Essays on firm dynamics in the Swedish wholesale trade sector

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Abstract

This thesis consists of an Introduction and Summary chapter and five self-contained papers addressing dynamics of firms in the Swedish wholesale trade sector.

Paper [1] Firm entry into local markets has often been studied using administrative areas such as municipalities as the assumed relevant markets. However, administrative areas and the actual relevant markets based on local demand for firms' products often do not coincide, which could bias the results of studies treating administrative areas as the relevant markets. Based on a behavioural assumption regarding how retailers act when purchasing products from wholesale trade firms, we create alternative markets using Voronoi diagrams. We then compare the empirical results of investigating the determinants of firm entry using municipalities as the relevant markets with the results obtained using Voronoi markets. The results indicate that, in both cases, the same variables are statistically significant in affecting entry, though the estimated effects differ in size.

Paper [2] This paper analyses the determinants of firm migration in the Swedish wholesale trade sector using a unique dataset covering over 10,000 Swedish wholesale trade firms during the years 2000–2004. The results indicate that there are negative correlations between profits, firm age, and firm size and the probability of firm migration. There is a positive correlation between firm growth in the previous year and firm migration, indicating that growth opportunities that cannot be realized at the present location are an important motivation for migration.

Paper [3] To identify the determinants of firm growth within the Swedish retail – and wholesale trade industries during the period 2000-2004, we analyze a sample of 400 limited companies using quantile regression techniques. Our results indicate that firm growth mainly can be explained by time-invariant firm-specific effects, supporting Penrose's (1959) suggestion that internal resources such as firm culture, brand loyalty, entrepreneurial skills, and so on, are important determinants of firm growth rates.

Paper [4] Applying microeconomic theory, we develop a forecasting model for firm entry into local markets and test this model using data from the Swedish wholesale industry. The empirical analysis is based on directly estimating the profit function of wholesale firms. As in previous entry studies, profits are assumed to depend on firm- and location-specific factors, and the profit equation is estimated using panel data econometric techniques. Using the residuals from the profit equation estimations, we identify local markets in Sweden where firm profits are abnormally high given the level of all independent variables included in the profit function. From microeconomic the-

ory, we then know that these local markets should have higher net entry than other markets, all else being equal, and we investigate this in a second step, also using a panel data econometric model. The results of estimating the net entry equation indicate that 19 of 30 estimated models have more net entry in high-return municipalities, but the estimated parameters is only statistically significant at conventional level in one of our estimated models., and then with unexpected negative sign.

Paper [5] This study analyses the effects of firm relocation on firm profits, using longitudinal data on Swedish limited liability firms and employing a difference-in-difference propensity score matching method in the empirical analysis. Using propensity score matching, the pre-relocalization differences between relocating and non-relocating firms are balanced. In addition to that, a difference-in-difference estimator is employed in order to control for all time-invariant unobserved heterogeneity among firms. For matching, nearest-neighbour matching, using the one, two, and three nearest neighbours is employed. The balancing results indicate that matching achieves a good balance, and that similar relocating and non-relocating firms are being compared. The estimated average treatment on the treated effect indicates that relocation has a significant effect on the profits of the relocating firms. In other words, firms that relocate increase their profits significantly, in comparison to what the profits would be had the firms not relocated. This effect is estimated to vary between 3 to 11 percentage points, depending on the length of the analysed period after relocation.

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List of Papers

[1] Brandt D., Macuchova Z. and Rudholm N. (2014). Firm entry in the Swedish wholesale trade sector: Does market definition matter? *Annals of Regional Science*, 54(4): 703-717. (Reprinted with permission)

[2] Håkansson J., Macuchova Z. and Rudholm N. (2013). Firm migration in the Swedish wholesale trade sector. *The International Review of Retail, Distribution and Consumer Research,* 23(1): 48-64. (Reprinted with permission)

[3] Daunfeldt S-O., Lang Å., Macuchova Z. and Rudholm N. (2013). Firm growth in the Swedish retail and wholesale industries. *The Service Industries Journal*, 33(12): 1193-1205. (Reprinted with permission)

[4] Håkansson J., Macuchova Z. and Rudholm N. (2015). Predicting entry of Swedish wholesale firms into local markets. *The International Review of Retail, Distribution and Consumer Research*, 25(3): 298-312 (Reprinted with permission)

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Introduction and summary of the thesis

Zuzana Macuchova

1. Introduction

This thesis consists of five self-contained papers addressing various aspects of dynamics of firms in the Swedish wholesale trade sector.

Wholesale trade, along with retail trade, plays a crucial role in the economy, as it forms the bridge between production and consumption. In modern economies, few if any consumers buy goods directly from the producer. Instead, goods are processed through the distribution channels by retailers and wholesalers. While retailers operate in the latter part of distribution channels and deliver goods to the customers, the distinguishing feature of wholesalers is that they commonly do not deliver goods to end users. Instead, wholesalers traditionally work as 'middle-men' in the first part of the distribution channels, and connect producers with retailers or industrial, commercial, institutional and professional users.

The existence of wholesalers (and other intermediaries) is commonly explained by the effective and efficient performance of distribution services that are needed by producers and other members of the distribution channels. Producers, regardless of the size of the firm they operate, usually do not enjoy the same economies of scale that they have in production when it comes to product distribution. In other words, producers face some difficulties in efficiently distributing their products. Meanwhile, by shifting the task of product distribution to wholesalers, both producers and wholesalers might benefit from the situation. Specifically, on the one hand, producers might be able to maintain lower production costs, and on the other hand, well-managed and efficient wholesalers might be able to achieve both economies of scope and economies of scale. The ability to achieve product distribution in a manner that is more cost-effective than what a producer is able to achieve is what creates opportunities for wholesalers and other intermediaries.

The presence of wholesalers in the economy is not a novel phenomenon, the first reference regarding the existence of wholesalers and wholesale as an economic activity can be traced back roughly 5000 years ago to the Far East. As summarised in Beckman et al. (1959), at the time of the Greek empire, wholesaling and wholesalers had been recognised as a specific branch of commerce, and the wholesale sector continued to flourish during the Roman Empire, the Middle Ages and the Mercantilist period in Europe, into the modern era ushered by the Industrial revolution. The role of wholesaling

was further reinforced in the late nineteenth and twentieth centuries, with production specialisation on the national level and with increased trade on the global level. Recent developments with regard to product distribution indicate that traditional wholesaling activities are now also sometimes performed by other actors within the distribution channels, for example, by retailers or producers (Quinn and Sparks, 2007).

