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## Business cycles and start-ups across industries: An empirical analysis of German regions<sup>☆</sup>

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## ABSTRACT

We analyze whether start-up rates in different industries systematically change with business cycle variables. Using a unique data set at the industry level, we mostly find correlations that are consistent with counter-cyclical influences of the business cycle on entries in both innovative and non-innovative industries. Entries into the large-scale industries, including the innovative part of manufacturing, are only influenced by changes in the cyclical component of unemployment, while entries into small-scale industries, like knowledge intensive services, are mostly influenced by changes in the cyclical component of GDP. Thus, our analysis suggests that favorable conditions in terms of high GDP might not be germane for start-ups. Given that both innovative and non-innovative businesses react counter-cyclically in 'regular' recessions, business formation may have a stabilizing effect on the economy.

## Executive summary

The relationship between the business cycle and entrepreneurship appears to be an unsolved puzzle. There is an ongoing discussion of whether more businesses are ventured during boom periods or during recessions. More specifically, it is unknown whether booms and recessions affect entries into different types of businesses in the same or in different ways.

A main shortcoming of existing studies is that they investigate the effect of business cycle variables on entrepreneurship in total and do not distinguish between industries. Hence, the data of these studies are not refined enough to identify differences between innovative and replicative entrepreneurs or between start-ups in large and small scale industries. Thus, it is not just the direction of the effects that is undetermined, it is more importantly the composition of new businesses in terms of quality and quantity. Moreover, previous studies using net-entry as a measure for the effect of the cycle on entrepreneurship are not fully able to identify total entry (and exit) effects.

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In this contribution we investigate what kind of businesses are established throughout the business cycle. Based on gross-entry data for different industries, we define four types of industries. We distinguish between innovative and non-innovative industries and within these two groups identify potentially large-scale and small-scale industries. In our theoretical concept, we provide a rationale of how the cyclical variables of GDP and unemployment unfold, through the existing demand-side and supply-side driven channels, differing effects on new business formation. We show under what conditions demand-side or supply-side effects may prevail and unfold either pro- or counter-cyclical effects on each of these four types of business entries.

The empirical analysis is performed for the 38 NUTS 2 regions of Germany over the 1995 to 2008 period. The entry data allow us to classify 11 different kinds of industries, among them innovative industries, including technology-oriented services and high-tech manufacturing. We assign them into four types of industries based on their innovativeness and minimum efficient size.

Applying fixed-effects panel estimates, we find that aggregate conditions, i.e. GDP and unemployment, influence new business formation in rather different ways, depending on the type of industry. Nearly no empirical evidence is found for a pro-cyclical effect of GDP on entry. Rather to the contrary, we observe a counter-cyclical influence of GDP on new business formation, but only for entries into small-scale industries. Entries into large-scale industries remain unaffected by GDP. For unemployment, we observe counter-cyclical influences on entries in nearly all industries, except small-scale innovative industries like knowledge-intensive services.

Thus, when focusing on business entries into innovative industries, an important difference emerges: changes in unemployment lead only to counter-cyclical influences on the innovative part of large scale industries, in particular on innovative manufacturing. Changes in GDP influence only business entries in innovative small-scale industries, like knowledge intensive services. The results remain robust when analyzing several sources of a potential bias, including effect dynamics, unobserved spatial links, potential endogeneity, industry-specific business cycles, aggregation, and de-trending methods.

Our analysis suggests that favorable macroeconomic conditions in terms of high GDP might not be germane for start-ups. According to our results, it is rather the other way around: recessions leading to lower production or entry costs seem to be a more conducive environment for setting up innovative businesses than boom periods. The positive influence of unemployment on start-ups in large-scale innovative industries that we find suggests that these entries are positively affected by easier availability of labor when unemployment is high. This does not necessarily mean, however, that newly-founded businesses in large-scale innovative industries start hiring unemployed workers—they may simply hunt for workers who are employed elsewhere but may be willing to change jobs at lower mobility premium.

Our findings demonstrate the importance of accounting for industry-specific characteristics when analyzing the relationship between the business cycle and new business formation. Further research may investigate to what extent booms and recessions unfold asymmetric effects on business entries in terms of intensity and direction. One further limitation of our study is that we only analyze the influence of ‘regular’ recessions on entry. Thus, it is important to determine whether the effect directions differ between recessions and depressions, as in the aftermath of the 2008 financial crisis. Moreover, it would be desirable to have more information about the individual characteristics of the new businesses in each of the industry groups.

## 1. Introduction

Research postulates that the cyclical changes of macroeconomic factors, such as the business cycle and unemployment, influence the number of new firms (Parker, 2012a; Koellinger and Thurik, 2012). Theoretical considerations suggest that these two variables may unfold either pro- or counter-cyclical effects (see, inter alia, Bernanke and Gertler, 1989, Hopenhayn, 1992, Francois and Lloyd-Ellis, 2003), thus making the relationship between the macroeconomic variables and entrepreneurial entry ambiguous. As there is a positive effect of start-ups on growth (Van Stel et al., 2005), its direction matters: pro-cyclical effects may constitute the risk that cycles are amplified. This seems to be particularly important, as it may slow recovery during recessions if entrepreneurial entry lags behind the business cycle (Clementi and Palazzo, 2016). In contrast, counter-cyclical effects could be beneficial for the economy when the opening of more businesses leads the cycle (Koellinger and Thurik, 2012)—it could spur economic recovery during recessions, while a decline of start-ups in boom periods would not further enhance GDP growth.<sup>1</sup>

Empirical analyses of how these two macroeconomic factors influence business entries report mixed results (Parker, 2012a; Sanchis Llopis et al., 2015). However, the great majority of existing research uses only the total number of firm entries, the total number of transitions into self-employment, or the changes in self-employment rates as outcome variable (see inter alia Thurik et al., 2008 or Congregado et al., 2012), and analyzes how business cycles influence this total number of entrepreneurial entries. Hence, these approaches do not account for different conditions and characteristics of industries. Therefore, it is not only the direction of the effects that is unknown, but also the composition of new businesses in terms of quality. To what extent do the different stages of the cycle affect innovative start-ups that may generate considerable impulses for growth and to what extent do they affect marginal businesses with less impact on the economy? In this context, Barlevy (2007) claims that radical innovation positively affects further new businesses to be ventured during boom periods, while Ghatak et al. (2007), Román et al. (2013), and Koellinger and Thurik (2012) argue that recessions may especially stimulate the formation of marginal businesses because of falling wages and lower

<sup>1</sup> Note that a positive effect of start-ups on economic outcomes is observed because of its influence on GDP-growth (see, e.g., Carree and Thurik, 2008). The economic effect of new firm formation on total employment is more complex, with positive influences in the short run (in the first two years) and then again in the long run after five years. In the medium term, i.e. between years 2 to 5 after a start-up, the employment effect turns out to be negative due to exits of established incumbents (see Fritsch, 2013, for an overview of the empirical evidence).

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