The influence of export on regional entrepreneurship

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Abstract

This study aims to further explore the factors promoting new firm births. Literature suggests agglomeration offers beneficial circumstances, such as possible spillover effects, which attract entrepreneurs. This study assesses whether export is a characteristic that offers more spillover effects and promotes more entrepreneurship. I find significant differences between different industries and regions. Regional differences in the number of firms formed are explained by the size of the population, industry density and owned assets. The results indicate spillover effects to influence firm formations but do not prove export to be a factor.

Contents

1 Introduction

Most studies of economic development analyse one or multiple countries. They evaluate national policies, or other characteristics, as driving forces to economic growth. Although nationwide analyses offer important insights, there is also a branch of economics emphasizing the regional differences in economic performance within a nation. Studies of regional economics highlight some essential determinants of economic performance, such as agglomeration of entrepreneurship.

Entrepreneurship has long been recognized as a driver of economic growth and development. By seizing business opportunities entrepreneurs create jobs. Entrepreneurship is known to increase productivity and bring innovations. In addition, indirect effects should be considered when evaluating the benefits of entrepreneurship. An increase in firms can lead to more competitive markets and improved supply conditions. There are many factors influencing local entrepreneurship, such as agglomeration effects. Economic activities tend to accumulate close to each other. Clustering helps firms to benefit from spillover effects. Especially knowledge spillover effects, distributed by people or goods, can result in further agglomeration.

Some types of businesses contribute more to the economic effects of entrepreneurship than others. Export-oriented entrepreneurs contribute more to economic growth than general entrepreneurial activity. Regions with more exports tend to have more MNEs and more favourable industry characteristics. Exporting firms tend to have better management, higher productivity, more R&D activity and more international trade experience (Barrios, Görg, and Strobl 2003, Alvarez 2007). Firms are thought to show self-selection in regards to export, where the most efficient and competitive firms are more likely to start exporting their goods and/or services (A. Bernard, J. Jensen, and Schott 2006, Clerides, Lach, and Tybout 1998). I expect exporting firms to offer more possible spillover benefits to other entrepreneurs.

This paper will build on and contribute to the previously mentioned literature. Regional economic characteristics are evaluated to explain local entrepreneurship. Specifically, the effects of export on new firm formation are evaluated. Previous studies have examined the effects of economic factors on firm formation and other factors influencing location choice but haven't considered whether regional export influences location choice. The basic hypothesis is that local firm entry is positively associated with foreign earnings. Thus, exporting activity is a driving force of agglomeration and a predictive

variable of entrepreneurship. This paper will expand the current location choice theory and will provide a further understanding of entrepreneurial activity. The results and implications of this paper might offer policy-makers some support in promoting export policy or help aim entrepreneurial enhancement policies.

The second section of this paper, the literature review, will further discuss the existing literature about location choice, agglomeration, spillover effects and export. In the third section, the data and multiple regression models are described. The data shows an indication of a positive correlation between export and entrepreneurship. The fourth section shows the results of an ordinary least squared (OLS) regression and Fixed effects (FE) regressions. The results offer no support for the hypothesis. Effects from other indicators are discussed. The conclusions are in the final section and will contain suggestions for further studies regarding local entrepreneurship and export.

2 Literature Review

Three academic approaches can be distinct in regards to entrepreneurship. One category of research studies why some people become an entrepreneur and start a firm. Another approach is to consider the effects of entrepreneurship. Conversely, another branch will look at the determinants of entrepreneurship. This last approach will be discussed below. Studies have established a broad understanding of what influences regional differences in new firm establishments.

Armington and Acs (2002) have looked at determinants of entrepreneurship in a regional context and found that industry intensity, the number of firms per capita, is one substantial explanation. In addition, Population growth, income growth and human capital are also determinants of regional firm birth rates. Lasch, Robert, and Le Roy (2013) studied new location decisions in the ICT sector and found that new firms tend towards co-location with incumbent ICT firms. They found some effects of knowledge spillovers, but the effects of agglomeration, entrepreneurial capital and human capital are mixed.

Agglomeration is an influential phenomenon studied in the context of location choice. Local clustering of economic activities and firms can help businesses establish scale economies, lower trade costs and knowledge ac-

cumulation (Fujita and Thisse 1996, Malmberg, Sölvell, and Zander 1996). On the contrary, these clusters can experience a tighter labour market and higher labour costs, resulting from the increase in competition. Agglomeration also emerges due to scale economies at a firm's level. Costs can be reduced by concentrating production on fewer plants, strengthening agglomeration. However, firms may benefit from opening a new plant closer to their customer's market and reducing trade costs. There is a trade-off to be made between the reduction of production costs and the reduction of transportation costs (Fujita and Thisse 1996).

