New business creation and its effect on employment growth in regions facing population decline

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Abstract

Particularly in regions that are in decline, the creation of new businesses is often highly prioritized by local governments. Entrepreneurship can play an important role in maintaining vitality in declining regions through the creation of jobs. Yet the way in which new business creation exerts its influence on employment growth is not yet evident. Are start-ups in these areas just as productive in influencing employment change as they are in growth regions? Although there is a large and growing body of research on new business creation and employment, there is still a knowledge gap concerning the impact of the context upon this. New business creation can contribute to the growth of regional employment in the short term and in the long term. The relationship varies over time and can even be negative for some years after start-up. Focussing on the regional context, we investigate whether the relationship differs according to population decline or growth, and to the degree of urbanization, in order to determine both long and short term employment effects. We conclude that the context does indeed matter a great deal. We show that modest rates of decline may be very manageable and irrelevant to some aspects of economic welfare. Analyses are performed using panel data of firm dynamics and employment growth from the LISA database on a municipality level (418 regions) between 1996-2010. The data is complemented with data on population density, size, growth and decline from the Statistic Netherlands.

Key words: Employment growth, population decline, new business creation, urban and rural regions, direct and indirect effects.

JEL codes: L26, O18, R10, J23

1. Introduction

After centuries of continuous population growth, many regions in Europe are experiencing periods of stagnation or depopulation (Haartsen and Venhorst, 2010, Reher, 2007). Historically, population growth has always been considered a sign of a successful society and a successful economy (Reher, 2007; Glaeser et al, 1992; Glaeser et al., 1995), implicitly stating that
population decline is a sign of being unsuccessful. Theoretically, a larger population allows for economies of scale and labour division and thus improved productivity. As labour is one of the major inputs of production, as long as more people can be employed, production will also grow (Coleman and Rowthorn, 2011). A decline in population would thus mean slower output growth, unless compensated by increased productivity. There are also other obvious negative consequences of depopulation, such as the restructuring of population composition causing labour shortages through ageing. All of these aspects are interlinked (Reher, 2007).

Population decline and ageing are noticeable trends in many Dutch regions. There is a great challenge in keeping these declining regions viable in the future, both economically and socially (SER, 2011). Some practical consequences have been receiving a lot of attention in particular parts of the Netherlands, often focussing on housing issues, such as falling real estate values and unoccupied houses and shops. Less attention has been paid to the economic implication of these demographic changes. Basically, population decline can bring disadvantages to any society by diminishing economies of scale (Coleman and Rowthorn, 2011). However, opportunities for growth exist for all types of regions (OECD, 2013) and economic decline can also occur in all types of regions. Moreover, a decline in population does not automatically lead to less development (Gáková and Dijkstra, 2010). Population decline will, however, decrease the number of potential entrepreneurs, and this is strengthened by the effects of ageing as the probability of a person starting their own firm takes the shape of an inverted U and thus decreases after a certain age (Bönte et al., 2009; Schneider and Eichler, 2007). Yet it does not mean that the actual number of new firms will decline (Delfmann et al., 2014). What we do not know is the economic impact of the firms started in declining regions. This paper provides an analysis of how new business creation impacts economic development in regions that are facing population decline, while at the same time differentiating between urban and rural regions. It asks whether the short, medium and long term job creation effects of new business creation differ between these areas. Specifically, do new firms started in regions of population decline generate less employment growth impact compared to those started in regions of growth?

Entrepreneurship is ‘critical to building and sustaining the regional economies of urban and rural areas’ (Willis et al., 2012 p:16). Particularly for declining regions, new business creation is often highly prioritized by local governments as it can play an important role in keeping
declining regions vital through job creation (Armington and Acs, 2002; Audretsch and Thurik, 2000; Stam, 2010; Wennekers and Thurik 1999). Logically, new business creation is indeed a promising method for encouraging economic development, yet the existing literature does not provide a consistent answer to the question of the extent to which business creation influences local economic growth (a.o. Audretsch & Fritsch, 2002; Carree & Thurik, 2003; Fritsch, 2008; Li et al., 2011; Willis et al., 2012). There is still a knowledge gap concerning the regional context in which new business creation takes place (Koster and Karlsson, 2009).

The remainder of this paper is structured as follows. We first discuss the theoretical links between entrepreneurship and regional employment. Important distinctions are made between direct and indirect effects on employment and the likely differences in the balance between opportunity and necessity driven entrepreneurship in different types of regions. Then we outline the model structure and the data employed. Following a presentation of the results we discuss specific insights arising from the analysis, and finally we provide some brief conclusions.

2. *Theoretical framework*

Entrepreneurship is a good thing. Intuitively, one would expect a positive relation between new business creation and economic growth. There are many ways in which entrepreneurs facilitate economic growth, for example through job creation and innovation which in turn increase productivity and competition (Acs and Audretsch, 1990; 2003; Carree and Thurik, 2003, 2008; Glaeser et al., 1992). However, the relationship between new firm formation and economic development is rather complex. New firms can even have a negative impact on employment change, also known as destructive entrepreneurship (Baumol, 1996). Shane (2009) argues that by encouraging more people to start businesses, economic growth will not be enhanced nor will it create a lot of jobs. The basic assumption justifying his statement is that the vast majority of people starting a business are not entrepreneurs in the sense of them building firms that will grow, generating additional jobs and wealth. Actually, the chances are high that these types of start-ups will be a home-based business without the aspiration to grow bigger.