Traditional wholesale is, however, still a large and wide-ranging sector in most advanced economies. According to the 2010 Eurostat statistics, the wholesale trade sector belongs to one of the largest sectors within the EU27s non-financial business economy. For instance, in 2010, the wholesale trade sector comprised 1.8 million enterprises and generated a turnover of approximately 5,200 billion Euros. In terms of turnovers, the sector contributed 22% of the non-financial business economy totals, while in terms of value added, the sector contributed to 10% of the non-financial business total. Furthermore, with 10.4 million employed persons, the wholesale trade sector accounted for almost 8% of the labour force employed in the non-financial sector of the economy, while the labour productivity in this sector was high above the average of the non-financial sectors of the economy.

Although wholesaling is one of the major economic sectors globally and nationally, and despite its key role in economies in majority of countries, there is very little recognition given to this sector in academic research. The existing knowledge is mainly concentrated in the field of business administration, logistics and human geography.

This thesis positions itself in the regional economic literature and addresses dynamics of firms in the wholesale trade, with a special emphasis on three aspects of this dynamics: (i) entry, (ii) growth and (iii) spatial relocation.

Generally, there is a long-lasting interest in entry of new firms and growth of firms in the regional economic literature. A number of recent empirical studies have shown that new firm formations are found to stimulate innovation and increase productivity among incumbent firms (e.g. Fritsch and Mueller, 2004; Aghion et al., 2009); new business are reported to contribute to economic growth (Poh et al., 2005; Carraee and Thurik, 2005) and to increased labour productivity (Audretsch and Keilbach, 2007). New firms are also found to contribute to an increase in employment in the regions they enter (van Stel and Storey, 2004; Baptista and Preto, 2011). As a consequence, many scholars as well as policy makers believe that entry of new businesses and growth of firms in general, is a promising way on how to achieve regional growth. It has also long been observed that the formation of new firms vary between regions (e.g. Reynolds et al., 1994; Davidsson et al., 1994; Johnson and Parker, 1996), where some regions experience higher rates of new firm formation than others, and that this variation seems to be persistent over time (Andersson and Koster, 2013). Subsequently, an im-

portant stream of the literature explores factors explaining entry and growth of firms, and search for explanations of this regional variation. Compared to the interest devoted to the entry of new firms and growth, there has been little scholarly research focusing upon the spatial relocation of firms. However, several recent studies confirm that mobility of firms is higher than generally assumed (e.g. Knoben et al., 2008; Wetering and Knoben, 2013). Another interesting result in this context is that firms that relocate are often those that are experiencing growth, thus, contributing to the employment change in the region they enter (Knoben, 2011).

As mentioned above, research considering the dynamics of firms has long tradition in economics, and has already yielded a large body of literature, especially regarding entry of new firms and growth of existing firms. This begs the question, why add another academic essay to the existing research?

The answer to this question is that despite the existence of all the previous contributions, many questions regarding entry, growth and relocation of firms remain unanswered. Although a number of earlier studies reported that factors affecting entry and growth of firms, in particular, vary significantly among industrial sectors (e.g. Dunne, 1988; Davidsson et al., 1994; Johnson, 2004), calling for more research on more disaggregated industrial levels considering these intersectoral differences, existing literature is still dominated by studies on manufacturing sectors and more recently, also on some selected service sectors of the economy. It is interesting to note that with few exceptions (e.g. Dijk and Pellenbarg, 2000; Daunfeldt et al., 2006; Daunfeldt et al., 2013), wholesale trade industry is an unexplored area. This is surprising, particularly when the previously presented statistics on the economic importance of this industrial sector are considered.

Therefore, the five individual papers included in this thesis focus on entry, growth and spatial relocation of firms in the Swedish wholesale trade sector. To this end, a dataset including limited liability firms was compiled, and various econometrical methods were used to study, among other things, the determinants of entry, growth and relocation of Swedish wholesale firms. In all papers, the firms are assumed to behave in a profit maximising manner and operate in imperfectly competitive markets. However, considering the advances in institutional and behavioural economics, in the empirical estimations, the neoclassical, profit maximising view has been augmented to also incorporate variables deemed important by these theories, where appropriate.

More specifically, paper [1] investigates the determinants of new firm formation in the Swedish wholesale trade sector. Additionally, this paper also focuses on an inquiry what a relevant market of a wholesale trade firm is. To this end, several count data models are estimated, using the previously mentioned micro-dataset, and two definitions of firms' relevant markets, rele-

vant markets represented by municipalities, and relevant markets based on a cost minimizing behaviour of the retailers.

Paper [2] examines the determinants of firm relocation in the Swedish wholesale trade sector. In this paper, a distinction is being done between the factors in the in-migration municipalities, i.e. municipalities in which the firms move, and in the out-migration municipalities, i.e. municipalities that relocating firms are leaving behind. Doing so enables the examination of both the push and pull factors, relevant in a firm's decision to relocate.

Paper [3] studies the determinants of growth of wholesaling firms in Sweden. Besides the traditional ordinary least square regression, this paper employs also a quantile regression technique. This technique gives insights into the effects of the determinants into all parts of the growth distribution of firms.

The first three papers of this thesis add to the existing empirical literature the evidence on determinants of entry, growth and relocation from the Swedish wholesale trade sector. As mentioned earlier, the dynamics of firms within wholesaling is until now not been researched extensively. This is accomplished by adoption of a novel data set, that enables to control for the effects related to firms, to the industrial branch of the wholesale trade sector in which the firms operate, and lastly, also for the characteristics of the geographical region, where the firms are located. The longitudinal nature of this dataset, in combination with various econometrical methods, also enables to control for the effects of time-invariant unobserved firm-characteristics, where deemed appropriate, and in this way alleviate the heterogeneity of firms.