Regardless of this trade-off, investors are known to be influenced by industry-level agglomeration benefits when deciding on a location to invest. In Japan, investors show a preference for areas characterized by previous Japanese investments when they decide on a location for their plants (Head, Ries, and Swenson 1995). Some studies suggest that internal firm factors are more important for the decision of location choice. Entrepreneurs are more likely to succeed in a region and industry in which they have more experience. This effect is mostly due to the benefits of recruiting employees and capital to start the firm (Dahl and Sorenson 2012). In the Netherlands, location choice for firm migration is mainly determined by internal firm factors, such as firm size (Van Dijk and Pellenbard 2000). Location factors, such as location stress, influence the relocation of a firm to a lesser degree. This suggests that outside factors, like spillover effects and competition, shouldn't significantly influence the choice of business owners to move to a different region. However, their paper doesn't specifically include spillover effects and competition as external factors.

Spillover effects can occur within and between industries, but spillover effects from foreign direct investments (FDI) vary systematically between countries and industries (Blomström and Kokko 1998). Local capability and competition are two factors that can positively influence the spillover effects of FDI. To maximize spillover effect, less advanced tech firms prefer to locate in areas with high industrial activity. Advanced tech firms, on the contrary, avoid high industrial activity and competitors. They prefer areas with high levels of academic activity (Alcácer and Chung 2007). This shows that firms consider both inward and outward knowledge spillover effects when choosing a location to enter the market.

Knowledge spillover effects, the diffusion or transfer of knowledge from one firm to another, are considered in studies about location choice. Armington and Acs (2002) argue that localized knowledge spillovers and thick labour

markets are more important than other agglomeration effects. Knowledge spillovers can occur through people, like leading scientists, or through trading products (Feldman 1999). Malmberg, Sölvell, and Zander (1996) highlights the importance of long-term effects of knowledge accumulation. These clusters are favourable due to the process of innovation, involving face-to-face communication. By concentrating knowledge in an area, both formal and informal networks will become more accessible. These networks are mostly made by and only accessible to insiders of a certain environment. Despite that, knowledge spillovers are not necessarily distributed locally. Academic knowledge spillovers occur not only by localized mechanisms but also by collaborative research over longer distances (Ponds, Van Oort, and Frenken 2008). Chung and Alcácer (2002) show that regions with a high R&D intensity are more likely to attract FDI from firms in research-intensive industries. It will also attract more investments in manufacturing, suggesting firms will use manufacturing facilities to get exposure to knowledge spillover effects. This results in regions with accumulated knowledge experience further agglomeration.

There is an argument to be made that spillovers won't result in agglomeration. In high-end service industries, firms are willing to pay substantially more rent to be exposed to networking and information spillover effects (Arzaghi and Henderson 2008). In a limited area, growth and an increase in firms might not be a possibility. Spillovers can increase demand, but won't increase supply increase. This results in higher rents and not in an increase of agglomeration.

Another aspect to consider is export. Regions characterized by export might offer advantageous opportunities for entrepreneurs to start a business. However, it is still debatable whether exporting activity itself brings positive externalities to other firms in the home country. Empirical studies offer mixed results. Some find evidence for positive externalities, such as learning effects, the reduction of entry costs for firms in regards to export (Aitken, Hanson, and Harrison 1997) and the reduction of production costs Clerides, Lach, and Tybout 1998). Other findings show no evidence of positive spillovers in the home country from exporters(Barrios, Görg, and Strobl 2003, A. B. Bernard and J. B. Jensen 2004). Although Barrios, Görg, and Strobl (2003) didn't find evidence for spillover benefits from exporting activity, they do offer evidence for R&D spillover effects on export ratios.

Export might indicate favourable circumstances more indirectly. The determinants of export have been studied extensively. Especially internal-

controllable factors play a role in export success, emphasizing the importance of competent management and effective marketing (Zou and Stan 1998). Firms with higher productivity are more likely to export, which indicates the presence of self-selection in the international market (A. Bernard, J. Jensen, and Schott 2006, Clerides, Lach, and Tybout 1998). Previous experiences with international markets make a firm more likely to successfully become an exporter (Alvarez 2007, A. B. Bernard and J. B. Jensen 2004). R&D activity is another factor considered to be a determinant of export activity (Barrios, Görg, and Strobl 2003).

In regards to external factors determining whether a firm will export, the presence of multinationals (MNEs) in the same region of the firm is one determinant factor. MNEs' production and export activities make domestic firms more likely to export (Greenaway, Sousa, and Wakelin 2004). The influence of MNEs emphasizes the importance of information and technological spillover effects(Alvarez 2007). Characteristics of the industry also partially determine export success, where more technologically intense industries have a positive effect on export performance (Zou and Stan 1998).

Because exporting firms show the phenomenon of self-selection, I expect firms in a region with more export to be more productive, to invest more in R&D, to have more previous experience with exporting and to hold better management on average. I expect the regions with more export to be characterized by the presence of more MNEs and more technologically intense industries. Consequently, regions characterized by more export can offer more possible spillover benefits for entrepreneurs.