So then, what is the economic effect of new business creation? There seems to be consensus on the pattern in the relationship between start-ups and employment change over time. Fritsch and Mueller (2004) made an important contribution showing that the impact of start-ups on
employment growth follows an s-shape wave pattern. As Figure 1 shows, the impact of new firms on employment growth is not stable over time, with immediate positive effects being followed by short term negative effects and again by long term positive effects. Both positive and negative impacts on employment growth are therefore likely to occur, depending on the time lag of the start-up cohort and a number of studies have confirmed this short, medium and long term pattern (Storey, 1994; Fritsch and Noseleit, 2009; 2013a,b; Andersson and Noseleit, 2011; Koster, 2011; Li et al., 2011).

When new businesses enter a market, they may have both direct and indirect effects on economic development (Fritsch and Mueller, 2004). The direct effect refers to the new jobs that are created in the new firm, most noticeable immediately after start-up and indicated as stage 1 in Figure 1. These direct effects include the job created for the entrepreneur and for possible new employees immediately at the start or during the following years. The direct effect is therefore by definition positive in the first year. However, in many cases the entrepreneur’s ‘job’ will be a substitute for his or her previous job in employment and most new firms do not start out by hiring many, if any, new employees. The direct effect is thus likely to be small and short term.
Figure 1. New business creation has both positive and negative impacts on employment change throughout time. Source: Fritsch, 2008

In contrast to direct effects, the indirect effect of new business creation is often long term, and takes place up to ten years after the initial start-up. A start-up will not initially affect incumbent firms, but following the first positive effect there is a stage of exiting capacities resulting from the exit and decline of incumbents (Baptista et al., 2005), an indirect result from the new firms which is referred to as the displacement effect, depicted as stage 2 in the figure. Stage 2 negatively influences employment, not only due to the indirect displacement effect but also direct due to the failure of new firms (Baptista et al., 2005; Fritsch and Mueller, 2004; Carree and Thurik, 2008).

The third and final stage revolves around the indirect effects and is referred to as the induced effect or supply side effects. It reflects the theoretically improved competitiveness due to increased competition and the crowding out of the weakest incumbents, which thereby strengthens the innovation and productivity capabilities of the market. These supply side effects should result in a positive impact on employment (Fritsch and Mueller 2004; Koster and Van Stel, 2013; Li et al., 2011; Van Stel and Suddle, 2008). Based on the less favourable conditions, less competition and varying motivations for start-ups, we hypothesize that both declining and rural regions are less likely to see positive effects from entrepreneurship, particularly in the long term, and the reasoning for this is set out below.

2.1 Regional differences
The overall pattern of new business creation and employment change over time is expected to be fairly consistent in different regions and countries (Fritsch, 2008). Yet the interesting question is how the magnitude of the total effect on regional development differs depending on the changing demographics. The real drivers of competitiveness that induce employment growth and increase welfare are the long term effects on the supply side (Fritsch, 2008). Koster and van Stel (2013) and Mueller et al. (2008) argue that the longer term positive impact afforded by the process of creative destruction will only occur when the quality of the new firms is high enough. In other words, the quality of a firm points to its potential impact on economic growth and the quality of new firms will depend on both motivation and the regional context, set out below.
2.1.1 Motivation matters

The entrepreneurs' initial motivation can determine the growth potential of a firm (Acs and Varga, 2005; Shane, 2009). Nascent entrepreneurs are subjected to push and pull factors when deciding to start a firm. A distinction between opportunity driven and necessity driven entrepreneurship is often made, as first proposed by Gilad and Levine (1986) in terms of push and pull factors. Push factors are characterised by personal or external factors, have negative connotations, such as job loss, job dissatisfaction, difficulties finding employment, an insufficient salary, or inflexible work schedules. Alternatively, the pull theory states that individuals are attracted into entrepreneurial activities. Pull factors are those that draw people to start businesses – such as seeing an opportunity, seeking independence, self-fulfilment, wealth, and other desirable outcomes (Goetz et al., 2009; Segal et al., 2005; Williams and Williams, 2012).

Acs and Varga (2005) found that the effect on economic growth varies greatly depending on necessity or opportunity driven entrepreneurship. They showed that necessity driven entrepreneurship has no effect while opportunity driven entrepreneurship has a positive and significant effect. Similar results have been found by others (Sternberg and Bergmann, 2003; Reynolds et al., 2002). Contrasting these results, Block and Sandner (2009) did not find significant differences in the initial motivation when controlling for the professional background of the new entrepreneur, concluding that the importance of human capital.

In an adverse regional context, push effects might be greater than pull effects. In these environments it is likely that we find less job diversity, fewer jobs in general, lower education levels and lower wages than in growing and prosperous regions, and this also possibly results in a stronger push effect regarding entrepreneurship (Carrasco, 1999). Entrepreneurs in declining and/or remote regions are therefore assumed more likely to be motivated by necessity, as employment opportunities are limited and people have little to lose in starting their own business (Brooksbank, 2008; OECD, 2004; Williams and Williams, 2012). This effect is expected to be similar both in the context of a declining region and in that of a rural region, albeit with different causes. Therefore one can speculate that these regions will see less positive long term effects from new firms on employment change than more prosperous regions.
2.1.2 Location matters

The location of a new firm is important (Capelleras and Rabettino, 2007). Hoogstra and van Dijk (2004) address the question to what extent the location of a firm can be regarded as having an influence on the employment growth of a firm. Using an econometric model based on a data set of circa 35,000 establishments in the northern provinces of the Netherlands, they find that ‘location matters’. Geographic location determines several costs such as rent and labour. It also captures the scale of the consumer market. Rent is typically lower in rural regions, as well as in declining regions, positively affecting new business creation and their growth potential. Labour on the other hand will be cheaper but scarcer which might make it difficult to find the right employees. Thus, an individual decision to start a new business would vary depending on the location when assuming a rational consideration of the environment, and similarly their motivation is influenced by their location.