Also the last two papers of this thesis deal with entry into and relocation of firms within the Swedish wholesale sector, utilizing similar dataset as the previous three papers. However, compared to paper [1] and [2], where the determinants of firm's entry and relocation were analysed, paper [4] and [5] are more applied in their nature. Paper [4] formulates a model to forecast entry of new wholesaling firms into local markets, based on direct estimation of profit function, and investigates if wholesaling firms enter more frequently local markets where profits seem excessive based on observables characteristics. Paper [5] then empirically tests if relocating firms increased their profits due to the relocation, all else equal.

The remainder of this introduction is organised as follows. Section 2 provides background of the data compilation process and discusses the measurement issues along with suitable statistical techniques. Section 3 gives more extensive summaries of the five papers included in this thesis. Finally, Section 4 concludes the main findings of each of the papers and outlines policy implication of the results.

2. Data, measurements and methodological considerations

The papers included in this thesis use a micro-level dataset, compiled specifically for the purpose of this thesis. Section 2.1 describes the compilation process and introduces the dataset; Section 2.2 highlights measurement issues related to the dependent variables, and Section 2.3 discusses the methodological choices undertaken in each of the papers.

2.1. The dataset

Annual reports of Swedish limited liability firms form a basis of the compiled micro-level dataset. This data is provided by PAR, a private consultancy agency. A limited liability firm is one of the forms in which a business can be operated in Sweden. Commonly, self-employed individuals can incorporate their business and turn them into limited liability firms, business forms with a legal entity, treated as separate tax subjects. One of the main advantages of this business form for owners is that the corporate taxes are levied on the net return, and the firm's owners are responsible for the debts only to the size of the invested capital, which was recently lowered from SEK 100,000 to SEK 50,000. Firms with growth ambitions choose this limited liability form, to a large extent, while other organisational forms such as sole proprietorship (*enskild firma*), partnership (*enkelt bolag*) and economic organisation (*ekonomisk förening*) are chosen less seldom (Edmark and Gordon, 2013). The annual reports for limited liability firms are accessible because they are obliged, according to Swedish law, to report them to the Patent and Registration Office (PRV, Patent och Registreringsverket).

Information on firm's financial measures such as revenues, costs and profits, wages and number of employees is included in the annual reports data and available through PAR for research purposes and for policymakers. The full coverage of the data, in terms of the number of firms and the detailed nature of the information on each limited liability firm, makes the annual reports a valuable tool for analytical purposes, where firm-related characteristics are requested.

In order to add information on the geographical location of each firm, the annual reports data, provided by PAR, are merged with detailed information on firms, originating from Statistics Sweden business register. Firm's location in specific municipality, its registered address and registration year are some characteristics appended through a unique identification code in the annual reports data. Furthermore, industrial sector, in which firms operate, is identified with a 5-digit level of the Standard Industrial Classification system (SIC). The SIC system corresponds at 4-digit level to the European

standard NACE rev.2. The general information on firms is continually updated by Statistics Sweden; changes to the firm's address, to the industrial sector in which firm operates, or to the activity status are stored. These panel-data features, along with the unique identification number of each firm, enables one to follow-up limited liability firms over time and identify some of the aspects of dynamics of firms, such as new firm entry and relocation of firms.

In addition to the annual reports data provided by PAR and the information on firms from the Statistic Sweden business register; regional statistics data are utilized in the compilation process. Since the firm's location at the municipal level is known for each firm and each year, the characteristics of the municipality where the firm is located in the end of the each calendar year can be determined. Most of these municipal characteristics, e.g. population size, population density, educational level, are retrieved from Statistics Sweden, employing a municipality division for year 2000 with 289 municipalities.

The papers in this thesis were produced over a period of five years, and two different versions of the annual reports data were obtained from PAR during this period. The earlier version of the annual report data covers the period 1995-2005. This version forms the basis of the micro-level dataset employed in the first three papers of this thesis. The later version of the annual reports data covers the period 1997-2010 and is employed in the last two papers of this thesis.

In the data compilation process, the size of the datasets was reduced in several steps. First, there is a marked decline in number of firms during the last few years of the annual reports data, most likely due to the time delay between the submissions of the reports to the Patent and Registration office by firms, and the reports delivery to the PAR. Still, in order to avoid a possible bias, for instance due to the fact, that certain type of firms, such as restructuring firms, delay the submission of annual reports, to a greater extent compared to other firms, the last few years were dropped from both datasets. From the earlier version of the data, year 2005 was dropped, while year 2009 and year 2010 were excluded in the later version of the dataset.

Secondly, the annual reports data are aggregated to the location of firm's main office. This means that for firms with more than one establishment, the information in the annual reports data, provided by PAR, cannot be disaggregated to the single establishments and the information are ascribed to that establishment, registered as firms headquarters. As a consequence, all papers focus on the single-plant wholesaling firms, i.e. firms with only one registered establishment, which represents roughly 86% per cent of the total number of wholesale firms.

Thirdly, only firms with registered visitor's address were kept in the da-taset. It is dictated by the geographical aspect of the analysis; each of the presented papers address the geographical environment in which firm oper-ates to some extent and for this, the firm's registered address is required. In this case, mostly the earlier version of the annual reports data was affected. Specifically, the firm's visitor address was missing for all observations prior to the year 2000; thus, these observations were dropped from the empirical analysis.

The above-described data reduction processes resulted in two micro-level datasets: The first dataset covers single-plant wholesaling firms, with regis-tered visitor's address and being active at some point during the period 2000-2004. This dataset comprises 13,471 firms and forms the basis of the empirical analysis in papers [1], [2] and [3]. The second dataset is employed in papers [4] and [5] and includes single-plant wholesaling firms with a reg-istered visitor's address, being active at some point in the period 1998-2008, with a total 24,478 firms.

2.2. Measuring entry, growth, relocation and profits

As mentioned earlier, this thesis investigates issues related to entry, growth and spatial relocation of firms within the Swedish wholesale trade sector. In this sub-chapter, measurement issues related to the dependent variables of interest in the individual papers are highlighted.

Entry

Entry of new firms is examined in papers [1] and [4]. The main considera-tion in these two papers concerns a measurement of entry. In empirical stud-ies addressing entry, two types of measures are commonly used: gross entry and net entry. Net entry means that a 'pure' change in the number of firms in a time period is counted, i.e. firms exiting the markets are included in this calculation as negative entry. Compared to net entry measures, gross entry measure counts entering firms separately from exiting firms. Thus, the main practical difference between these types of entry measurements is that the net entry measure cannot capture the effects, when the same number of firms enter and also exit one market at the same time. In this scenario, the net entry is close to zero, although the numbers of entering as well as exiting firms can be high. As a result, empirical studies focusing on specific aspects of the firm dynamics generally prefer the gross entry measures.

