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Sierdjan Koster
André van Stel

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The relationship between start-ups, market mobility and employment growth: An empirical analysis for Dutch regions

Sierdjan Koster [A] and André van Stel [B]

[A] University of Groningen, The Netherlands

[B] EIM Business and Policy Research, Zoetermeer, the Netherlands

Abstract

Recent literature suggests that two types of competition may contribute to macro-economic performance: the extent of new-firm entry and the extent of competition among incumbent firms. In the present paper we explain employment growth at the region-sector level using direct indicators for both these types of competition -the start-up rate and the market mobility rate- as main independent variables. While previous studies in this field measured competition among incumbent firms in an indirect way, we use a direct measure called market mobility. The empirical analysis reiterates existing results in that we find the long-term economic effect of start-ups to be bigger than the short-term effect. We also find empirical indications that this long-term effect consist of two significant parts. First, the most successful start-ups grow out to become high-growth firms, and second, the entry of new firms stimulates incumbent firms to perform better.

Keywords: start-ups, incumbent firms, competition, market mobility, employment growth

JEL codes: O18, L16, M13

Contact: Sierdjan Koster, sierdjan.koster@rug.nl, André van Stel, ast@eim.nl

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INTRODUCTION

An important strand of empirical research into the relation between new-firm start-ups and regional growth suggests that the main impact of new-firm entries on regional growth is indirect and comes with a time lag (Fritsch, 2008). Although new firms have a direct impact by employing workers, the more important impact is assumed to be indirect by stimulating incumbent firms to perform better (Fritsch and Noseleit, 2009). This process is found to take several years as the least competitive incumbents and new firms first have to leave the market as a result of the increased competition caused by the new firms (creative destruction). After this process, the market has been reformed and the most competitive new and incumbent firms survive. They grow their businesses so that the market under consideration ultimately grows. This process only occurs when the quality of the new-firm start-ups is sufficiently high (Mueller et al., 2008).

Empirical studies, summarized by Fritsch (2008), generally support the argument. Basically, new firms induce competition among incumbent firms, which leads to economic growth. However, the empirical models employed in this type of research only use start-up rate data of several lags, and do not directly measure the extent of competition among incumbent firms. Hence, the empirical support for the theory is indirect. In this paper we employ a measure that captures the competition among incumbent firms called market mobility. The indicator was developed in Folkeringa et al. (2011) and used earlier in Koster et al. (2011).

In the analyses, we explain employment growth using the start-up rate (capturing the direct effect of new firm formation) and the market mobility rate (capturing the indirect effect) as main independent variables. This set-up allows us to actually assess the separate contributions of the direct and indirect effects of start-ups. Regarding the indirect effect, we are able to identify the influence on regional growth that relates to competition among incumbent firms which is ignited by the entry of new firms on the market. To the best of our knowledge, we are the first to include separate measures for competition induced by new and incumbent firms in a model of regional growth. Therefore, our regression results add to the knowledge base on the relation between start-ups, induced competition among incumbent

firms and consequent regional economic performance.

START-UPS AND EMPLOYMENT GROWTH

Most studies that address the impact of new firms on the economic development of regions do this by linking start-up rates to employment development. This type of research has proven to be quite productive and several influential special issues document the progress that has been made. In particular, special issues in *Regional Studies* in 2004 (volume 38, issue 8) and *Small Business Economics* in 2008 (volume 30, issue 1) and in 2011 (forthcoming) give state-of-the-art overviews. We refer to Acs and Storey (2004), Fritsch (2008) and Dejardin and Fritsch (2011) for surveys of these special issues. An important finding is that start-ups both have a direct or immediate effect on employment growth and an indirect effect (Fritsch and Mueller, 2004). The direct or immediate effect, in terms of employment, is simply the additional labour needed in the newly started firms. A part of the employees needed is drawn from the existing pool of employees, which in effect only leads to a reshuffling of employees. However, it can be expected that employees are also drawn from the pool of people that were not active on the labour market or were unemployed. In effect, new jobs are created which is reflected in regional employment growth. A positive immediate effect of start-ups can thus be expected. Among others, Fritsch and Mueller (2004), Koster (2011) and Fritsch and Noseleit (2009), empirically confirm this.

The indirect effect is governed by competition effects resulting from start-ups. These effects are predicted in the seminal contribution of Schumpeter (1912) in which he describes a creative destruction process ignited by entrepreneurial recombination of existing production factors. The process entails fierce competition where new firms enter the market with new products and services, thus challenging incumbent firms to improve their performance. If not, they are forced to downsize or even exit the market. This results in shifts in the composition of the population of incumbent firms. The most competitive entrants and incumbents survive and these businesses grow while the least competitive firms exit the market or are forced to downsize. The result of such a creative destruction process is an ever changing composition of the firm population in an economy where the average quality of the firms

continuously increases (as the high quality firms survive and grow and the low quality firms decline or exit).