Firms are set up by individuals and individuals are influenced by their contextual environments. For the purpose of the study, the regional context is looked at from two angles: first that of population change, which is split up into declining regions, stable regions and growing regions; and second, the degree of urbanisation, which is divided into rural regions, intermediate (urban-rural) regions, and urban regions. Many arguments suggest that a context of population decline or that of rurality is likely to be less inviting for business start-ups, because declining regions usually see their young people migrating out while simultaneously experiencing a declining workforce. In particular, the more highly educated are more likely to find employment elsewhere. This selection process will lower the overall quality of start-ups, thus negatively impacting on their potential to contribute to the region (Mueller et al. 2008; Van Stel and Sudde 2008).

The geographical remoteness of a firm’s location is also likely to influence the start-up process and the impact on regional employment growth. It is argued that many economic benefits are associated with an urban context, and entrepreneurial opportunities are often discussed in the literature as being key urban advantages (Armington and Acs, 2004; Bosma et al., 2008; Frenken and Boschma, 2007; Stam, 2009; Sternberg, 2011). Textbook arguments suggest that it is likely that the effects of start-ups in urban regions are stronger in areas where many businesses are
located in close proximity, due to agglomeration advantages and higher knowledge spillovers (Van Stel and Suddle, 2008). In urban areas, there are likely to be more abundant resources and a higher demand whereas in rural areas, there is usually less job diversity and lower wages than in cities (Freire-Gibb and Nielsen, 2014).

A key factor in location theory for continuity and growth is access to consumer markets (Shearmur and Polese, 2007). Setting up and running a business in a rural location poses additional challenges with or without population decline, given their distance to larger consumer markets and skilled labour, but also their more scattered professional networks (Bosworth and Farrell, 2011). Entrepreneurship in rural areas has particular attributes such as specialized labour markets, and a predominance of economic activities in the first sector (Baumgartner et al., 2013). However, ‘rural’ is no longer synonymous with ‘agricultural’ (OECD, 2006) nor is it synonymous with decline. Rural regions can in fact be very productive (OECD, 2013), although the above arguments mostly suggest that from the entrepreneur’s perspective, the push effects in rural regions are generally likely to be greater than the pull effects.

However, recent research has indicated that in the case of The Netherlands, rural and urban regions exhibit very different effects regarding new business creation (Delfmann et al., 2014). The Dutch urban areas actually have systematically lower start-up rates than rural or intermediate areas and this gap between urban and rural regions suggests that the relationship between new business creation and population change may be highly context-dependent. Therefore, it is important to know whether and how these new firms grow and how they impact on local economic development in both the short and the long term. Besides the above-mentioned similarities between rural regions and declining regions regarding their potential negative impact on the quality and motivation of start-ups, there are also important differences. Most importantly, declining regions can be urban and rural regions may be growing. Declining regions are undergoing change, per definition. Change is often accompanied by uncertainty, which can amplify the negative effects, as perceived risks might be higher, potentially causing new start-ups to lower their ambitions. Rural regions could very well be growing economically, in population or both. They do, however, always have a relatively small consumer market and relatively high transaction costs due to greater distances. Table 1 clearly shows the overlap of the

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regional contexts: of all declining regions about 28 per cent is considered rural, and of all rural regions, over 72 per cent is growing in population.

<table>
<thead>
<tr>
<th></th>
<th>Decline (&lt;-1%)</th>
<th>Stable (-1&gt; &lt;1%)</th>
<th>Growth (&gt;1%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural</strong></td>
<td>28,30%</td>
<td>22,60%</td>
<td>27,00%</td>
</tr>
<tr>
<td></td>
<td>15,30%</td>
<td>12,60%</td>
<td>72,10%</td>
</tr>
<tr>
<td><strong>Intermediate</strong></td>
<td>51,70%</td>
<td>64,50%</td>
<td>54,10%</td>
</tr>
<tr>
<td></td>
<td>13,40%</td>
<td>17,30%</td>
<td>69,30%</td>
</tr>
<tr>
<td><strong>Urban</strong></td>
<td>20,00%</td>
<td>12,90%</td>
<td>18,90%</td>
</tr>
<tr>
<td></td>
<td>15,80%</td>
<td>10,50%</td>
<td>73,70%</td>
</tr>
<tr>
<td></td>
<td>100,00%</td>
<td>100,00%</td>
<td>100,00%</td>
</tr>
</tbody>
</table>

Table 1. Cross tabulation revealing overlap in types of regions.

Given the different stages in which new business creation exerts its impact on employment change over time, we want to investigate whether these patterns also differ depending on the quality of the firm and on its context. Considering the overall outcome of previous studies we expect to find different results for necessity driven entrepreneurship in the long run. Unfortunately, however, based on the quantitative dataset we use, the initial trigger for start-up is unknown. Yet reasoning from the theoretical proposition that more entrepreneurs are pushed into self-employment in declining regions and in rural regions, we theorise that these will see most of their positive effects in the first and second year of the start-up cohorts. There is also less chance of growth because the consumer base is relatively small or declining. In other words, in these types of regions we should observe a relatively high direct effect (stage 1 of Figure 1), and less long term effects on employment growth. The long term impact should become visible in the indirect effects, as these represent the ‘Schumpeter-effect’ of crowding out and increased competition (stages 2 and 3 of Figure 1). Growing regions should benefit in the long run from better quality firms, more competition and market potential. Urban regions should benefit amongst others from better business infrastructure and closer consumer market proximity. They should show a stronger displacement effect and higher supply side effects.