There are many factors influencing local firm formation. Economic activities tend to accumulate close to each other. This helps firms to benefit from spillover effects. Especially knowledge spillover effects, distributed by people or goods, can result in further agglomeration. Exporting firms tend to have better management, higher productivity, more R&D activity and more international trade experience. Regions with more export tend to have more MNEs and more favourable industry characteristics. This paper will build on and contribute to the previously mentioned literature by arguing that regions with more export allow for more spillover effects, leading to further agglomeration. As a result, I expect more firms will be formed in regions with more export.

The academic literature on location choice is extensive, however, it failed to consider export as a determinant for firm formation. To my knowledge, there is no evidence yet of export being a leading factor in agglomeration

and therefore firm formation. This paper will expand on the current location choice theory. It will provide a further understanding of entrepreneurial activity and the origin of agglomeration. In particular, the role of export in entrepreneurial entry will become more clear.

3 Data and Methodology

The effect of export on entrepreneurship will be examined by analysing secondary data. This data will be collected from two publicly available databases, namely the 'KVK (Chamber of Commerce) Regiodata' and Statline. Statline is a public database from CBS (Central Bureau of Statistics) offering data on varying sets of topics. KVK Regiodata is a Dutch database offering insights into economic development. These databases offer data categorized on a NUTS 2 division. NUTS is a statistical division of geographic regions. The second level of the NUTS division is equivalent to the Dutch provinces. The KVK Regiodata database is made up of a combination of sources. Apart from the KVK business register, data is collected from COEN (business cycle survey Netherlands), LISA employment register, CBS and UWV (employee insurance benefits agency). The collected data will consist of aggregated panel data from 2012 to 2020 and will be grouped by region.

Entrepreneurship

The data on entrepreneurship come from Statline. To measure entrepreneurship, the number of established formations in hundreds will be used. An establishment is a separate location used to conduct business activities. Firm formations are measured over the years, between provinces and between industries. Table 1 shows the average annual firm formation per province. Noord-Holland has the most new establishments, whereas Zeeland has the fewest. Table 2 shows that on average 730 firms are formed per year per region per industry. The formation of an establishment is counted if it occurs simultaneously with the formation of a firm. There are economic criteria to be satisfied to be a firm. There should be information on the revenues or employment. A newly formed firm can exist out of multiple establishments. All these formed establishments, if located in different zip codes, will be accounted for individually. All firms have at least one establishment. The

incorporation of an establishment is only counted if it's simultaneous with the incorporation of the entire firm. The most recent data (2021-2022) is not definitive yet, which is why I won't include it in the analysis. In 2015 a few sectors were included, namely public administration and government services, education, healthcare and welfare and lastly households. These sectors will be excluded from the data for all years, to maintain consistency. There is no formation of a new establishment when a firm is formed by a (de)merger, acquisition or relocation.

Export

Growth of international revenues will be the measurement for export. The growth of international revenue is measured as the weighted percentage of firms with an increase in international revenues minus the weighted percentage of firms with a decrease in international revenues. This data comes from the KVK Regiodata and originates from COEN. In the questionnaire, firms are asked whether their international revenues have increased, decreased or have remained the same over the last three months. The data doesn't contain the revenues from international markets. This means that I measure whether the firms in a province, in general, have started to export more in the previous three months.

Table 1 shows the average annual firm formation and export growth per region as described above. The provinces are in order of highest amount of average annual firm formation to lowest. Noord-Holland and Zuid-Holland have the most firms formed in the provinces. These two provinces are known for the Randstad, which is an agglomerated region including the four largest cities of the Netherlands. Although Zeeland ranks lowest regarding firm formation, it does have a higher average annual growth of exporting firms than Noord-Holland. The next three highest-ranked provinces do however also have the highest annual average increase in exporting firms. This suggests a possible positive correlation between export and firm formations. Table 3 shows the simple correlation between firm formation and export is 0.07. This strengthens the hypothesis that export will positively influence firm formations within provinces.

Figure 1 shows a scatterplot to visually evaluate correlation between firm formations and export. The figure also contains a linear prediction plot. The prediction plot shows a positive correlation. Negative values of export

are usually accompanied by low values of firm formation. High values of firm formations have only appeared when export holds positive values. This influences the predicted plot to show a slightly positive correlation. However, the data doesn't fit this plot very well. The mismatch is possibly caused by other not accounted variables. Patterns might be more clear within one province or one industry.