The theory described above is confirmed by several empirical analyses using micro level data. A standard result in empirical studies on the effect of entries and exits on productivity is that a considerable part of the productivity improvement can be attributed to the entry of new business units with above-average productivity and the exit of units with below-average productivity (Fritsch and Mueller, 2004). Using employment as performance measure, other studies show that mobility of incumbent firms results in a net increase in total employment at the industry level. For instance, Baldwin (1995) divides Canadian manufacturing firms that survived from 1970 to 1982 into those gaining and those losing employment. The average 'gainer' grew by 7.8 percent annually while the average 'loser' shrank by 6.3 percent. For the German case of continuing firms in the non-agricultural sectors during 1977-1990, Boeri and Cramer (1992) find that employment increased by 6.2 percent annually for expanding incumbents, while the employment of contracting ones shrank 5.8 percent annually. These results show that turnover in the population of firms can be related to economic performance: economies with higher levels of turnover are expected to achieve higher levels of economic performance (Bosma et al., 2011; Van Stel and Storey, 2004). At the regional level, Fritsch and Noseleit (2009) quantify the direct and indirect effects of start-ups and they find that the indirect effect is more important. It remains unclear, however, what drives the indirect effect. Is it indeed the competition effect as predicted by Schumpeter or are other factors important, including a cohort effect of growing start-up firms (gazelles)?

The continuing process of creative destruction thus explains long-term economic growth, in terms of higher productivity levels and employment growth. Fritsch and Mueller (2004) conjectured that the indirect competition effect of start-ups may take some time to materialize and they specifically addressed the temporal dimension in the effect that start-ups have on employment generation. Empirically, the temporal dimension in the effect is tested with Almon regression models, where several lags of the start-up rate are included under certain parameter restrictions (see also Van Stel and

Storey, 2004). In this approach, it is possible to distill the temporal effect while controlling for serial autocorrelation between the yearly observations. The assumed competition effects sparked by start-ups in the base year are found to last between 7 (Arauzo Carod et al., 2008) and 12 years (Fritsch and Mueller, 2004), indicating that the effect of start-ups on employment generation should ideally be studied in a research design that takes the temporal effect into account. Since the Almon lag studies suggest that the indirect effects may be considerably large, it is of vital importance to measure the extent of competition (as driving theoretical concept) in a direct way, and to estimate the relation between start-ups, competition among incumbents, and regional growth in a regression model. Trying to test the theoretical idea that start-ups spark a competition effect among incumbent firms, Koster et al. (2011) have used a measure of competition and showed that start-ups do indeed set off a competition process among incumbent firms. This gives support to the underpinnings of the indirect economic effects that start-ups may have. However, since the Almon type of regression models only use data on start-up rates, and do not employ a direct measure of competition among incumbent firms, it is still unclear whether the indirect effects of start-ups on growth indeed run through competition. As discussed before, this is the contribution of this paper.

MARKET MOBILITY INDICATORS

There is a sizeable literature concerning the relationship between the dynamics in firm populations and sectors and economic development. Caves (1998) presents an overview of this strand of research and he distinguishes between three types of turnover in firm populations: the births and deaths of business units (‘entry and exit’), variations in sizes and market shares of continuing units (‘mobility’) and shifts between enterprises in the control of continuing business units (‘changes in control’). The present study focuses on the roles that the first two types of turnover play in economic development. As the term ‘mobility’ is used for different purposes in economic literature, variation in the ranking of incumbent firms is here indicated with the more precise term ‘market mobility’.

Market mobility indicators measure to what extent a ranking of a population of firms (in terms of economic performance) changes over time. If the ranking is stable (i.e. the same firms are at the high

and low ends of the ranking in two years of comparison), then market mobility is low. If there is much change in the ranking, then market mobility is high. Changes in the composition of firms can be interpreted as the result of competitive forces in a population of firms. To our knowledge Joskow (1960) is the first to suggest shifts in relative firm positions as an indicator of the "workability of competition (p.113)". Following Joskow, Baldwin and Gorecki (1994, p. 95) argue: "Mobility indices measure the outcome of the competitive process in terms of transfer of market shares from losers to winners. Much of what happens during the competitive process will be manifested by changes in relative firm position". Market mobility measures differ from concentration indicators, commonly used to represent the competitive structure of markets, in that they capture the dynamics in a firm population following the firms individually. Concentration measures, in contrast, do not consider firms individually but regards the overall distribution of firms in the market. As a result, concentration measures mask underlying dynamics in the firm population. As Schumpeter's theory expects individual firms to change position as a result of new entries (firms with a competitive edge will grow whereas others will decline), the market mobility measure appears more appropriate in this context.