In paper [1], the determinant of entry, i.e. factors influencing new firm formation, within the Swedish wholesale trade sector is identified. In addi-tion, this paper also makes an inquiry into what is a relevant market for a wholesaling firm. In this paper, the gross entry measure is utilised, i.e. only the entering firms are counted. This choice is motivated mainly by being able

to compare with previous studies on entry in the Swedish wholesale trade sector. Firm entry is then identified as the first time a firm's organizational number appears in the annual reports data, and at the same time the firm reaches sales higher than 10,000 SEK. This strategy of identifying new firms using annual reports data is combined with information on firms' establishment date, coming from Statistics Sweden business register. Accordingly, only 'true' entry of firms are considered, rather than existing firms that might have gaps in the annual reports data for some reason.

The entry of wholesaling firms is further addressed in paper [4] of this thesis. Compared to paper [1], where the determinants of the new firm formation were examined, in paper [4], a forecasting model for entry of wholesaling firms into local markets is proposed. Paper [4] utilises net entry measure, where entry is measured as a change in number of firms in local markets, represented in this paper by municipalities, in the period t and the period t-1. The main reason for using the net entry measure, even though some recent empirical studies used gross entry measures, is the set-up of the forecasting model in this paper. In the set-up of this model, wholesaling firms are assumed, in line with microeconomic theory, to enter the markets with the intention to generate profits. Markets characterised with abnormally high profits and abnormally low profits are then identified; subsequently, the effects that profits have on entry of firms are assessed. It is assumed that although individual firms might not always be able to correctly distinguish the high-return municipalities from the low-return municipalities, on average it is expected that firms will, to a larger extent, enter the high-return municipalities and also, leave the low-return municipalities. This behaviour will lead to a high level of net entry in high return municipalities, when compared to low-return municipalities. Thus, given the set-up of and assumption behind the forecasting model, the net entry measure seems to be appropriate way on how to measure entry of wholesaling firms in this paper.

Growth

Growth of firms is addressed in paper [3] of this thesis. In this paper, determinants of firm growth in the Swedish wholesale trade sector are examined. Similar to the empirical studies on entry conducted in papers [1] and [4], a main consideration is related to measurement of growth. Two growth indicators can be commonly found in the empirical literature: employment and sales (Chandler et al., 2009; Coad and Hölzl, 2010; Delmar, 2006). The literature is far from conclusive on what indicator to use. However, although employment and sales growth seems to be correlated only modestly (Coad, 2009), most studies on growth show that the empirical results are not especially sensitive to the choice between these two variables. Thus, this paper uses sales as the growth indicator, and measures growth as the log difference

in sales, in time *t* and *t-1*. The main reason for choosing sales is that the other option, number of employees, would relate the growth more to the internal characteristics of firms, such as their organisational structure. Furthermore, the econometrical strategy adopted in this paper, a quantile regression, is expected to perform computationally better with sales, since sales are a continuous variable, while number of employees has a count data structure. Related to measurement of firm growth is also type of growth. A distinction is commonly made between organic growth, which is internal to the firm, and external, acquired growth. Organic growth refers to the change in number of employees within the firms, while external growth means that firms increase the number of employees through mergers and acquisitions. Due to data limitations, this paper does not distinguish between organic growth and external growth, and thus, considers total growth of firms.

Relocation

Spatial relocation of firms is the last issue discussed in this thesis. In paper [2], the determinants of firm relocation are analysed, while in paper [5], the after-relocation profits of relocating firms are evaluated. In these papers, firm relocation is measured in a rather straightforward manner as a change of the firms' location address beyond the municipal border in time *t* and time *t-1*. Administrative areas corresponding to Swedish municipalities are frequently used in recent relocation studies (Wetering and Knoben, 2013; Kronenberg, 2013), even though other definitions of firm relocation might also be found, such as relocation beyond postcode zones (De Bok and Van Oort, 2011).

Profits

A last measurement issue in this thesis is related to measures of firm profits, required in the empirical analysis in papers [4] and [5]. In these papers, returns on total assets are chosen as the measure of profits. Return on assets (ROA) measures how much a firm has earned, related to all firm's investments, commonly, ROA is perceived as the 'broadest' measure of profitability and management effectiveness, not depending on the financial strategy of the firm. As emphasised by Libby et al. (2002), simply, firms with higher ROA are doing a better job of selecting and managing investments, ceteris paribus. Another option for how to measure firm profits would be to use the firm's return on equity (ROE). However, compared to ROE, the ROA is a more precise measure than ROE, since ROE is affected by the source of financing.

2.3. Methodological considerations and econometrical methods

The papers in this thesis address questions related to dynamics of firms within the Swedish wholesale trade sector, employing the micro-level datasets described in section 2.1. A problem specific to all the papers in this thesis, and in general, to studies searching for generalisable findings on the population of firms, is the heterogeneity of firms. In other words, firms differ from each other with respect to their internal characteristic and also with respect to the characteristics of the geographical environment, in which firms operate. Not all these characteristics can be captured in conventional statistics, such as in the annual reports of firms, employed in this thesis. The unobserved characteristics of firms might then bias the results of the empirical estimations, if not controlled for with appropriate statistical techniques. Considerations concerning the unobserved heterogeneity of firms, and other methodological issues related to the estimation strategies dealt with in the individual papers, are highlighted in the text below.

In paper [1], determinants of new firm formation are examined. The dependent variable in this paper is defined as the number of firms entering within a spatial unit, i.e. municipality or market defined with a Voronois polygons technique. By definition, the dependent variable yields a discrete outcome, consisting of non-negative integers only. The main methodological consideration in this paper is related to the choice of suitable method for modelling this discrete outcome. Following most of the recent research on location of firms (Arauzo-Carod, 2010), count data models are employed in the empirical analysis. Count-data models (see e.g. Cameron and Trivedi, 1998), in comparison to other multivariate statistical methods, can deal with the 'zero problem', i.e. situation when there is overrepresentation of zero values in the dependent variable. This zero problem commonly occurs in entry studies, which analyse entries using highly disaggregated territorial units (e.g. Arauzo-Carod, 2008). In the context of this study, in which determinant of entry are analysed on a municipality level as well as using alternatively defined markets, the zero problem means that a large number of these spatial units is expected not to receive any entry of new firm. Still, the spatial units, not receiving any entry provide relevant information because the characteristics of these units, i.e. industry- or regional-specific factors, can help to explain why they have not been chosen by any new firm. The count-data models by design can handle positive and zero occurrence of entry as natural outcomes, and both types of outcomes make contribution to the estimates.