Table 1: Average annual firm formation and export growth per region

Region	Avg. annual firm formation	Avg. annual export growth (%)
Noord-Holland	283.15	6.73
Zuid-Holland	267.21	8.47
Noord-Brabant	164.10	8.66
Gelderland	122.88	8.54
Utrecht	108.17	5.72
Overijssel	63.13	8.03
Limburg	56.35	558
Friesland	33.43	6.87
Groningen	33.19	3.70
Flevoland	30.90	6.62
Drenthe	24.13	3.62
Zeeland	19.62	6.77

Source: Statline, CBS and KVK Regiodata

Economic Growth

Regional economic growth will be accounted for using a few control variables. The variable *population* is the total amount of inhabitants in the province in the corresponding year measured in millions. Population has the highest simple correlation with firm formation, measuring 0.49. The other economic indicators show a positive and low simple correlation with firm formation.

To account for the shortage in the regional labour market, *jobs* and *unemployment* will be added to the models. *Jobs* is measured by assessing the growth in jobs fulfilled by employees in a region. Jobs together with unemployment will account for the labour market in a province. *Unemployment* is measured by assessing the growth of the total amount of unemployment beneficiaries in a province. Unemployment benefits are a specific type of welfare

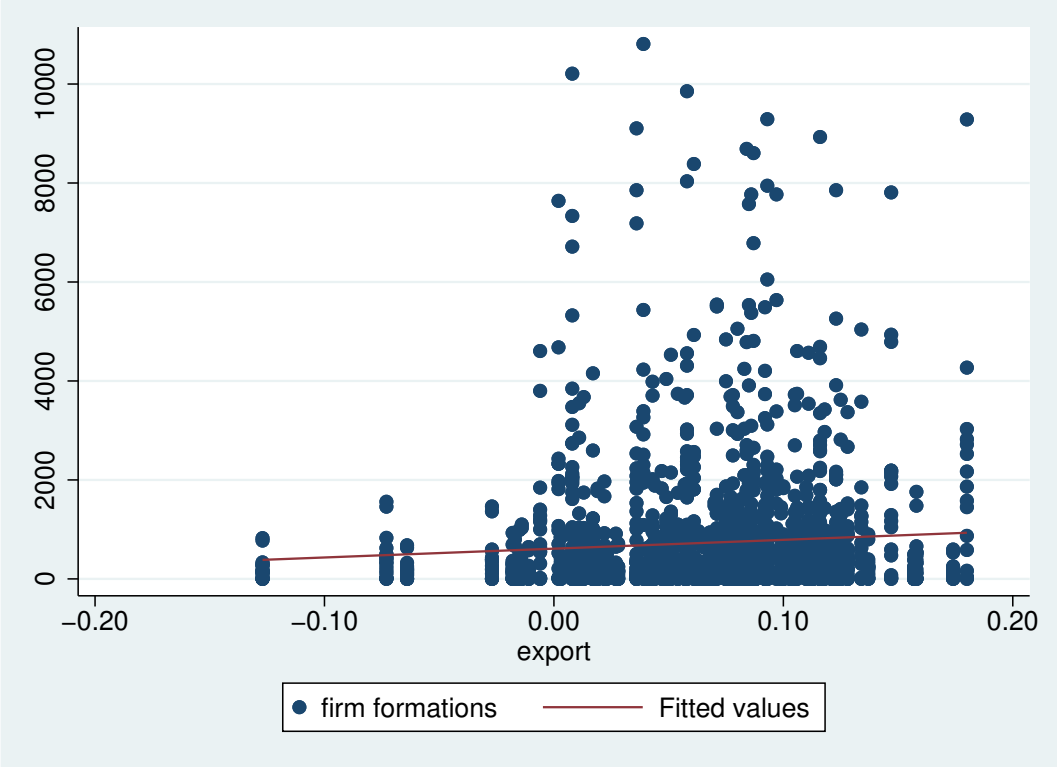

Figure 1: Twoway scatterplot of Firm formation and Export with a linear prediction plot

benefit that is received by people falling into unemployment to bridge the gap until they are able to get a job. This measurement excludes receivers of the disability benefits and old-age benefits, who won't be participants in the workforce anymore. Unemployment shows a small and positive correlation to firm formations. A tight regional labour market with growing unemployment can force people to start firms out of necessity.

Income represents the opportunity costs of potential entrepreneurs in a region. With income increasing, entrepreneurs are more likely to be better off becoming employed. Therefore, income can be expected to have a negative correlation with firm formations. However, Table 3 shows a small positive correlation with firm formations. Income is measured as the growth of the average spendable income of a private household, excluding student households. Spendable income is the gross income with tax, insurance premiums, and income transfers extracted. *Assets* is the growth of the median value of all assets of all households in a region, calculated by taking the balance of assets and debts. Assets indicate the financial opportunity of a household to start a business. Having more valuable assets makes it easier to fund entrepreneurial activity and support the household in a period without revenue or profits.

Industry Density

To estimate potential positive externality effects, Armington and Acs (2002) introduced the measurement of industry density. Industry density is measured as the number of establishments in a region divided by the region's population. This measurement will represent the extent of pooled labour markets. A higher industry density should facilitate more spillovers. This data is collected from Statline. Comparable to the definition of the formation of establishments, the number of establishments is all separate locations used to conduct business activities. Every firm has at least one establishment and multiple locations with the same zip code will be counted as one location. Population size will be the total population measured on the first of January. Its simple correlation with firm formation is positive.