Still, interpreting market mobility measures as reflecting the outcome of a competition process among incumbent firms is not without debate. It has been argued that shifts in firm population may occur for reasons other than competition among those firms. Particularly, overall market developments, oligopolistic market power and capital vintage effects (productivity declines as the firm ages) may explain market mobility patterns in the firm population (Baldwin, 1995; Caves, 1998). Although these arguments warrant caution interpreting market mobility rates as reflecting a competition process, the core of the argument remains intact in the setting of the current study. Dunne et al. (1989) and Davis and Haltiwanger (1992) conclude that market mobility is largely independent of the development of industries. Expanding, stable and contracting industries show a large degree of variation in market mobility. Overall market developments do not seem to influence the market mobility rates. In an oligopolistic market the firms' positions may remain stable while there is extensive competition among the firms in the market. This argument seems valid particularly when using narrowly defined markets in which a few firms can dominate the market. In this study, however, we are forced to use quite broad

markets and the argument seems less applicable as a result. The market control required for exerting oligopolistic market power is difficult to organize in such large and relatively diverse industries. Finally, capital vintage effects may explain some of the shifts recorded but it is difficult to see this effect independently of the market. Firms with declining productivity will only lose their market share if there is competition for those shares. Capital vintage can thus be seen as a mechanism that explains how competition translates into mobility among firms.

In conclusion, market mobility measures are not perfect measures of all aspects of competition. They do not, for example, capture the current competitive structure of a market which is probably best captured by concentration measures. Also, variables other than competition may partly explain market mobility, even though we have argued that the impact of these variables may be small. Keeping these caveats in mind, market mobility rates do a good job in capturing shifts in firm populations over time accurately. As such, they are a direct measure of the shifts in the firm population as predicted in Schumpeter's take on industrial change and economic development. These shifts are the result of the individual firm responses to the developments in the markets, which take place in a competitive environment. Market mobility rates can be interpreted to represent this aspect of competition.

The market mobility rate

In this paper we employ an indicator of market mobility, at the region-sector level in which the mobility rates reflect the degree of change over the period 2000-2006 in the ranking of establishments with five or more people in terms of employment size (see also Folkeringa et al., 2011; Koster et al., 2011). The construction of the market mobility indices involved a huge longitudinal database at the firm level and a Markov chain methodology to convert the firm level data into an overall indicator of the intensity of the dynamics in a specific region-sector. The calculation process is fairly intuitive, although labour intensive given the large number of firms involved: A population of firms in a given industry is ranked in four quartiles at two points in time (2000 and 2006), based on employment size. Then, transition probabilities from size-class i to size-classes 1 to 4 are estimated by establishing the proportion of firms that has moved from size-class i to size-classes 1 to 4, respectively. The diagonal elements of the

transition matrix show the likelihood that firms remain in the same (relative) size-class. The mobility measure is constructed in such a way that markets with high values for the diagonal elements (i.e. small probabilities of moving to another size-class), have low market mobility values, and vice versa[1].

As the analysis requires all firms to be in the data set at the start and end point of the period under consideration, exiting firms are not covered by the measure. As a result, the analysis does not pertain to all aspects of industrial restructuring as described in the above. Also, new firms that may enter and exit the data base during the study period, are not considered (see Reynolds, 1999, for an analysis on the employment effect of turbulence indices based on entry and exit). The market mobility measure reflects changes over time in the firms' rankings in terms of the number of employees. As such, it measures the outcome of competition among incumbent firms. This competition, in turn, is assumed to have resulted from entry by new firms.

DATA AND MODEL

The theoretical argument addressed in the analysis is the Schumpeterian expectation that start-ups cause a process of creative destruction or competition among incumbent firms. Through this process of competition (or shake out), the fittest firms remain which should in turn lead to economic development. Hence, a cohort of start-ups could contribute to macro-economic performance by inducing incumbent firms to perform better, i.e. by increasing competition among incumbent firms. However, start-ups can also contribute directly, for instance when the most successful ones grow out to become large firms (high-growth firms). The analysis tests whether both the direct and indirect effect of start-ups are pertinent in explaining regional employment development. Also, by including both effects simultaneously, we are able to assess the relative contributions of each.