Three of the most commonly employed count-data models, the Poisson model (PM), the zero inflated Poisson model (ZIPM) and negative binomial regression model (NBREG), are considered in the paper. The Poisson model

(PM) is taken as the starting point; one of the main advantages of the PM is that it can deal with the previously mentioned zero problem, i.e. overrepresentation of spatial units without any entry of new firm. However, the PM relies on two assumptions, related to the characteristics of the mean and variance of the distribution, along with an assumption concerning the zero problem, namely, PM can deal with situation in which there are large numbers of spatial units not receiving any entry; however, problem may arise when this number is excessive. The descriptive statistics in this paper indicate that there might be an 'overdispersion problem', i.e. the variance is larger than the mean for both spatial units. These results then suggest that other models, apart from PM, should be utilized. Therefore, in addition to the Poisson model, the negative binomial regression (NBREG), which can solve both the problem of overdispersion and the excess of zero observations and a zero inflated Poisson model (ZIPM), are employed. The results of the above-mentioned three models are quite similar; however, the Schwartz's Bayesian information criterion favours the NBREG model.

In paper [2], the determinants of relocation are analysed. In the firm relocation literature, three theoretical approaches to relocation are commonly identified: neoclassical, behavioural and institutional approach. This paper builds on the neoclassical approach, however, in line with Pellenbarg et al. (2002), the authors seek for more 'eclectic' approach and incorporate also insights from the institutional and behaviour approaches into the theoretical model of firm relocation, put forward in this paper.

In order to operationalise this theoretical model, a three level random intercept logistic regression model is utilised. The dependent variable is an indicator variable equal to one, if the firm relocates in time t; otherwise it is zero. Besides the firm-, industry- and regional-specific factors, informed by the results of previous firm relocation studies, random effects on the firm and municipality level, along with time-specific fixed effects are included in the empirical model. The settings of the empirical model thus control for unobserved heterogeneity at time, municipal and firm level. The firm-level random effects are included in order to capture such unobservable firm characteristics as degree of rationality in management, firm culture or the skills of firms' employees, i.e. factors frequently proposed by the behavioural theories on firm relocation. The municipality-specific random effects are expected to capture, for instance, the impacts of local real-estate markets, one of the factors suggested by the institutional theory of firms' relocation. Trying to capture the effects of these variables using the suggested random effects structure requires that these factors are time-invariant throughout the period of this study. The length of the analysed period, which is four years, along with nature of the factors makes us believe that this assumption should not be violated to the extent that it will affect our results.

In paper [3], the determinants of growth are examined. The recent advances within firm growth research confirm that the distribution of firm growth does not display characteristics of a normal distribution. Instead, the firm growth distribution seems to be 'tent-shaped' with fatter tails in comparison to the normal distribution. In other words, the shape of the firm growth distribution affirm, what was observed already for a long period of time, that is, a large number of firms appear to experience very little growth, while there is a non-negligible fraction of firms that experience a high- and low-growing rate, respectively. The heavy-tailed nature of the firm growth distribution has several implications for the estimation strategy undertaken in this paper. First, the commonly used technique, ordinary least squares (OLS), appears as less informative in this context. The OLS estimates describe the effects of the explanatory variable on the 'average' firm; however, as pointed out above, an 'average' firm barely grows. Secondly, the firm growth distribution may violate the OLS assumption on normally distributed errors.

Therefore, besides the traditional OLS regression, a quantile regression technique was also utilised in this paper. The quantile regression has an attractive property of being more robust to outliers and thus, and as a result, the quantile regression performs well in heavy-tailed distributions. In addition to this robustness property, the quantile regression technique enables one to go beyond estimation of the effects on an 'average' firm and instead, makes it possible to disentangle the effects of the explanatory variables (i.e. firm-, industry- and region specific) on different parts of the firm growth distribution. Thus, the effect of, for example, market concentration can be examined for the upper 10% of firms, i.e. the fastest growing firms that make a disproportionally large contribution to the economic growth of a region.

Another methodological choice undertaken in this paper is inclusion of firm-specific indicator variables into one of the empirical models in this paper. Empirical studies on firm growth commonly report that very little of the variation in firm growth is actually explained by conventional factors such as firm size, firm age or characteristics of the region where firm is located (e.g. Geroski, 1995). The prevailing explanation for that is that there is a strong idiosyncratic component in the growth process, related to the base of resources that the firms dispose with (Penrose, 1959). Examples of such resources are brand names, employment of skilled labour, trade contracts, machinery and efficient procedures within the firms. These idiosyncratic resources are, however, very difficult to measure empirically. The firm specific indicator variables included in one of the empirical models are expected to capture these effects of the idiosyncratic resources, given that the unobserved firm-specific heterogeneity is constant over time.

In paper [4], analogous to paper [1], entry of firms is addressed. This paper aims to develop a forecasting model for entry of wholesaling firms and empirically assess the model's predictive power. The general idea behind the forecasting model suggested in this paper is based on a direct estimation of a profit function, followed by identification of local markets, represented by municipalities, with abnormally high- and low returns on asset. Low-return markets are those municipalities, where firm profits are substantially lower than what the values of the independent variables in the model would suggest, while high-return markets are municipalities with profits higher than suggested by the independent variables in the profit model. In second step, it is investigated if net entry, i.e. number of firms that enter and exit the markets, is more common in high-return than low-return municipalities.

In this step, it was difficult to determine how large the profit differences must be, in order to affect the entry and exit behaviour of firms. Due to lack of previous literature that could be used as guideline, it was decided to estimate five different empirical models, which differ in the threshold of what identifies the low- and high-return municipalities. Meanwhile, there is a trade-off associated with this empirical strategy. In the models where the highest decentiles are compared, these have a larger number of observations, but the difference in returns between the high-and low-return municipalities becomes rather small, and the probability of differences in entry behaviour is thus low. In contrast, in the model where only the top 15 and bottom 15 municipalities were compared, differences in profits were large and should affect behaviour; however, there were only a small number of observations available for the empirical analysis, which makes it difficult to find statistically significant results.