Table 2 provides the descriptive statistics of the discussed variables. Some variables may be endogenous and correlate to each other. These relations can be seen in Table 3. Due to potential cumulative growth mechanisms, interpretation should be done with caution. The regression results may not necessarily imply causality.

Table 2: Statistics summary

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm formations	1,836	7.30	12.76	0	108.10
Export	1,836	0.07	0.05	-0.13	0.18
Population	1,836	1.42	1.03	0.38	3.71
Jobs	1,836	0.01	0.02	-0.06	0.05
Unemployment	1,836	-0.01	0.15	-0.21	0.34
Income	1,836	0.03	0.02	-0.20	0.08
Assets	1,836	0.10	0.26	-0.66	1.03
Industry density	1,836	0.08	0.01	0.07	0.12

Table 3: Correlation between firm formations and panel variables associated with firm births

	Firm form	export	Population	jobs	unemployment	Income	Assets
Firm formations	1						
Export	0.07	1					
Population	0.49	0.20	1				
Jobs	0.02	0.39	0.03	1			
Unemployment	0.03	-0.41	0.05	-0.83	1		
Income	0.05	0.05	0.04	0.35	-0.49	1	
Assets	0.06	0.24	0.04	0.63	-0.67	0.32	1
Industry density	0.31	0.05	0.44	0.21	-0.15	0.24	0.42

Methodology

Multiple regression models will be discussed and considered to analyse the data. An OLS regression is a technique to analyse a linear regression with multiple variables. The FE regression model is a known technique to assess panel data. Firstly, a basic OLS regression will be used to analyse the relationship between firm formations and export. This is the first model. This model will be expanded to a fixed effects regression model in a few steps. The first FE regression model will only add year effects. Afterwards, industry effects will be added in the third model. The last model will account for regional effects too. The fourth, complete model will be as follows:

$$Entrepreneurship_{r,t,y} = \alpha_{r,t,y} + \rho_1 * Export_{r,y} + \beta + \gamma + \delta + \zeta + \theta + \iota + \kappa + \lambda + \mu + \epsilon_{r,t,y} \quad (1)$$

Where

$$\alpha = constant\, term$$

$$\beta = \rho_2 * population_{r,y}$$

$$\gamma = \rho_3 * jobs_{r,y}$$

$$\delta = \rho_4 * unemployment_{r,y}$$

$$\zeta = \rho_5 * income_{r,y}$$

$$\theta = \rho_6 * assets_{r,y}$$

$$\iota = \rho_7 * industrydensity_{r,y}$$

$$\kappa = \rho_8 * Dummy_{year}$$

$$\lambda = \rho_9 * Dummy_{industry}$$

$$\mu = \rho_{10} * Dummy_{region}$$

$$\epsilon = error\, term$$

The rho's in the formula are the coefficients of the variables, measuring their effect on firm formation. As Population is measured in millions and firm formation in hundreds, the ρ_2 represents how many additional firms will be formed, in hundreds, when a province has one million inhabitants more. Jobs, unemployment, income and assets are measured as a percentage of growth. As one of these variables increases with 1 percent-point the corresponding rho's measure the effect on firm formation, in hundred. Industry density is measured as a ratio of the total amount of firms divided by the local population. The correlating rho indicates the effect on firms formed, in hundreds, when a region has more firms relative to the population. ρ_7 is the estimated effect on firm formation if the ratio increases with 1. If the coefficient is positive, it means more additional firms will be formed if there already are relatively many firms per person.

By adding individual-specific dummy variables the OLS regression model becomes a fixed effects regression model. A fixed effects regression is a model used to analyse panel data and is suitable when individual-specific characteristics remain constant over time. Multiple dummy variables are used in this

FE regression, namely year, industry and region dummies. As mentioned before, the panel data range from 2012 to 2020. Year dummies account for time-specific factors, like the implementation of new national policy in a certain year encouraging firm formation. Firm formations are measured per industry, using the first digit grouping of the SBI 2008 categorization (See Appendix A). Some industries are easier to enter than others because less experience or knowledge is necessary to enter. This results in differences in structural firm formations between industries. Industry dummies account for the factors that make such differences occur. The Dutch provinces will be the classification of the region dummies. Regional dummies account for the differences among regions. Provinces differ in the level of human capital and resources, influencing the likelihood of firm formations. Adding too many dummy variables comes with a risk. The effects of other predictive variables might be embedded in the dummies. This might unjustly remove the significance of specific predictive factors, such as export. When dummy variables are used, one value is omitted. This is of importance when interpreting the regression results. In these models, the year 2012, industry A and Region Drenthe have been omitted.