[1] Market mobility is computed as $M_U(\mathbf{P}) = n\sum_{i\in I}\pi_i(1-p_{ii})/(n-1)$, where **P** is the transition matrix containing transition probabilities from one state to another (in our case, the states reflect the ranked classes of firms, based on their firm size), n is the number of states (four, in our case), i is an indicator for the i^{th} state, π_i is the stationary probability for state i, and p_{ij} is the probability of moving from state i to state j between two time periods. The indicator $M_U(\mathbf{P})$ may then be described as the unconditional probability of leaving the current state, scaled by n/(n-1) (Cantner and Krüger, 2004). See Norris (1998) for a general account of the Markov chain

We apply a multivariate regression analysis which explains employment growth in the Netherlands in the period 2000 to 2006. The main explanatory variables for our purpose are the start-up rate (lagged and current) and the market mobility measure described above. The analysis is done at the region-sector level. The regional dimension is at the NUTS-III spatial aggregation level. This regional scale comprises of 40 labour market regions[2] and is commonly used in economic research in the Netherlands (cf. Bosma et al., 2011; Frenken et al., 2007; Van Stel and Nieuwenhuijsen, 2004). Regarding sectors, the data allow for a five-sector classification (cf. van Stel and Suddle, 2008): manufacturing (International Standard Industrial Classification code D), construction (ISIC code F), trade (ISIC codes GH), transport & communication (ISIC code I), and business services (ISIC codes JKNO). Although this is admittedly a rough classification, it does allow for some variation in industry structure concerning effects and market mobility rates. The following variables are included in the empirical analysis.

- Percentage employment change 2000-2006

This is the dependent variable. It is generally used as an indicator of regional economic development (see, for example, Fritsch and Mueller, 2004). Using this measure, we follow the empirical standard in this type of research.

- Market mobility rate 2000-2006 (M_U)

This is the main explanatory variable. As an indicator of the dynamics shifts occurring as a result of competition, it is expected to have a positive effect on employment growth. Mobility rates are computed using data for those establishments which have five or more workers both in 2000 and in 2006. Firm entries and exits are excluded from this measure. Data on individual firms are taken from the data base REACH (REview and Analysis of Companies in Holland), which is operated by a private firm called 'Bureau van Dijk'. The original source of these data is the so-called 'Handelsregister' (business register) maintained by the Dutch Chambers of Commerce. Initially, for each region mobility rates are

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methodology.

[2] In the Netherlands, this regional division is known as the COROP classification.

computed at the sector level distinguishing 16 industries (cf. Folkeringa et al, 2011). Next, the mobility rates are aggregated towards the five-sector level described above using a sector weighting scheme.[3] Appendix I provides descriptive statistics of the market mobility measure. It shows that there is a sizeable variation both across regions and across sectors.

- Average start-up rate 1999-2005.

Following the labour market approach, the start-up rate is calculated as the number of start-ups divided by regional employment. The data on the number of start-ups are taken from the Dutch Chambers of Commerce. The number of start-ups is defined to include all independent new-firm registrations. It includes both new firms with employees and new firms without employees. Mergers, new subsidiary companies, new branches and relocations to other regions are not counted as a start-up. Data on employment are taken from Statistics Netherlands and the employment figures relate to employee jobs expressed in full-time equivalents (labour years).[4]

- Average start-up rate 1993-1999.

As discussed in the above, the impact of start-ups on employment growth may be lagged (see, for example, Fritsch and Mueller, 2004). Therefore the analyses include lagged start-up rates.

In addition to our main variables of interest, several control variables have been included in the analyses. These are population density, wage development in the period 2000–2006 and lagged employment change.

- Population density.

In the models, population density is included as a catch-all variable that is strongly correlated to aspects such as educational attainment, income levels and market access. As such it represents several aspects that may influence regional employment growth. We also include a squared term in order to capture a

[3] We aggregate towards the five-sector classification because the start-up rate variable is not available at lower sectoral aggregation levels.

possible non-linear relationship between density and employment growth. Data for population density are taken from Statistics Netherlands. Population density varies only at the regional level.

- Wage development 2000 – 2006

This variable is measured as the relative change in the *real* wage rate between 2000 and 2006, i.e. we correct the nominal wage development for the influence of inflation. Van Stel and Storey (2004, p. 897) summarize the expected effects of wage changes on regional employment change: "Another control factor is the nature of the labour market, reflected in local wage rates. Rees and Shah (1986) assume that the welfare maximizing individual chooses between utility in self-employment and utility in paid employment for which wages are taken as the proxy. Hence rises in wage rates would be expected to lead to movements into wage-employment and out of self-employment, consistent with a positive effect on employment change. Furthermore, wage rises may also stimulate labour supply which could also lead to increased employment at the regional level. However, there is also a possible negative effect as a higher price of labour may lead to a lower demand for labour (substitution between capital and labour). These opposite effects make the sign of wage rates indeterminate from theory."

- Lagged employment growth (1993-1999)

This variable is included to correct for reversed causality (Granger, 1969).