In paper [5], effects of relocation on the return on assets of relocating firms are identified. In an ideal world, this identification would require access to return on assets of each relocating firm i in two states of one world – in state 0, given the firm has not relocated, and in state 1, given the firm relocated. A difference between firm profits in state 1 and state 0 would then yield the effect of relocation on profits of the relocating firm i, and averaging over all relocated firms in the sample would yield the average effect of relocation. However, there is a fundamental problem related to this estimation strategy – only one of the above-mentioned outcomes is observable in the data, while the other outcome is inherently missing. Nonetheless, a firm can either relocate, or stay in the original location; it cannot be in state 0 and state 1 simultaneously. Therefore, in this paper a technique frequently used within the evaluation literature, difference-in-difference propensity score matching, is applied in order to identify the above-mentioned average effects of relocation. Matching allows for the constructing of the missing potential outcome needed for the evaluation problems, as the one described above. Propensity

scores restrict matches to suitable pairs of comparison units only; thus, it helps to avoid problems of selection on observables, an issue frequently reported, for example, in the settings of evaluation studies on human migration (e.g. Eliasson et al., 2012). In the context of firm relocation, previous studies commonly report that the drivers of the firm's relocation decision are, in particular, characteristics related to firms, e.g. age or size of the firm. Therefore, the propensity score matching is utilised to control for these important determinants of firm relocation. Another issue commonly discussed in evaluation literature is a selection on unobservables. In order to control for the effect of unobservable characteristics of firms, e.g. quality of the managerial staff, the propensity score matching is combined with difference-in-difference estimator. Doing so, the time-invariant heterogeneity between relocating and non-relocating firms can be controlled for.

3. Summary of the papers

Paper [1]: Entry into the Swedish wholesale trade sector – does market definition matters?

The first paper (co-authored with Daniel Brandt and Niklas Rudholm) empirically examines the determinants of firm entry within the Swedish wholesale trade sector. Firm entry literature searching for determinants of entry commonly adopts various administrative areas (municipalities, counties, local labour market areas) as geographical units of analysis.

However, this paper argues that analysing firm entry determinants using administrative regions implies an assumption that a firm's relevant market is equal to these administrative units, an assumption which might be misleading. Administrative areas are typically created to encapsulate daily activity patterns of the inhabitants. Thus, the administrative areas do not necessarily need to correspond to the relevant markets of potential entrants, and using them might bias the results of studies regarding firms entering the market. This could particularly be the case in sectors that are dominated by large firms, as is the wholesale trade industry. Given the characteristics of the wholesaling firms, it would be expected, that the relevant market into which a firm is considering to enter should be larger than just the municipality where the firm locates.

In this study, a distinction is made between two conceptually different but perhaps relevant market definitions. Administrative areas, represented by municipalities, represents the first type of firm' relevant markets, while the second definition is represented by markets based on an assumption of cost minimizing approach of retailers, and delineated using a Voronoi polygons technique. Adopting these two different relevant markets, the determinants,

which are important for entry of wholesaling firms, are examined, and the role of the relevant market definition in studies regarding firm entry is assessed.

The results suggest that new entering firms tend to avoid regions with high market concentration, i.e. regions where one or only few firms control the market. Type of the local government and the quality of the local infrastructure are other two additional factors, deemed important in the analysis. The signs of the estimated coefficients remain the same regardless of which definition of the relevant market that was employed in the analysis. Meanwhile, the size of the effects differs, and the coefficients are generally higher once we use relevant markets delineated on the cost-minimizing assumption of retailers, i.e. the Voronoi polygons.

Paper [2]: Firm migration in the wholesale trade sector

The second paper (co-authored with Johan Håkansson and Niklas Rudholm) addresses the determinants of firm relocation within the Swedish wholesale trade sector. While the amount of studies analysing determinants of new firm formation is tremendous, the issue of firm relocation remained comparatively unexplored. The existing empirical studies covers mainly the Netherlands (van Dijk and Pellenbarg, 2000; Brouwer et al. 2004; Stam 2007; Knoben et al. 2008; Knoben 2011; Wetering and Knoben, 2013; Sleutjes and Völker, 2012; Kronenberg 2013), Portugal (Holl 2004) and Switzerland (Bodenmann and Axhausen, 2010). Meanwhile, only few studies (Daunfeldt et al., 2013; van Dijk and Pellenbarg, 2000) incorporate wholesale sector into the analysis.

In this paper, a neo-classical approach to firm relocation, put forward by Naakosteen and Zimmer (1987) is adopted, and in line with the microeconomic theory, firms are assumed to base their decision to relocate on the expected profits. However, it is also considered, that the institutional and behavioural theories of relocation might provide valuable insights on firm's relocation decision. For instance, in the neoclassical approach, the firms are assumed to be largely unaffected by the institutional environment in which the firm operates. This seems to be a rather strong assumption, and as shown in Pellenbarg et al. (2002) for Netherland, local institutions, i.e. local governments and real-estates, affects the firm's relocation decision. Having this in mind, the neoclassical approach is augmented empirically and incorporates also important contributions from the institutional and behavioural theories.

The results of the empirical analysis confirm that firm-specific variables, deemed important by neo-classical theories of firm migration, are all statistically significant and with expected signs. Firm profits, age and size of the firms are negatively related to the probability of relocation. For out-

migration municipalities, firm growth in the previous year is also positively correlated with the firm's probability to relocate. The results for industry specific variables show that firms seem to be avoiding municipalities, in which the concentration of firms operating in the same branch of the wholesaling industry is already high. From the group of location specific variables, the main finding is a negative correlation between having a right-of-centre governed municipality board and the decision to migrate out of the municipality. In other words, wholesaling firms are less reluctant to out-migrate from municipalities governed by right-wing parties. Furthermore, wholesaling firms seem to avoid moving to highly populated municipalities.