3. Data and methodology

3.1 Data
We use the LISA database (Landelijk Informatiesysteem van Arbeidsplaatsen en vestigingen), ranging from 1996 till 2010 to determine the impact of start-up cohorts on employment change. The database provides information at the establishment level per year, thereby uncovering start-ups and the number of jobs for all establishments in the Netherlands that have paid jobs. Individual establishments were identified firstly by firm name and address. A new establishment is counted as a start-up if the combination of both the address and the firm name was new within the region on a NUTS 3 level. The dataset consists of over 12 million cases between 1996 and 2010. There is a data limitation concerning the collection. LISA collects the data via 20 agencies, which use slightly different procedures. This leads to a certain degree of systematic bias in the data. In order to mitigate a possible impact of this data bias, we include a control variable for the agencies in all regressions. Additional data on population density, growth and decline, and controls were retrieved from Statistic Netherlands (CBS).

Our spatial unit of analysis is the municipality, a low level of aggregation. The analyses are performed with all municipalities in the Netherlands, aggregated to the number of municipalities in 2011 (418) to facilitate comparisons between several years. The municipal level is preferred for two reasons. First, as new business creation is often a local phenomenon (Dahl and Sorenson, 2012; Sternberg, 2011), new businesses are likely to be located in the home region primarily serving local and regional markets and are therefore heavily influenced by local conditions (Bosma et al., 2008; Stam, 2009). Yet, population decline does not stop at the municipal border, and labour markets also often have a larger spatial scale than the municipal scale. We therefore include some controls to cope with these issues, as explained below. Compared to other countries, the commuting patterns of workers in the Netherlands are relatively short (OECD, 2013), and municipalities do indeed play an important role in shaping labour markets, housing and unemployment policies (Knoben et al., 2011).

Second, a small spatial scale allows us to identify the predominantly rural areas and to understand specific local issues in the Netherlands (OECD, 2008). The relationship between urban and rural regions in the Netherlands is a special case within Europe; the Netherlands is

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1 The NUTS 3 level was chosen as most firm relocations are local (van Dijk and Pellenbarg, 2000) and the risks of false identifications due to firms holding the same name on a NUTS 2 level was considered too great.
highly urbanized and densely populated. Rural regions are also becoming more connected to urban areas, for instance by increasing commuting between these regions (OECD, 2008). The OECD defines rural areas as those having a population density below 150 inhabitants/km² (OECD, 2008). If the standard OECD definition at the NUTS-3 level is applied to rural areas in the Netherlands, it would appear that there are no predominantly rural areas in the country. In order to cope with the specific circumstances of the Netherlands, we therefore adopted a rurality measure based on address density, which is frequently used in Dutch policy but also commonly used in scientific papers (e.g. Haartsen, 2002; Van Stel and Suddle, 2008). This measure uses the average number of addresses/km² within a radius of 1 km from each individual address. Address density uses the concentration of human activities such as living, working and utilizing amenities as indicators of urbanization – the lower the concentration of these activities, the lower the level of urbanization (Haartsen, 2002). Rural areas are then defined as areas with fewer than 500 addresses/km². In line with the general perception, the three northern provinces of Friesland, Drenthe and Groningen are the most rural, together with Zeeland (Haartsen, 2002).

3.2 Dual causality

Although local economic performance is to a great extent determined by the local entrepreneurial potential and physical preconditions (Baumgartner et al., 2013), the relationship between business creation and employment change is likely to be a two-way relationship: these factors influence each other. A strong economic performance by a region could increase that region’s new formation rate since it implies a higher level of entrepreneurial opportunities. Most empirical research pays attention to one particular direction (Hartog et al., 2010). For the purpose of this study we are mainly concerned with the impact of start-up rates on employment change. However, given that the opposite relationship can be expected to hold as well, a one directional analysis could lead to biased results, overestimating the effect of start-ups if not estimated simultaneously (Fritsch, 2012). A number of studies have attempted to disentangle this relationship, most extensively that by Hartog and others (2010) who provide an overview of studies examining this issue and find a weak effect of growth in previous periods on the level of new business formation. We therefore tested the direction of causality using Granger Causality test. The test does not suggest any major impact from reversed causality and the risks of over-estimating the results are very limited. Given the limited impact of reversed causality we prefer
the Almon lag method, explained below, as it allows us to distinguish the direct and indirect effects over time. The test results are included in the appendix.

3.3 Model

As explained earlier, various studies of the relationship between new business creation and employment growth have shown very diverse results, possibly because of the variety of empirical approaches used (Baptista et al., 2005). Using a similar method will help to make the outcome more comparable to previous results. We therefore largely adopt the method by Fritsch and others (Fritsch et al, 2008; Fritsch and Noseleit, 2009; 2013b). The regressions are run with three different dependent variables: total employment change, employment change in new firms and employment change in incumbent firms. The latter two help to disentangle the effects of new business creation, to determine whether the start-ups exert the most influence in the relative short term, or whether the biggest impact on employment is seen in firms that have been in the region for a decade or longer (Fritsch and Noseleit, 2013b).