- Sector dummies

As shown in Koster et al. (2011), there is an important sector dimension in the relationship between start-ups dynamics and market mobility. Therefore, in order to correct for possible sector influences in the relationship between start-ups, mobility and economic development, sector dummies are included in the analysis. Also we split the sample two-way and assess Industry sectors (manufacturing and construction) and Services sectors (trade, transport and communication, and business services) separately. In addition, mobility rates vary across industries (Appendix I). Therefore, correcting for

[4] Because of a change in the employment data at Statistics Netherlands, data for 2006 are not comparable to 2005. Therefore, we use the average of 1999-2005 instead of 2000-2006, the period for which we measure mobility.

sector is important.

- Regional dummies

Finally, we include regional dummies at a high spatial aggregation level. These dummies group the 40 NUTS-III regions (our unit of analysis) into four larger groups (NUTS-I). Inclusion of the dummies helps preventing possible spatial autocorrelation caused by unobserved heterogeneity (Van Stel and Nieuwenhuijsen, 2004). In order to assess any possible remaining spatial dependence in the models, standard Lagrange multiplier tests are reported where appropriate. The tests were performed using a row-normalized weight matrix defined on the basis of contiguity (Queen's criterion).

Tables 1 and 2 present the descriptive statistics and the correlation between the variables included in the analysis. Two observations stand out. Firstly, the mean values of the percentage employment change in 1993-1999 (18.18) and 2000-2006 (0.11) reflect the overall decrease in job generation experienced in the Netherlands in the first half of the 2000s. There are still sizeable regional differences in employment change, however. This is what the regression analyses will eventually pick up. Secondly, the correlations between the independent variables are moderate at most except for the large correlation between the current and lagged start-up rate (0.83). Because of this feature the two variables are always entered separately.

- Table 1 –

- Table 2 –

The empirical analysis is done in two steps. Firstly, pooled OLS regressions are estimated for the whole sample. In the regressions, employment growth is explained by the market mobility variable (Mu), the current start-up rate and the lagged start-up rate. Secondly, this is done for the Industry and Services sectors separately.

RESULTS

Table 3 presents the results of the pooled OLS model for all industries together. The table contains model variants using current (model I) or lagged (model II) start-up rates. Before turning to the variables of interest, it is useful to note that the control variables show robust and consistent results. Population density is negatively related to employment growth and population squared has a positive effect. This suggests a U-shaped relationship, although the effect of the negative sloping linear coefficient is driving the effect most strongly. This reflects the situation that most growth takes place outside the most urbanized parts of the Netherlands. Also, as employment change is measured as a percentage, there could be a level effect reducing relative growth of employment in regions with high levels of employment. The sign of lagged employment growth is positive, pointing to some degree of path-dependency. Wage growth also has a positive effect, which suggests people are attracted to wage employment in (regional) markets with relatively high wages. This effect seems to outweigh a possible labour substation effect. Also, when wages increase relative to incomes from other occupations (e.g. self-employment income), wage-employment becomes more attractive, and more people will choose to become wage-employed (Rees and Shah, 1986). Finally, it is clear that the regional dummy variables have minor effects only. The eastern part of the country has -ceteris paribus- a slightly increased growth rate compared to the West. Also, the Lagrange multiplier tests turn out insignificant which indicates that spatial dependence is not a concern. This also affirms that the spatial level of the analysis is pertinent for assessing the effect of market mobility on regional employment growth.

- Table 3 –

- Table 4 –

Turning to the variables of interest, it is clear that the market mobility measure has a consistently positive effect on employment growth. This suggests that competition between incumbent firms leading to shifts in the firm population is indeed a pertinent mechanism explaining economic development. Also

start-up rates, both current and lagged, are positively related to employment growth. The current start-up rate is not significant though (model I). In general terms, it is clear that both start-up rates and the competition effects generated are important in explaining employment growth.

In order to assess the relative sizes of the effects of the variables, the effects of a standard deviation change are computed. Table 4 presents the standardized effects (i.e. the effect on employment change of a one standard deviation-change in market mobility or start-up rate), which can be directly compared because they are now measured in the same scale. Now, it is possible to assess the relative strengths of each mechanism. The table shows that the lagged start-up rates have a bigger impact than current start-up rates. The standardized effect of the lagged start-up rate is considerably larger than the effect of the current start-up rate (2.73 vs. 1.68). This finding is consistent with existing theory and empirical studies (Fritsch, 2008): the long-term effect of start-ups is bigger than the immediate job generation effect. The long-term effect has two elements: successful new start-ups grow into bigger companies (gazelles) and induced competition among incumbent firms. Since Models I and II include both lagged start-up rates and a specific measure for competition (the market mobility rate), the remaining effect of the lagged start-up rate can be attributed to job creation as a result of expanding new firms (possibly only a few very successful ones). This effect appears to be quite strong and it is more important that the effect that runs through industrial restructuring captured by the market mobility rate (Table 4: 2.73 vs. 1.67).