OLS and FE regression have some assumptions. Linearity is one assumption both models share. Figure 1 shows this might not be the case between firm formation and export. If export or other variables indeed have a different kind of relation to firm formation, the results of OLS and FE regression are likely to be inaccurate. This can become specifically problematic if such an inappropriate model is extrapolated. There is the risk of having omitted variables, resulting in biased estimates. Dummy variables can account for multiple underlying factors that might be omitted otherwise. This lowers the probability of calculating biased estimates as a consequence of omitted variables. Also, there should be no multicollinearity. It is assumed that independent variables don't have high levels of intercorrelation. Table 3 shows the levels of correlation of independent variables. What counts as 'high levels of correlation' is arbitrary. When using 0.8 as threshold, Jobs and Unemployment show a high correlation, meaning the multicollinearity assumption has been violated. Multicollinearity makes the estimated coefficients less accurate. It can cause the model to hold less statistical power and the p-values to become less trustworthy.

Two assumptions are violated by the use of the current data, making OLS and FE regression models inappropriate: normality and constant variance Du et al. 2012. The normality assumption states that the data follows a normal

distribution. The data on firm formations appear to be positively skewed. The skewed nature of the data results in the variance of the error term to be inconstant, which is called heteroskedasticity. The OLS and FE regression assume the error term to be constant. The used methodology is therefore limited in accurately estimating standard errors. P values and the confidence intervals can become deceptive.

4 Results

This section will turn to the results of regression analyses of the factors associated with the regional and industrial variations in new firm births. The results of the OLS and the FE regression models are presented in Table 4. The hypothesis of export positively influencing firm formations in a regional context is rejected by all models. It was argued that there should be a positive effect between export and firm formation, as the estimated regression in Figure 1 predicted. The results of the first three models suggest a negative correlation between export and firm formation, which opposes the hypothesis. However, all four models show no significant correlation between export and firm formations. The scatter plot in Figure 1 already indicates the lack of a clear linear relation. More firms with an increase in export in a region do not result in additional firm formations within the same region.

Other factors are related to firm formations. Population is the only variable from the first model that remains significant in all models. In the first three models, the significant level is 0.1%. In the fourth model, the significant level is 5%. Armington and Acs (2002) found regional population growth to be more important in explaining new firm births than regional population size. The results in Table 4 show that population size does significantly influence regional firm births. There might be multiple ways in which population affects firm formation. A higher population will show more potential customers, making it more attractive for firms to start and settle business. This way a large population can cause more agglomeration. A higher population also makes it more likely for a region to have more entrepreneurs. Although entrepreneurs can start their companies in different regions than where they live, Dahl and Sorenson (2012) showed that they are more likely to succeed when they are familiar with the region they start their business in. This increases the likelihood of entrepreneurs starting their firms in the same region as where they live. A region with more entrepreneurs will then

also experience the birth of more firms.

As Armington and Acs (2002) argued, Industry density is strongly positive and statistically significant. This confirms that entrepreneurs are more attracted to regions where the pooled labour market is more exposed to spillover effects. The effect of industry density is significant at a level of 0.1% in the first three models but loses its significance when regional dummies are added to the model. Because industry density wasn't measured between different industries, the industry dummies didn't affect the estimated coefficient.

The other economic indicators are not significant in any model. This would suggest that economic indicators are not of importance in the decision-making of starting a firm. Theoretically, Income is expected to have a negative influence on firm formations, as it represents opportunity costs for entrepreneurs. When the income increases, it becomes less likely that entrepreneurs will benefit from starting their own business. One second FE model shows a significant effect of Assets on firm formation. This indicates that entrepreneurs are more likely to start a business when they already have resources. This emphasizes the importance of direct available resources to exploit business opportunities. Jobs show a negative relation to entrepreneurship, although not significant. When more jobs are fulfilled in a region, the pooled labour market becomes smaller for firms to find employment. As recruiting and hiring employees becomes more difficult and costly, starting a business can become less lucrative. More unemployment will expand the regional pooled labour market, resulting in the reverse effect.

The different dummy variables show mixed results. Year dummies didn't provide significant coefficients in models 2, 3 and 4. In the years 2013 to 2020, there have been no significant changes compared to 2012 that also influenced the number of firms formations. Most industries are significantly different from industry A when regressing the number of firms established, except for Industry C and L. Industries B, D, E and U experience significantly less firm formation than Industry A. Industry F, G, H and M show a strong positive coefficient. Only four Provinces do not show significant difference with Drenthe, namely Flevoland, Groningen, Limburg and Zeeland. The other provinces show strong negative coefficients, meaning they provide lower firm formation than Drenthe. This is surprising because Table 1 shows that Drenthe has the lowest annual average of firm formations, besides Zeeland. It would be expected for other provinces to account for a higher amount of firm formations. Industries, characterised by more firm formations, might