The first dependent variable in our model is defined as the annual employment change (EMP\textsubscript{total}) in a municipality in the period 1996 to 2010. Total employment change is thus simply percentage change, calculated by total employment in time t compared to the total employment in the year before, time t-1.

\[ \Delta EMP_{\text{total}} = \frac{(EMP_{\text{total} t=0} - EMP_{\text{total} t-1})}{EMP_{\text{total} t-1}} \]

The effect on employment change in new firms is calculated per cohort (EMP\textsubscript{new}). Jobs created by new firms are calculated by summing up the employment in the start-ups in the preceding 9 years.\(^2\)

\[ EMP_{\text{new} t=0} = EMP_{\text{cohort} t=0} \text{ to } EMP_{\text{cohort} t-9} \text{ in year } t=0 \]

\[ EMP_{\text{new} t-1} = EMP_{\text{cohort} t-1} \text{ to } EMP_{\text{cohort} t-9} \text{ in year } t-1 \]

\(^2\) We choose 9 time lags, as empirical test results indicated 9 was the optimal number of lags. Previous studies showed the time period varies between 6 and 10 years to identify statistically significant effects of start-ups on employment. We estimated a Vector Autoregression (VAR) model (Thurik et al., 2008). Based on the VAR we determined the ideal number of lags to include in the regressions. The results of the LR test and the Akaike information criterion indicate 9 lags is optimal.
The employment in incumbent firms (EMP_{inc}) in a certain year is simply calculated by subtracting the number of jobs in the start-ups of the previous nine years from total employment. Therefore, the incumbent employment is the number of jobs in businesses that are at least nine years old.

\[ EMP_{inc\ t=0} = EMP_{total\ t=0} - EMP_{new\ t=0} \]
\[ EMP_{inc\ t-1} = EMP_{total\ t-1} - EMP_{new\ t-1} \]

In order to sum up to the total employment both EMP_{new} and EMP_{inc} are then weighted to calculate their relative contribution to total employment change. Both are calculated as the share of employees in new businesses and incumbent businesses respectively, over all employees. This allows us to compare the contribution of start-ups in EMP_{new} and EMP_{inc} directly. We refer to the work of Fritsch and Noseleit (2013b) for in-depth information regarding all calculations.

\[ \Delta W_{EMP_{new}} = (EMP_{new\ t=0} - EMP_{new\ t-1}) / EMP_{total\ t-1} \]
\[ \Delta W_{EMP_{inc}} = (EMP_{inc\ t=0} - EMP_{inc\ t-1}) / EMP_{total\ t-1} \]

We run three separate regressions for the three dependent variables for the following regional contexts: declining, stable and growing regions, and rural, intermediate and urban regions. The main explanatory variable consists of the start-up rates in the region, of which we use 9 time lags. This is however somewhat problematic, as in reality regional start-up rates are heavily correlated over time (Andersson and Koster, 2011) causing severe problems of multicollinearity. To avoid these problems we use Polynomial Distributed Lags (PDL), also known as the Almon lag method, using a third-order polynomial for estimating the lag structure, which turns out to be the best approximation (Fritsch and Noseleit, 2013a; Baptista and Preto, 2011). We refer to van Stel and Storey (2004; 2008), Fritsch and Noseleit (2013a,b) and Van Stel and Suddle (2008) for a similar application of this method using start-up rates and employment growth rates of respectively British, German and Dutch regions.

### 3.3.1 Controls
Complementing the method used, we include several control variables in the models that are likely to have an impact on regional employment change, to make sure the outcome of the start-up rates are as accurate as possible. Table 2 provides an overview of all the variables used, Table 3 gives some descriptives of the main variables.

The municipal level is fairly small, and generally smaller than the labour market area. In order to control for potential influences at higher spatial scales, we account for commuting patterns. Commuting patterns provide an indication to what extent a municipality depends on other municipalities for its economic development. In addition, we lag certain variables using a spatial weights matrix based on first-order contiguity. These variables are prefaced by W_. We control for the changing demographic composition by including the developments in youngsters and adults aged 65 or older as it is observed that an ageing population can have a negative impact on entrepreneurial activity (Storey 1994; Binet and Facchini, 2013). To control for the effect of regional human capital on growth we include the share the higher educated people. The share of immigrants, both international and interregional, is also included as recent studies have clearly illustrated the important impact of immigrants on economic development (Lisenkova et al., 2013). We also control for income developments. A change in regional income entails a change in potential regional demand, which prompts higher levels of employment from new business creation (Audretsch and Fritsch, 1994; Knoben et al., 2011). Finally we control for sector structure (Baptista et al., 2005; Van Stel and Storey, 2004) and to cope with the data limitation of systematic differences across the collection agencies, we use a dummy variable for the 20 agencies. This can be expressed by the following equation:

\[ EMP_r = f \ NFF_{LAG0-9} + POPc + W_{POPc} + URB + W_{URB} + COMMUTE + AGE + W_{AGE} + HIGH_{EDU} + W_{EDU} + IMM + INCOME + SEC + LISA + \varepsilon \]

<table>
<thead>
<tr>
<th>Start-ups</th>
<th>Start-up rates except agriculture, labour market approach (dividing the number of start-ups by the potential labour market (age 15-65) per region).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population change</td>
<td>Population change per year, data from Statistic Netherlands. For further analysis, three categories are used: decline (&lt; -1%); stable (-1&gt; &lt;1%); growth (&gt;1%), 2 year mean of 96-07 to avoid heavy fluctuations and to</td>
</tr>
</tbody>
</table>
allow some response time for the dependent variable.