Distinction by sector

It is possible that there are sector differences in the relationship between market mobility, start-up rates and employment growth. In order to assess these possible differences, the same analysis is done for two broadly defined sectors (Industry and Services). The results for Industry (manufacturing and construction) are presented in Tables 5 and 6. The results for Services (trade, transport and communication, and business services) are presented in Tables 7 and 8.

- Table 5 –

- Table 6 –

- Table 7 –

- Table 8 –

In general, the results show that employment change in Industry sectors is more difficult to explain than in Service sectors. The R^2-scores are lower and fewer (control) variables show significant results. For Industry sectors (manufacturing and construction), only the change in real wage is consistently positively related to employment generation. More employment opportunities tend to push wages upwards as competition for employees increases. For Services, the results for the controls are similar as those for the whole sample analyses.

Also the variables of interest show different results. For the Industry sectors (Tables 5 and 6) the effect of market mobility is positive as is the effect of the lagged start-up rate. However, both effects are not significant. This suggests that in the Netherlands, competition in Industry sectors (and, presumably, particularly in manufacturing) takes place at the regional level only to a limited extent. Given the small geographical size of the Netherlands, and the international orientation of the manufacturing sector, this seems a plausible result.

In the case of the Service industries (Tables 7 and 8), the results are similar to those for all industries together (see Tables 3 and 4). Start-up rates and market mobility among incumbents have significant positive effects. Another interesting result is that the immediate start-up effect is somewhat larger than for the whole sample also relative to the indirect effect (Table 8: 2.26 vs. 2.64). It seems to suggest that growth as a result of start-ups is established much quicker in service industries. Nevertheless, the indirect effect of start-ups is still the strongest explanatory factor of employment growth. The differences in the sector results are in line with findings by Andersson and Noseleit (2011), who also find sector differences in the time-span needed for indirect effects to take place.

CONCLUSIONS

Recent literature suggests that the effect of start-ups on employment change can be decomposed into an immediate effect and a long-term effect. The immediate employment effect reflects the employees needed in the new firms. The long-term or indirect effect mirrors the growth of successful start-ups and a rearrangement process among the incumbent firms. Existing firms are challenged by the new firms and those that are able to adjust are assumed to strengthen their position relative to other incumbents. This process should lead to productivity and employment benefits for the regional economy. While existing studies measured this competitive reshuffling process among incumbent firms in an indirect way (in particular, by imposing Almon restrictions on the coefficients of a set of lagged start-up rates), this paper adopts a direct measure of the rearrangement in the firm population. This measure is called market mobility.

In the analysis, employment growth is explained at the region-sector level using indicators for the immediate effect (start-up rate) and the indirect effects (lagged start-up rate and market mobility rate). The analysis corroborates earlier findings that the indirect effect is bigger than the immediate effect. When analyzing (separate) model variants with current and lagged start-up rates, we find the coefficient of the lagged start-up rate to be clearly higher. We also find empirical indications that this long-term effect consist of two significant parts. First, we find that the market mobility rate has a positive effect on employment growth. This suggests that the reshuffling in the population of existing firms has a positive effect on regional employment growth. We know from earlier evidence in Koster et al. (2011) that the market mobility rate is partly explained by the lagged start-up rate. This implies that new firms cause competition among incumbent firms stimulating existing firms to perform better. In addition, the finding in this paper that market mobility positively affects regional employment growth, implies that increased performance by incumbent firms positively affects macro-economic performance. Second, we find that when including the lagged start-up rate and the market mobility rate together, the lagged start-up rate is still significant. This finding suggests that a significant portion of new jobs is created by (possibly only a few very successful) high-growth start-ups that grow to be big firms in the long run.

This effect appears to be bigger than the effect of competition among incumbent firms.

We also find sector differences in the interrelation between start-ups, market mobility and regional employment growth. For Industry sectors (manufacturing and construction), we find the effects of start-ups and market mobility on regional employment to be weak. This may reflect the situation that in the Netherlands, competition in manufacturing takes place at the national level. For services industries, start-up rates and competition among incumbents have significant positive effects on regional employment. Our results also suggest that regional growth as a result of start-ups is established much quicker in services industries, compared to manufacturing and construction. Although the analysis does reveal significant differences across sectors, the sector breakdown used is rather coarse. Therefore, it is difficult to interpret the findings in terms of firms competing in the same market. Rather, it reflects rather broad industry differences in terms of market size and inputs. It seems promising, therefore, to look at the intricate relationship between start-ups, induced competition among incumbents and regional economic growth using more narrowly defined industries.