Paper [3]: Firm growth in the Swedish retail and wholesale industries

The third paper (co-authored with Sven-Olof Daunfeldt, Åsa Lang and Niklas Rudholm) examines determinants of firm growth within the Swedish wholesale trade sector. The literature on firm growth is immense, however, for a long period of time it focused mainly upon manufacturing firms (Coad 2009). First recently, a number of studies (Audretsch et al. 2004; Johnson et al. 1999; Wilson and Morris, 2000) also investigated the growth of firms in the service sector of the economy and a few studies have compared firm growth in retail and wholesale sectors with other industries, such as manufacturing (Pakes and Ericson, 1998).

As mentioned earlier, in this paper, the ordinary least squares regression (OLS) is combined with a quantile regression technique, in order to estimate the determinant of the firm growth. As shown Coad (2009), a usual problem when estimating firm growth is that most firms do not grow at all, whereas a small number of firms grow very fast. In this extent, the quantile regression enables to go beyond the 'average' firm and analyse for example the fast-growing firms in the economy.

The results indicate that models without firm-specific fixed effects have very low explanatory power and most of the variables are not significantly determined. This supports the previous findings in the literature that firm growth is to a high degree stochastically driven (Geroski 1995). However, once the firm-specific fixed effects were included in the estimation, the explanatory power of the model increased dramatically. This increase of the explanatory power between the model without and with firm-specific fixed effects suggests, that unobserved firm level heterogeneity can be the main driving force of firm growth of wholesaling firms.

Paper [4]: Predicting entry of Swedish wholesale firms into local markets

The theme of the fourth paper (co-authored with Johan Håkansson and Niklas Rudholm) is related to the topic in paper [1]. But instead of the determinants of new firm formation, this paper focus upon predicting entry of wholesaling firms into local markets in Sweden. More specifically, applying microeconomic theory, a forecasting model, based on a direct estimation of profit function is set-up, controlling for firm- and location-specific factors. The differences between observed firms' profits and the predicted profits from the estimation of the profit function are then used to identify local markets, with abnormally high- and low-profits, given the values of the observable characteristic in the model. In the second step, the net entry of wholesaling firms into this local markets are analysed, in order to investigate, if net entry of wholesaling firms is more common in high-return local markets.

The results from the first step of the analysis, in which profit function is estimated, show that size of the firm, measured in sales and size of the wholesaling branch, in which firm operates, are negatively correlated with firm profits. Firm growth, minimum efficiency scale and being located in a municipality with right-of-the-center local government have, on the other hand, a positive impact on profits.

The results from the second step of the empirical estimation suggest that there are local markets with abnormally high, and abnormally low profits, given the size of independent variables included in the profit model, and also, that the difference is statistically significant in all models. Furthermore, in 19 out of 30 estimated models, positive correlation between being a high-profit municipality and entry is observed, however, the correlation is statistically significant only in one out of 30 models and with opposite sign than expected.

Paper [5]: Firm relocation and firm profits: Evidence from the Swedish wholesale trade sector

The fifth paper included in this thesis addresses likewise paper [2] the issue of firm relocation. As mentioned earlier, the size and scope of firm relocation studies in the regional economics literature is rather small, especially once compared to the amount of studies on new firm formation or growth of firms. Still, the recent two decades witnessed an increase of interest in firm relocation, resulting in a several insightful studies, covering mainly countries with available business register data. Many of these studies focused, in similarity to paper [2] in this thesis, on the identification of drivers of firm relocation.

Compared to the amount of research on determinants of relocation, however only a handful of studies analyses the effects that firm relocation has on

the firms that relocate. This lack of studies on the effects of relocation is surprising, in particular if having in mind that part of the empirical studies searching for firm relocation determinants adopts the neoclassical approach to firms' relocation. In this approach, firms' relocation decision is viewed as a capital investment project, where firms discounts the net expected earnings from relocation and the costs of the move and compare to what they can get if choosing not to relocate.

The point of departure of this study is to analyse the relationship between firm relocation and the after-relocation profits of relocating firms. To this end, difference-in-difference propensity score matching is employed, and the average treatment effect of relocation on profits of relocating firms is examined.

The main results indicate that in the shortest evaluated period, stretching one year prior and one year after firm's relocation year, relocating firms increase their profits, measured with return on total assets (ROA), with in average 8 percentage points. A positive average treatment effect of relocation is observable also once the change in profits is evaluated for two-, three- and four years after firm's relocation.

4. General findings and policy implications

There is broad evidence in the regional economic literature that various aspects of firm dynamics, such as formation of new firms and growth of existing ones, bring a variety of economic benefits. The papers included in this thesis attempt to contribute to this literature by focusing upon entry, relocation and growth of firms in the Swedish wholesale trade sector.

The research questions addressed in these papers are in a sense similar to those in previous empirical research on dynamics of firms. However, while early previous studies mainly focused on the manufacturing industry, and first recently also selected service sectors of the economy have been studied, the wholesale trade sector has been largely neglected.

This is surprising, in particular when the importance of this sector for the functioning of the economy is considered. Wholesale trade forms a backbone of the economy as it efficiently connects production with consumption. According to the statistics, traditional wholesaling is still one of the largest sectors of the economy in majority of the EU27 countries, and should thus have attracted more attention in the literature.

The first paper of this thesis deals with factors being influential determinants of entry of new wholesaling firms. One of the main findings from paper [1] is that firms in the Swedish wholesale sector avoid establishing in regions with already high concentration of other firms within the same industrial branch of wholesaling. A possible explanation for this negative effect

that market concentration seems to have on entry of new wholesaling firms might be that in markets with one or only few dominant firms, the entry of new wholesaling firms can be deterred more effectively, compared to other markets. The existing firms might more easily cooperate and use strategies such as keeping prices down, creating excess capacity, or advertising aggressively in doing so, thus, preventing other firms from entry into their market.

This finding should especially be of interest for the Swedish competition authority, and the behaviour of incumbents in important markets should perhaps be monitored to avoid potential abuse of the dominating position that some incumbents might have in their local markets.

Two other factors being positively related with establishments of new firms are the quality of infrastructure in the municipality and the type of the local government. Municipalities with right-of-the-centre local governments seem to attract wholesale trade firms to a higher degree than municipalities governed by majorities coming from left-wing parties. The importance of the political settings for entrepreneurial activity was attested already by Baumol (1990); moreover, in recent study on firm entry in wholesale trade sector in Sweden, Daunfeldt et al. (2013), using a more comprehensive empirical model than the one in this thesis, also found a negative correlation between firm entry and municipalities governed by left-of-the-centre majority.