| **Urbanisation** | Population density – based on address density per square kilometre, from Statistics Netherlands at municipality level (log). For further analysis, three categories are used: urban, intermediately urban and rural. Urban denotes municipalities with address density > 1500 and rural denotes municipalities with an address density of < 500. |
| **Controls** | Commuting is measured in absolute numbers of incoming commuters in 1998, 2000, 2004 and 2005 due to data availability. Based on these years a trend line was determined and applied to the remaining years. |
| | Age distribution is measured by annual numbers of inhabitants in two categories “Under_15” and “Over_65”. Data from Statistics Netherlands. |
| | Share of higher educated inhabitants relative to the active workforce (log), annual data of 1997-2007 due to data availability. 61 small municipalities were excluded from the source dataset for privacy reasons. These municipalities are estimated based on the share of higher educated in the COROP region. Data from the EBB (Enquete Beroepsbevolking) executed by Statistics Netherlands. |
| | Share of immigrants, annually per inhabitant per municipality. Statistics Netherlands, municipality level. |
| | The annual share of low income households between 1997 and 2009 is used as a proxy for level of income per municipality. Low income households are in the 2nd, 3rd and 4th decile, the upper limit was 17.100 euro in 1997 and 23.700 in 2009. |
| | Annual sector shares, measured in share of jobs per municipality, based on the LISA dataset. We used 8 sectors based on a classification provided by Van Oort (2004): Resource Based Activities; Production (reference category); Physical Infrastructure; Distribution; Consumer Based Activities; Well-Being; Information Activities; Information Infrastructure. |
| **Agency dummy** | The 20 LISA regions were included as dummy variables. |

Table 2. Variables used
### Table 3. Descriptives of main variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start-up rate</td>
<td>2.43</td>
<td>1.41</td>
<td>0</td>
<td>16.23</td>
<td>N = 5852 / n = 418 / T = 14</td>
</tr>
<tr>
<td>EMP&lt;sub&gt;total&lt;/sub&gt;</td>
<td>1.92</td>
<td>4.85</td>
<td>-47.42</td>
<td>101.17</td>
<td>N = 5852 / n = 418 / T = 14</td>
</tr>
<tr>
<td>EMP&lt;sub&gt;new&lt;/sub&gt;</td>
<td>1.46</td>
<td>0.84</td>
<td>0</td>
<td>6.75</td>
<td>N = 2090 / n = 418 / T = 5</td>
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<tr>
<td>EMP&lt;sub&gt;inc&lt;/sub&gt;</td>
<td>-0.06</td>
<td>3.24</td>
<td>-18.46</td>
<td>25.32</td>
<td>N = 2090 / n = 418 / T = 5</td>
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<tr>
<td>Population change</td>
<td>0.38</td>
<td>1.12</td>
<td>-11.51</td>
<td>13.73</td>
<td>N = 5852 / n = 418 / T = 14</td>
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<tr>
<td>Urbanisation (log)</td>
<td>980.99</td>
<td>716.83</td>
<td>122</td>
<td>6029</td>
<td>N = 6270 / n = 418 / T = 15</td>
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#### 4. Results

Before we disentangle the employment effects of new business creation in declining and growing regions, we first divide the enterprises in all regions into total, new and incumbent and use this as a baseline for the remaining results. The results are shown in Table 4 and visualized in Figure 2.
<p>| | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Immigrants</td>
<td>-0.01</td>
<td>-0.00</td>
<td>-0.01**</td>
</tr>
<tr>
<td>Income (low)</td>
<td>0.02</td>
<td>0.01</td>
<td>0.02***</td>
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<tr>
<td>W_Income</td>
<td>0.02</td>
<td>-0.00</td>
<td>0.03**</td>
</tr>
<tr>
<td>Youngsters</td>
<td>0.02</td>
<td>2.36</td>
<td>-0.01</td>
</tr>
<tr>
<td>Elderly</td>
<td>-0.09</td>
<td>0.29*</td>
<td>0.01</td>
</tr>
<tr>
<td>Industry shares</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Agency dummies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>α1</td>
<td>-0.30***</td>
<td>-0.92***</td>
<td>-0.10***</td>
</tr>
<tr>
<td>α2</td>
<td>0.20***</td>
<td>-0.20***</td>
<td>0.02***</td>
</tr>
<tr>
<td>α3</td>
<td>0.05***</td>
<td>0.18***</td>
<td>0.02***</td>
</tr>
<tr>
<td>α4</td>
<td>-0.02***</td>
<td>0.03***</td>
<td>-0.00***</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.16</td>
<td>0.14</td>
<td>0.70</td>
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<tr>
<td>Log likelihood</td>
<td>-5301.68</td>
<td>-5263.36</td>
<td>-1336.02</td>
</tr>
<tr>
<td>F-statistic</td>
<td>9.44</td>
<td>8.00</td>
<td>114.56</td>
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<tr>
<td>Prob(F-statistic)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>N</td>
<td>2090</td>
<td>2090</td>
<td>2090</td>
</tr>
</tbody>
</table>