This study reiterates earlier empirical findings in which the indirect effect is found to be more important than the direct employment generating effect of start-ups. This further strengthens the argument that assessing the impact of new firm formation on economic development should be done in an explicit longitudinal setting. It also stresses the importance of addressing the mechanisms that play a role in shaping the indirect effects, induced competition among incumbent firms being one of those mechanisms. The analysis shows that while controlling for other variables, turnover in the population of incumbent firms, reflecting a competition process, has a positive and significant individual effect on employment generation.

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Table 1: Descriptive statistics.

	Mean	**SD**	**Min**	**Max**
Percentage employment change (2000 – 2006)	0.11	12.68	-35.48	34.14
Lagged employment change (1993-1999)	18.18	18.89	-28.81	91.67
Start-up rate (1999-2005)	12.08	8.42	1.20	45.46
Lagged Start-up rate (1993-1999)	10.73	5.93	1.01	32.41
Market Mobility (Mu x 100)	65.93	8.79	36.1	91.1
Average wage change (00-06)	4.70	16.02	-34.41	56.62
Population density (x100)	6.54	6.03	1.47	31.11
Population density squared (x100)	78.92	162.40	2.15	967.96

Table 2: Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Percentage employment change (2000 – '06)	1							
(2) Lagged employment change (1993-1999)	.59	1						
(3) Start-up rate (1999-2005)	.09	.13	1					
(4) Lagged Start-up rate (1993-1999)	.25	.36	.83	1				
(5) Market Mobility (Mu x 100)	.42	.35	.26	.35	1			
(6) Average wage change (00-06)	.65	.39	-.34	-.16	.15	1		
(7) Population density (x100)	-.21	-.17	.03	-.06	.07	-.07	1	
(8) Population density squared (x100)	-.15	-.13	.02	-.06	.10	-.04	.93	1

Table 3: Estimation results all industries (whole sample).

Variable	I	II
Constant	-15.81 (5.85)***	-17.76 (5.66)***
Population density	-0.75 (0.28)***	-0.76 (0.27)***
Population density squared	0.02 (0.01)**	0.02 (0.01)**
Average wage growth (00-06)	0.37 (0.07)***	0.37 (0.06)***
Lagged employment growth (93-99)	0.09 (0.05)*	0.05 (0.05)
Market Mobility (Mu)	0.19 (0.08)**	0.19 (0.08)**
Start-up rate (99-05)	0.20 (0.14)	
lagged Start-up rate (93-99)		0.46 (0.15)***
Dummy Manufacturing (D)	-4.06 (2.27)*	-3.33 (2.21)
Dummy Construction (F)	-0.10 (3.86)	-0.42 (2.68)
Dummy Trade (GH)	0.16 (1.87)	-1.33 (1.83)
Dummy Transport (I)	--	--
Dummy Bus. Services (JKNO)	7.40 (2.12)***	8.28 (1.97)***
Dummy North	-0.43 (1.78)	-0.54 (1.77)
Dummy East	1.51 (1.43)	1.90 (1.41)
Dummy West	--	--
Dummy South	1.23 (1.57)	1.97 (1.57)
R-squared adjusted	0.68	0.69
loglikelihood	-668.97	-664.45
LM-statistic (error)	0.19	0.23
LM-statistic (lag)	0.34	0.36
N	199	199

Note: Pooled OLS regressions for all industries with robust standard errors, standard errors in parentheses.
Dependent variable: Percentage employment change between 2000 and 2006
***: p<0.01; **: p<0.05; *: p<0.10.

Table 4: The effects of 1 SD change in main variables, whole sample (N=199)

	Coefficient		St. Dev.	Effect of 1 SD	
Variable Name	I	II		I	II
Market Mobility (Mu)	0.19	0.19	8.79	1.67	1.67
Start-up rate (99-05)	0.20		8.42	1.68	
lagged Start-up rate (93-99)		0.46	5.93		2.73

Table 5: Estimation results Industry: manufacturing (D) + construction (F)

Variable	III	IV
Constant	-9.17 (8.78)	-11.22 (8.33)
Population density	-0.45 (0.38)	-0.56 (0.36)
Population density squared	0.01 (0.01)	0.02 (0.01)*
Average wage change (00-06)	0.50 (0.11)***	0.51 (0.10)***
Lagged employment change (93-99)	0.04 (0.07)	0.02 (0.08)
Market Mobility (Mu)	0.21 (0.14)	0.18 (0.14)
Start-up rate (99-05)	-0.04 (0.15)	
lagged Start-up rate (93-99)		0.21 (0.21)
Dummy Manufacturing (D)	-11.49 (3.64)***	-8.64 (2.92)***
Dummy Construction (F)	--	--
Dummy North	-1.20 (2.27)	-1.17 (2.13)
Dummy East	0.75 (1.98)	1.04 (1.93)
Dummy West	--	--
Dummy South	-3.98 (2.13)*	-3.36 (2.10)
R-squared adjusted	0.44	0.45
loglikelihood	-254.37	-253.79
LM-statistic (error)	0.03	0.09
LM-statistic (lag)	0.48	0.22
N	79	79

