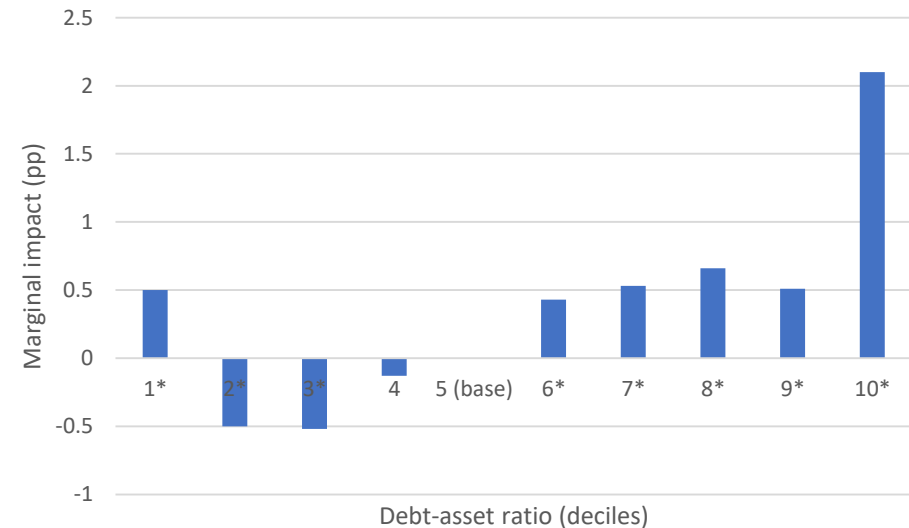
Controls for industry and cohort included



Probit model – Other marginal probabilities



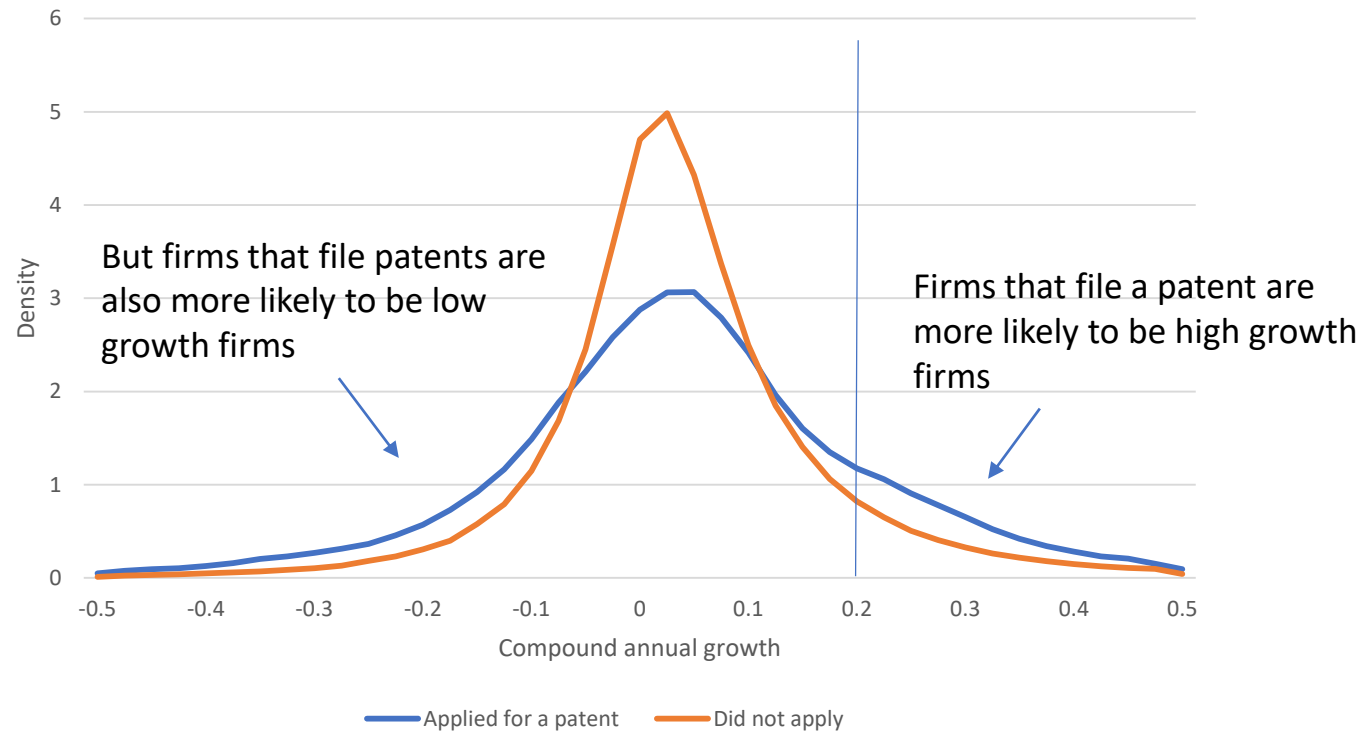
- Older firms are less likely to be high growth
- Reversion to mean in growth, and persistence in high growth
- Access to debt financing important



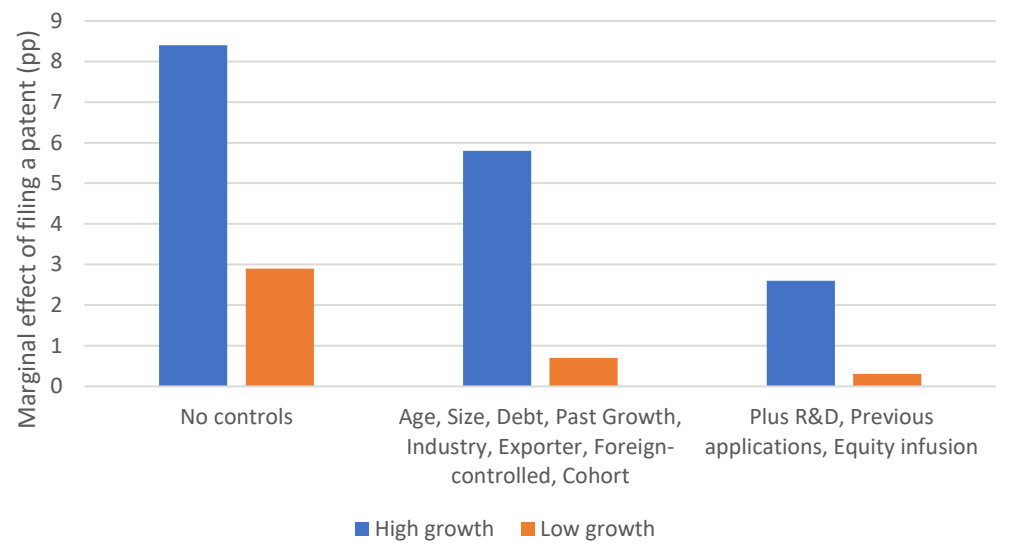
*Statistically significant at 10 percent level

Controls for industry and cohort included

Food for thought – Low growth firms



- The revenue growth rates for firms that applied for a patent are higher, but also exhibit more variance.
- Marginal effect on probability of begin low growth is not statistically significant after controlling for other firm characteristics.



Next steps

- Complete the study and the documentation of the variables derived from PATSTAT
- Include the derived variables used in the study in the BRM