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

Table 4. Estimated PDL models

Using the PDL we found highly significant results for nearly all start-up lags. The exception is t-5 with employment change in incumbent firms as the dependent variable. Given that t-5 is the precise turning point, from negative impact in stage 2 towards positive impact in stage 3, the results should be near zero. The control variables are most relevant for the employment change in new and young firms. Commuting behaviour is near zero but negatively significant for employment growth in new and young firms. Possibly, urbanisation already accounts for the main commuting effect. A negative effect for new and young firms suggests that people find employment elsewhere. Higher education shows the expected positive sign, but is statistically insignificant. Age distribution is also mainly insignificant, but there is an interesting positive result for the effect of ageing on employment growth in incumbent firms. This could partly reflect the relative conservative preferences of the elderly to buy their goods and services from the older local businesses (Lunsford and Burnett, 1992). Population change shows the expected positive sign, and has a negative impact in the neighbouring region. This suggests some competition effects between municipalities. It may also show a functional difference, with some municipalities focussing on work and others on residential functions. For the industry shares, most impact was seen for ‘distribution’ and ‘consumer based activities’ for all three dependent variables.
Visualizing these outcomes results in Figure 2. On the vertical axis of Figure 2 we see the impact of new firms on employment change in the Netherlands per municipality and on the horizontal axis the time lags of the cohorts. The figure shows the high positive effect in the year of start-up, immediately followed by a steep decline in the following years, turning positive from approximately time lag 6. The s-curve is precisely what we would expect based on the work done by Fritsch and Noseleit in Germany or Van Stel in the Netherlands. It seems that the employment change in incumbent firms, the indirect effect, determines the total employment change; the patterns are very similar. The pattern of the impact on new and young firms also confirms previous research; positive at first and relatively flat from $t=2$ onwards. This is, however, where the similarities appear to end. Summing the coefficients of start-ups on employment change over the period of analysis reveals that there is only 0.14 percent employment growth due to new business creation over a period of 10 years (Table 5). Having a closer look at the coefficients indicates that the sum of the effect in new firms is much larger than the sum of the indirect effect in incumbent firms. Thus, employment in new firms is responsible for all growth, given that employment in incumbents sums up to a negative overall impact. This contradicts the above mentioned papers, although Mueller et al. (2008) also found negative total effects of new business creation for the ‘wrong type’ of entrepreneurship. More recently, the OECD published a report supporting our finding: young firms contribute more to aggregate employment growth compared to incumbent firms (Criscolo et al., 2014).
Figure 2. Impact of start-ups, split up in total employment, new and young firms and incumbents

```
<table>
<thead>
<tr>
<th>sum of lags</th>
<th>all</th>
<th>decline</th>
<th>stable</th>
<th>growth</th>
<th>rural</th>
<th>interm.</th>
<th>urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>new &amp; young</td>
<td>0,34</td>
<td>0,32</td>
<td>0,40</td>
<td>0,36</td>
<td>0,57</td>
<td>0,42</td>
<td>0,46</td>
</tr>
<tr>
<td>incumbents</td>
<td>-0,19</td>
<td>-0,03</td>
<td>-0,71</td>
<td>-0,26</td>
<td>-0,54</td>
<td>0,12</td>
<td>-0,39</td>
</tr>
<tr>
<td>tot emp</td>
<td>0,14</td>
<td>0,28</td>
<td>-0,31</td>
<td>0,10</td>
<td>0,03</td>
<td>0,54</td>
<td>0,07</td>
</tr>
</tbody>
</table>
```

Table 5. Sum of lags, impact start-up rate on employment growth

We now explore whether these results vary per type of region. We differentiate the three dependent variables for the various regional contexts we have set out to distinguish, starting with regions undergoing population decline, and then stable regions and growing regions. Note the sum of all coefficients of the period studied are already included in Table 5.

**4.1 Start-ups and the degree of population change**

Figure 3 shows the impact of new business creation in different changing demographics. At first glance, we notice that the pattern in declining regions is much flatter, with less negative impact and the positive effects are not as high as they are in stable and growing regions. Again though, looking at the sum of the lags, it becomes clear that new firms in declining regions do have a significant impact on employment change. Even more so, the total effect is higher than seen in growing and stable regions. Stable regions do not seem to be able to compensate for the strong displacement effects in time lag 2 till 5 and add up to a negative overall effect.
Figure 3. Impact of start-ups on total EMP change, split up in declining, stable and growing regions

The results so far indicate that entrepreneurs in declining regions do have a significant impact on employment growth, both in the long and short term. The results are not consistent with the assumption that new entrepreneurs in these regions are more likely to be motivated by necessity and that they therefore will have very little effect on employment growth as far as these first results suggest. But it could also mean there is a lack of competition, which should indeed result in relatively high immediate effect due to new capacity, limited displacement and induced effects. We need to segregate our results further and look at the effect in new firms in the different regions. Figure 4 shows very little variation amongst declining, stable and growing regions. The sum of all lags is also nearly the same for employment change, with declining regions performing just under stable regions by 0.08 percent and growth regions by only 0.04 percent.

Figure 4. Impact of start-ups on EMP change in new firms, split up in declining, stable and growing regions.
Figure 5. Impact of start-ups on EMP change in incumbents, split up in declining, stable and growing regions.

Turning to the effect on employment growth in incumbent firms in Figure 5, the typical wave pattern is again markedly present. Contrasting the effects within new firms, here we do see a clear distinction between declining and growing regions. Decline is rather flat and similar to the pattern for total employment in Figure 3, whereas growing regions, but in particular stable regions, show fairly steep highs and lows. This indicates that established firms in declining regions are impacted less by newcomers. Browsing back to Table 5 we find an unexpected result for the incumbent firms. The total impact, the sum of all lags, is negative in nearly all cases. The positive impact in the first and third stages does not seem to compensate for the negative displacement effects in the second stage, which are most pronounced in stable regions. The strong displacement effects can be explained by intense competition and selection. Apparently, this does not translate into supply-side effects that are great enough to ensure overall growth.

4.2 Start-ups and the degree of urbanisation

As described in the theoretical framework, previous studies have found significant differences between different degrees of urbanisation concerning the impact of new business creation. In this paragraph, we analyse employment growth in the same way as done for the three variables identifying population change in the section above: we first calculate the short term impact of
young firms and second the impact of established firms, split into rural, intermediately urban and urban areas.