Note: Pooled OLS regressions for Industry sectors with robust standard errors, standard errors in parentheses.
Dependent variable: Percentage employment change between 2000 and 2006
***: p<0.01; **: p<0.05; *: p<0.10.

Table 6: The effects of 1 SD change in main variables, Industry sectors (N=79)

	Coefficient		St. Dev.	Effect of 1 SD	
Variable Name	**III**	**IV**		**III**	**IV**
Market Mobility (Mu)	0.21	0.18	7.31	1.54	1.32
Start-up rate (99-05)	-0.04		12.20	0.49	
lagged Start-up rate (93-99)		0.21	7.43		1.56

Table 7: Estimation results Services: trade (GH) + transport (I) + business services(JKNO)

Variable	V	VI
Constant	-18.05 (6.76)***	-19.98 (6.66)***
Population density	-0.92 (0.35)***	-0.90 (0.34)***
Population density squared	0.02 (0.01)**	0.02 (0.01)**
Average wage change (00-06)	0.28 (0.09)***	0.27 (0.08)***
Lagged employment change (93-99)	0.09 (0.05)	0.06 (0.05)
Market Mobility (Mu)	0.20 (0.08)**	0.22 (0.08)**
Start-up rate (99-05)	0.59 (0.30)**	
lagged Start-up rate (93-99)		0.57 (0.18)***
Dummy Trade (GH)	-2.47 (2.46)	-2.45 (1.94)
Dummy Transport (I)	--	--
Dummy Bus. Services (JKNO)	6.14 (2.56)**	8.91 (2.03)***
Dummy North	0.12 (2.39)	-0.27 (2.45)
Dummy East	2.00 (1.98)	2.42 (1.92)
Dummy West	--	--
Dummy South	5.48 (1.97)***	6.08 (1.99)***
R-squared adjusted	0.63	0.64
loglikelihood	-399.28	-397.18
LM-statistic (error)	1.61	0.71
LM-statistic (lag)	2.98*	2.32
N	120	120

Note: Pooled OLS regressions for Service sectors with robust standard errors, standard errors in parentheses.
Dependent variable: Percentage employment change between 2000 and 2006
***: p<0.01; **: p<0.05; *: p<0.10.

Table 8: The effects of 1 SD change in main variables, Services sectors (N=120)

	Coefficient		St. Dev.	Effect of 1 SD	
Variable Name	**V**	**VI**		**V**	**VI**
Market Mobility (Mu)	0.20	0.22	7.88	1.58	1.73
Start-up rate (99-05)	0.59		3.83	2.26	
lagged Start-up rate (93-99)		0.57	4.64		2.64

APPENDIX I: Descriptive statistics market mobility rate (Mu)

	Manufacturing (D)		Construction (F)	
Top 3:	IJmond	74.2	Delfzijl	83.1
	Zuidwest Friesland	71.9	Noord Drenthe	79.8
	Agglomeratie DenHaag	65.6	Delft en Westland	72.4
Bottom 3:	Midden Noord Brabant	50.6	Zuidwest Friesland	56.6
	Zuidwest Overijssel	45.2	Zuidwest Overijssel	56.0
	Noord Drenthe	43.0	Zuidoost Zuid-Holland	54.9
Mean		56.2		64.9
Median		55.2		64.4

	Trade (GH)		Transport (I)		Business Services (JKNO)	
Top 3:	Zaanstreek	79.8	Zuidwest Drenthe	89.5	Zuidwest Overijssel	91.1
	Zuidwest Overijssel	77.8	Agglomeratie DenHaag	81.3	Overig Zeeland	91.0
	Agglomeratie DenHaag	77.5	Gooi- en Vechtstreek	77.3	Kop van Noord-Holland	83.2
Bottom 3:	Zuidoost Zuid-Holland	64.7	Achterhoek	53.5	Noord Friesland	63.6
	West Noord Brabant	64.4	Noord Overijssel	52.8	Noord Drenthe	62.0
	Midden Noord Brabant	64.2	Zaanstreek	36.1	Gooi- en Vechtstreek	56.2
Mean		71.5		65.7		72.0
Median		71.8		64.9		70.4

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