Table 4: Regression results at regional firm formation

firm formation	OLS model	FE model 1	FE model 2	FE model 3
export	-2.22 (5.80)	-8.54 (8.21)	-8.54 (5.72)	0.31 (6.40)
population	5.44 (0.29)***	5.42 (0.30)***	5.42 (0.21)***	29.86 (14.17)**
jobs	-8.01 (22.15)	-18.52 (25.22)	-18.52 (17.57)	-6.77 (18.20)
unemployment	2.28 (3.65)	3.25 (7.33)	3.25 (5.11)	-0.92 (5.66)
Income	7.56 (13.09)	24.21 (49.37)	24.21 (34.38)	11.81 (34.98)
Assets	1.17 (1.53)	2.91 (2.11)	2.91 (1.47)**	-0.04 (1.83)
Industry density	130.75 (30.30)***	144.46 (35.38)***	144.46 (24.64)***	166.01 (241.40)
Constant	-11.48 (2.35)***	-12.73 (2.82)***	-17.46 (2.09)***	-29.02 (12.03)**
R2	0.2526	0.2538	0.6413	0.6484
2013		1.25 (1.54)	1.25 (1.07)	-0.38 (1.17)
2014		0.06 (2.98)	0.06 (2.08)	-1.05 (2.28)
2015		0.80 (3.00)	0.80 (2.09)	-0.97 (2.57)
2016		-0.05 (3.07)	-0.05 (2.14)	-1.97 (3.03)
2017		0.42 (3.55)	0.42 (2.47)	-2.29 (3.57)
2018		0.25 (3.59)	0.25 (2.50)	-2.33 (4.07)
2019		-1.10 (4.02)	-1.10 (2.80)	-2.67 (4.74)
2020		-1.49 (2.01)	-1.49 (1.40)	-2.82 (4.18)
Ind. B			-2.52 (1.05)**	-2.52 (1.04)**
Ind. C			1.66 (1.05)	1.66 (1.04)
Ind. D			-2.42 (1.05)**	-2.42 (1.04)**
Ind. E			-2.39 (1.05)**	-2.39 (1.04)**
Ind. F			10.74 (1.05)***	10.74 (1.04)***
Ind. G			18.98 (1.05)***	18.98 (1.04)***
Ind. H			1.73 (1.05)*	1.73 (1.04)*
Ind. I			2.39 (1.05)**	2.39 (1.04)**
Ind. J			5.88 (1.05)***	5.88 (1.04)***
Ind. K			4.89 (1.05)***	4.89 (1.04)***
Ind. L			-0.76 (1.05)	-0.76 (1.04)
Ind. M			28.06 (1.05)***	28.06 (1.04)***
Ind. N			5.26 (1.05)***	5.26 (1.04)***
Ind. S			5.79 (1.05)***	5.79 (1.04)***
Ind. R			5.66 (1.05)***	5.66 (1.04)***
Ind. U			-2.57 (1.05)**	-2.57 (1.04)**
Flevoland				2.20 (2.47)
Friesland				-5.18 (1.66)***
Gelderland				-40.35 (20.63)*
Groningen				-1.52 (2.26)
Limburg				-15.68 (9.79)
Noord-Brabant				-51.85 (26.36)**
Noord-Holland				-55.61 (27.52)**
Overijssel				-16.83 (9.23)*
Utrecht				-21.02 (8.37)**
Zeeland				2.08 (2.82)
Zuid-Holland				-76.42 (43.26)*

Notes: N=1,836.
*=p≤0.10, **=p≤0.05, ***=p≤0.01

be more present in these provinces than they are in Drenthe. The positive effects from such industries might then be absorbed by the industry dummies, instead of the regional dummies. Adding industry dummies resulted in a high increase of R-squared. Year and region dummies didn't contribute much to an increase of R-squared. This indicates that industries hold more predictive power than years and regions, in these models.

5 Conclusion

This paper has examined export as a predictive variable on regional firm formation. It is argued that regions characterized by more export can offer more possible spillover benefits for entrepreneurs. An OLS and FE models are used to evaluate regional panel data.

The findings indicate agglomeration effects, as more firms are formed in regions with more people and a higher firm density. Entrepreneurs do take spillover effects into account when deciding on where to set up their business. However, an increase in exporting firms does not function as a catalyst in regards to agglomeration. It is concluded that regions with more exporting firms do not necessarily provide more spillover benefits to start-ups. Other economic indicators don't seem to impact firm formations on a regional level, except the assets of the median household.

However, the results might be unreliable, as multiple regression assumptions have been violated. Multicollinearity and a skewed distribution are causes of concern when interpreting the regression results. One consequence can be inflated standard errors, resulting in unjustified insignificant results. The regressions may contain inaccurate estimations of the coefficients and standard errors.