![Graph showing impact of start-ups on EMP change, split by rural, urban, and intermediate regions.](image)

Figure 6. Impact of start-ups on total EMP change, split up in rural, urban and intermediate regions

The impact of start-ups on the total regional employment change in Figure 6 shows the expected differences in the longer term pattern. The effects in rural regions appear to be the least pronounced regarding both the negative displacement effects in time lags t1 till t5, and the positive induced effect in the later time lags. We see the highest impact in intermediate regions, which also seem to turn into the positive somewhat earlier than rural and urban.
The graph for the effect on employment change in new firms in rural and urban regions is slightly less uniform compared to the effects on new and young firms in declining, stable and growing regions (Figure 7). Particularly in the initial year (t0), the three regions vary distinctively: there is a large impact of new business creation in rural regions, being nearly twice as high as in urban areas. Even though there might be a denominator effect visible here, it does indicate the short term importance of new business creation. The impact in t-2 until t-5 also shows some variation with rural regions experiencing the most negative effects. The total effects over the longer time period (Table 5) show that rural regions remain positive mainly because of the strong impact in the initial year.
Figure 8. Impact of start-ups on EMP change in incumbent firms, split up in rural, urban and intermediate regions.

The results in rural, intermediate and urban regions are very much in line with our expectations (Figure 8). Similar to the effects we have seen in declining and growing regions, the impact on employment in established firms is only positive in intermediate regions for the full study period. The pattern in rural areas is distinctive, there is hardly a positive effect noticeable in t0 and the highs and lows are again relatively flat. Urban regions also have a negative total sum, but do show the typical wave pattern. Rural regions see the least positive impact, and intermediate regions the most. These municipalities are mostly found in the centre of the country and in the Randstad area in-between the largest cities and urban centres. In the Dutch context, these are likely to be the most competitive regions in terms of real estate prices and availability, for both office space and private housing. They provide similar facilities to many of the urban centres and have already been shown in previous research to provide the most entrepreneurial opportunities (Delfmann et al., 2014). The results reported are different compared to the study by Van Stel and Suddle (2008) in the Netherlands who find negative outcomes for the periphery. This can be explained by two big methodological differences. First the authors use a data base which divides the Netherlands into 40 regions, which is a significantly larger scale than the 418 municipalities used in this study. To reiterate, preference was given to the small spatial scale given the local mind-set of new business creation and in order to identify the predominantly rural areas (OECD,
Second, Van Stel and Suddle operationalize the notion of urbanization differently, namely by specifying the Randstad area versus the rest of the country, while we find the most impacts are in intermediate regions which are part of these bigger regions used by Van Stel and Suddle. In other words, the differences in the data set-up mean that their results and ours do not necessarily contradict one another.

5. Conclusion
The main goal of this paper was to disentangle the impact of new business creation on regional employment growth in different regional contexts, and in particular to compare declining regions with growing regions. The overall pattern we found seemed to confirm previous research, demonstrating the impact of long term indirect effects on total employment growth. Interestingly, we found that the sum of all time lags remained positive on account of the direct effects in the first 2 time lags of the start-up cohorts because the immediate effect was much larger than the sum of the displacement and induced effects. The direct effects are per definition a local phenomenon but perhaps the displacement effects and supply side effects are not visible at the chosen aggregation level. These results are different to most of the other empirical studies and need further investigation.

This paper shows that population decline does not automatically lead to economic decline, Population decline in itself is not a reason for concern regarding employment growth. The largest impact is found in incumbent firms. The older firms seem to adjust their employment accordingly, whereas this effect is less for new and young firms. Despite the adverse circumstances of population shrinkage in declining regions, we found that start-ups do have a positive and significant impact on employment change in these regions. The net employment effect of new business creation is small in rural regions, but we do find that there is high employment growth in the first immediate stage. While rural regions exhibit the least positive impacts, it is the intermediate regions which experience the most positive employment effects from their new firm start-ups.

Both declining and rural regions show the least amount of variation in the impact of start-ups over time. This suggests that established firms in declining regions are less impacted by newcomers than established firms in other types of regions, and implies that modest rates of
decline may be manageable and hardly noticeable. Indeed, a declining population may be irrelevant to some aspects of economic welfare. The results seem to indicate that entrepreneurs in disadvantaged regions do have a significant impact on employment growth, both in the short and long term. However, the widespread assumption that these business owners are more likely to be motivated by necessity, and thus have very little effect on employment growth, does not seem to apply here. Thus, even though entrepreneurship in rural regions and disadvantaged regions generates less economic benefits compared to other regions, our results suggest that aiming to foster more local start-ups can still be a desirable strategy for local governments.

**Literature**


Freire-Gibb, & Nielsen (2014), Entrepreneurship Within Urban and Rural Areas: Creative People and Social Networks. Regional Studies, 48(1), 139-153


Entrepreneurship, Entrepreneurship & Regional Development: An International Journal, 23:3-4, 135-157, DOI: 10.1080/08985620903183736


### Appendix Granger causality

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<tr>
<th>Dependent variable: Employment change</th>
<th>Chi-sq</th>
<th>Prob.</th>
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<td>Start-up rate</td>
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<tr>
<td>if decline</td>
<td>96,77</td>
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<td>if stable</td>
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<tr>
<td>if growth</td>
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</tr>
<tr>
<td>if rural</td>
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</tr>
<tr>
<td>if intermediate</td>
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</tr>
<tr>
<td>if urban</td>
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<td>0,00</td>
</tr>
<tr>
<td></td>
<td>23,07</td>
<td>0,01</td>
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</table>

<table>
<thead>
<tr>
<th>Dependent variable: Start-up rate</th>
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<th>Prob.</th>
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<tr>
<td>if urban</td>
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Appendix. Vector Autoregression model: Granger Causality/Block Exogeneity Wald Tests