

## **Broadband Infrastructure and Entrepreneurship**

The availability of broadband infrastructure affects the expected profit and therefore the likelihood to start a new venture in various ways: (1) customer base; (2) better processes and organization within the firm; (3) access to information and to cooperation partners, increasing the likelihood of successful innovation. Despite this narrative of lots of positive effects there is little empirical evidence on the connection between broadband availability and entrepreneurship. Among the few papers dealing with the subject Audretsch et al. (2015) have documented a significant positive relation of broadband availability and entrepreneurship. This paper contributes to that literature and is the first to establish causality in documenting how broadband availability impacts on establishment start-up rates across German municipalities.

Therefore, we combine establishment start-up rates and information on establishment characteristics with unique telecommunication data, documenting broadband Internet availability across roughly 12,000 German municipalities. Firm start-up rates are derived from the Establishment History Panel, provided by the Institute for Employment Research (IAB), containing the universe of German establishments with at least one employee liable to social security. Information on the branch of industry a certain establishment belongs to are included in our data set as well as the number of employees and their demographic characteristics. We will make use of this detailed information to identify potential heterogeneous effects of broadband availability on establishment start-up rates by industry, establishment-size and employee qualifications.

Identifying Internet effects on start-up rates is not straight forward. A simple cross-municipality regression with the key right-hand-side variable being the share of households for which a DSL connection is technically available would suffer from potentially severe omitted-variable bias. Such a bias could most likely arise from differences in entrepreneurial activity between municipalities. Telecommunication carriers face an incentive to roll out broadband infrastructure in areas where many businesses that have a high willingness to pay for a broadband subscription are located. Simultaneously, the business environment in these municipalities is likely to be conducive to firm start-up. As a result, cross-municipality estimates of DSL availability on establishment start-up rates would be biased.

The basic framework for our analysis is a first-difference model that compares establishment start-up rates from the early broadband Internet period with start-up rates from the pre-Internet period. While the first-difference model allows us to overcome estimation biases that result from unobserved time-persistent factors at the municipality level,

there might still be unobserved time-variant factors that are correlated with both changes in firm start-up rates and DSL availability across municipalities. We thus instrument DSL availability with regional and technological peculiarities of the traditional public switched telephone network (PSTN) that caused exogenous variation in high-speed Internet availability in the period under investigation. (cp. Falck et al. (2014))

The empirical literature on the effects of broadband infrastructure so far has mainly concentrated on the productivity in incumbent firms. Effects have been found to be at most moderate (cp. Bertscheck et al. (2013)). The reason why we believe that there should be stronger effects on business start-ups is based on the finding that entrepreneurs are regionally immobile (cp. Michelacci and Silva (2007)). A lack of supporting infrastructure might prevent potential candidates from starting a business and instead induce them to pursue a career as dependent worker elsewhere. We further expect that the effect of broadband availability on establishment start-up rates differs across industries, depending on their need for access to information and knowledge as well as cooperation partners.

A first look into the data revealed that it might take some time for broadband availability to translate into increased establishment start-up rates. Besides, effects seem to be heterogeneous. First regression results tend to indicate that broadband affects start-up rates of small establishments, active in the service sector whereas start-up rates of relatively large establishments appear to be rather unaffected.

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