Further studies might be able to achieve further understanding of the occurrence of agglomeration and the underlying location choices made. To take a different perspective, further study can evaluate the effect of import on entrepreneurship. Furthermore, as different industries show different levels of firm formations, underlying industry characteristics can be distinguished and analysed in further studies to gain a more detailed understanding of opportune circumstances for entrepreneurs. Any future research should also address and account for the issue of skewness in the data and multicollinearity.

References

Aitken, B., G.H. Hanson, and A.E. Harrison (1997). "Spillovers, foreign investment, and export behavior". In: *Journal of International economics* 43.1-2, pp. 103–132.

Alcácer, J. and W. Chung (2007). "Location Strategies and Knowledge Spillovers". In: *Management Science* 53.5, pp. 760–776.

Alvarez, R. (2007). "Explaining Export Success: Firm Characteristics and Spillover Effects". In: *World Development* 35.3, pp. 377–393.

Armington, Catherine and Zoltan J Acs (2002). "The determinants of regional variation in new firm formation". In: *Regional studies* 36.1, pp. 33–45.

Arzaghi, M. and J. V. Henderson (2008). "Networking off Madison Avenue". In: *The Review of Economic Studies* 75.4, pp. 1011–1038.

Barrios, S., H. Görg, and E. Strobl (2003). "Explaining firms' export behaviour: R&D, spillovers and the destination market". In: *Oxford Bulletin of Economics and Statistics* 65.4, pp. 475–496.

Bernard, A.B., J.B. Jensen, and P.K. Schott (2006). "Trade costs, firms and productivity". In: *Journal of Monetary Economics* 53.5, pp. 917–937.

Bernard, Andrew B and J Bradford Jensen (2004). "Why some firms export". In: *Review of economics and Statistics* 86.2, pp. 561–569.

Blomström, M. and A. Kokko (1998). "Multinational Corporations and Spillovers". In: *Journal of Economic Surveys* 12.3, pp. 247–277.

Chung, W. and J. Alcácer (2002). "Knowledge Seeking and Location Choice of Foreign Direct Investment in the United States". In: *Management Science* 48.12, pp. 1534–1554.

Clerides, Sofronis K, Saul Lach, and James R Tybout (1998). "Is learning by exporting important? Micro-dynamic evidence from Colombia, Mexico, and Morocco". In: *The quarterly journal of economics* 113.3, pp. 903–947.

Dahl, Michael S and Olav Sorenson (2012). "Home sweet home: Entrepreneurs' location choices and the performance of their ventures". In: *Management science* 58.6, pp. 1059–1071.

Du, Jing et al. (2012). "The use of count data models in biomedical informatics evaluation research". In: *Journal of the American Medical Informatics Association* 19.1, pp. 39–44.

Feldman, M.P. (1999). "The New Economics Of Innovation, Spillovers And Agglomeration: Areview Of Empirical Studies". In: *Economics of Innovation and New Technology* 8.1-2, pp. 5–25. DOI: 10.1080/10438599900000002.

Fujita, M. and J. Thisse (1996). "Economics of Agglomeration". In: *Journal of the Japanese and International Economies* 10.4, pp. 339–378.

Greenaway, David, Nuno Sousa, and Katharine Wakelin (2004). "Do domestic firms learn to export from multinationals?" In: *European Journal of Political Economy* 20.4, pp. 1027–1043.

Head, K., J. Ries, and D. Swenson (1995). "Agglomeration benefits and location choice: Evidence from Japanese manufacturing investments in the United States". In: *Journal of International Economics* 38.3-4, pp. 223–247.

Lasch, F., F. Robert, and F. Le Roy (2013). "Regional determinants of ICT new firm formation". In: *Small Business Economics* 40, pp. 671–686.

Malmberg, A., Ö. Sölvell, and I. Zander (1996). "Spatial Clustering, Local Accumulation of Knowledge and Firm Competitiveness". In: *Geografiska Annaler. Series B, Human Geography* 78.2, pp. 85–97.

Ponds, R., F. Van Oort, and K. Frenken (2008). "Innovation, spillovers and university-industry collaboration: an extended knowledge production function approach". In: *Journal of Economic Geography* 10.2, pp. 231–255.

Van Dijk, J. and P.H. Pellenbard (2000). "Firm relocation decisions in The Netherlands: An ordered logit approach". In: *Papers in Regional Science* 79, pp. 191–219.

Zou, S. and S. Stan (1998). "The determinants of export performance: a review of the empirical literature between 1987 and 1997". In: *International marketing review* 15.5, pp. 333–356.

6 Appendix A

Table 5: Industry codes

Code	Industry
A	Agriculture, forestry and fishing
B	Mineral extraction
C	Industry
D	Energy supply
E	Water companies and waste management
F	construction industry
G	Trade
H	Transport and storage
I	catering industry
J	Information and communication
K	Financial services
L	Rental and trade of real estate
M	Specialist business services
N	Rental and other business services
R	Culture, sports and recreation
S	Other services
U	Extraterritorial organisations

Source: CBS