A possible interpretation of this finding might be that municipalities in Sweden have rather strong position with respect to what is built within the municipality boundaries, and right-of-centre governments are possibly more lenient in the implementation of the Planning and Building Act, which in turn might affect the construction of new business sites positively. It should be, however, noted that while the correlation between right-of-centre governments and more entry by wholesale trade firms is a statistically significant finding, the background reasons clearly deserve further research.

The importance of good infrastructure to attract entry of new wholesaling firms is presumably interrelated with the nature of the wholesaling activities. The tasks provided by wholesaling firms commonly covers moving larger bulks from producers, repackaging, storing and sorting smaller bulks, followed by re-distribution to retailers and other customers. The efficiency of the logistic process, in particular, requires access to reliable infrastructure, i.e. roads and railways but also ports and airports. A recommendation for municipalities that want to attract wholesale firms would then be to invest in new infrastructure and uphold the quality of the infrastructure already in place, as this seems to be an influential factor that wholesaling firms value and consider when determining which market to enter.

Paper [2] investigates factors that are important determinants of firm relocation. The main conclusion from this paper is smaller wholesaling firms, in terms of annual sales, along with younger firms, are found to be more

prone to relocating their business, compared to larger and older firms. Results reporting a higher propensity to relocate among younger and smaller firms are reported also in previous studies on firm relocation (see e.g. van Dijk and Pellenbarg, 2000; Knoben and Oerlemans, 2008; Brouwer et al. 2004). One interpretation put forward in the literature is the territorial and organisational embeddedness of firms; older firms are expected to have stronger ties in the environment through employees, and relations with their partners, which make their relocation a more costly process, compared to the relocation of younger firms (Knoben and Oerlemans, 2008). The findings of paper [2], thus, suggest that similar mechanism reported previously for the firms operating within the automation industry sector in Netherlands might also be going on among firms in the wholesaling industry in Sweden.

In addition to the firm-specific factors, the findings from paper [2] show that wholesaling firms tend to avoid moving into densely populated municipalities. In this case, the population density might capture, among other factors, the land prices, as shown by other authors of entry studies (e.g. Figueiredo et al. 2002). These studies suggest that higher land prices commonly lead to higher prices for business locations. Having in mind that the firms in this thesis operate within wholesaling, where the requirements for business space is rather high, this finding might then suggest that firms are not moving into municipalities with higher densities because of the costly business spaces.

Lastly, the results of paper [2] also suggest that wholesaling firms tend to avoid municipalities with highly concentrated markets, and are more reluctant to move out from municipalities governed by right-of-centre parties, both results that are similar to the ones reported for entry in paper [1].

Paper [3] analyses determinants of firm growth. The main conclusion from this paper is that very little can actually be inferred on what factors affect firm growth. Although the estimation strategy sought to go beyond measuring the effects of how various factors on 'average' affect growth within wholesaling firms and sought to consider different types of firms with respect to the growth, neither industry-specific characteristics nor the characteristics of the regions where firms are located played any statistically significant role in the explanation of the firms' growth processes. Instead, the growth of firms seems to be driven by internal characteristics of firms, factors controlled for in the model, but difficult to uniquely identify and quantify using conventional business register statistics. To disentangle these factors would require a qualitative approach, or other setup of the empirical analysis. The findings from paper [3], thus, indicate how difficult it is also when employing advanced statistical methods to identify the determinants of fast growing firms.

Possible policy advice should then perhaps be that a more efficient way of how to support the growth of firms in a region is to create a good business environment in general, rather than trying to identify and give support to individual firms that are supposed to deliver firm growth to the community.

While the first three papers of this thesis attempt to disentangle the determinants of entry, growth and relocation in the Swedish wholesale trade sector, the last two papers of the thesis address similar topics, but are more applied in their nature.

Paper [4] develops a forecasting model for firm entry into local markets and tests this model using data from the Swedish wholesale trade sector. The main finding from this paper is that there are local markets in Sweden, characterised with abnormally high and abnormally low profits; however, the positive correlation between net entry of firms and high-return local markets that should be observed is not statistically significant in most cases. This finding is in line with a study done by Geroski (1995), who reports that although profitability has in most cases positive effects on firm entry, the size of the effects is often modest and/or statistically insignificant. From a policy perspective, this again points to the difficulty of identifying 'winners.' In this case, the difficulty in finding 'winning' regions attracting entry of wholesaling firms, instead of identifying 'winners' in terms of firms delivering high firm growth as in the previous paper.

Paper [5] examines the relationship between relocation and post relocation profits of relocating firms. The main finding from this paper is that firms on average seem to increase their profits in the post-relocation period, i.e. firms correctly identify costs and benefits of relocation and choose to move if this increases profits. This finding adds interesting insight, especially when contrasted with the findings of papers [3] and [4]. While in these two papers, the researchers clearly have difficulties to model entry and growth of individual firms, the findings of the last paper show that individual firm executives do seem to be able to correctly identify the profit opportunities associated with firm's relocations.

All in all, in bringing together the findings of the five papers in this thesis, there is one important thing that should be highlighted. It seems that regardless of what aspect of the firm dynamics is examined, only a small part of the outcome variation is explained using business statistics and utilising statistical methods, as those adopted in papers [1]-[4]. Moreover, the explained variation might mainly be attributed to the characteristics of the individual firms, such as age and size of the firm, observable in the conventional statistics, or unobservable ones, controlled for by firm specific fixed and random effects. This is particularly the case in the prediction of high growing firms as in paper [3] and in the prediction of the entry of firms, conducted in paper [4]. On the other hand, paper [5] indicates that firms

themselves, or more precisely, the firm's executives, seem to evaluate correctly the same type of forecasting problem. Inevitably, this further reinforces the policy advice suggested already in the context of the firm growth. It seems more fruitful to set-up a policy to support a general, entrepreneur friendly environment, and let individuals firms strive for growth and profits, rather than targeting the policy towards particular types of firms. The results of this thesis suggest that wholesaling firms are able to make decisions that increase profits and it is expected growth as well.

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