

# The networks of the solo self-employed and their success

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## **ABSTRACT.**

Solo self-employed individuals (i.e. one person enterprises, mainly offering their own human capital), form an increasing proportion of the labor market. Knowledge on solo self-employed is still limited and this makes tailoring policy measures towards this group difficult. Their network position may play a crucial role in economic performance of solo self-employed, as resources available are by definition limited. They are likely to depend heavily on their professional networks for acquisition and mobilizing additional resources. In this paper we use a specially constructed panel of solo self-employed from the Netherlands to explore the motives, gestation and spatial extent of their networks. (Multinomial) logit models are used to relate network position to their economic performance. The results suggest that the motives for and gestation of cooperation between solo self-employed differ from other groups of entrepreneurs. In contrast to existing ideas about network benefits, it is not information sharing and knowledge spill-overs, but executing and mutual sharing of assignments that are most important. Also, the spatial extent of networks is limited. Solo self-employed are mainly locally oriented. Finally, we find that in terms of success a good network position is negatively related to economic performance. In more detail, cooperation on scope is connected to success, whereas joined acquisition is related to poor performing solo self-employed, as they tend to reach out for other solo self-employed when business is slow.

**JEL CLASSIFICATION:** D85, L22, L25, J24, R12

**KEYWORDS:** Solo self-employed, economic performance, network formation, spatial embeddedness

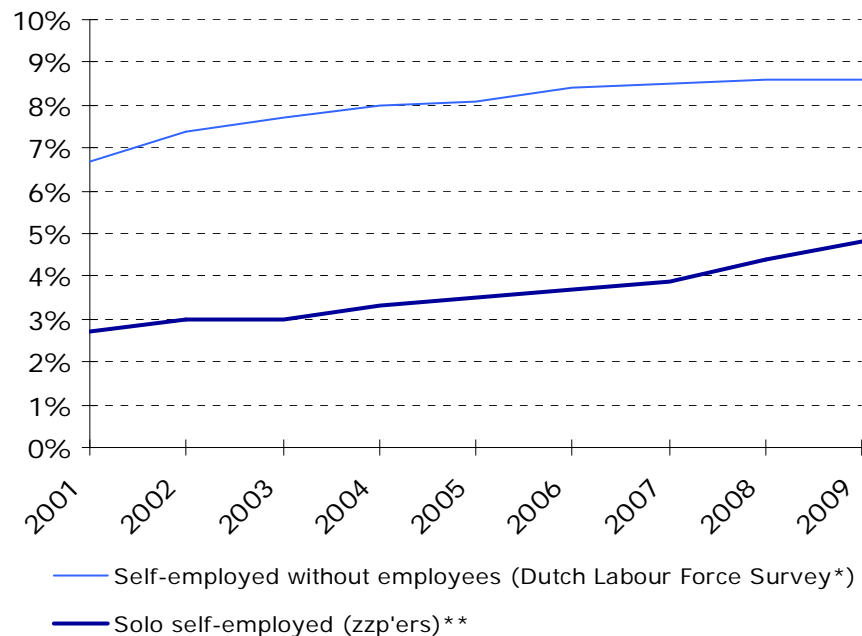
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## 1. Introduction

Since the 1980s, The Netherlands, and more generally Europe, has witnessed an increase in the share of self-employment (see, for example, Arum & Müller 2004). The gap with the United States has been closed and for many European countries, the share of self-employment is now similar or even higher than that in the USA (see, for example, Van Stel, Cieslik and Hartog 2010). Parallel to the increasing importance of self-employment in the economy we see an increase in the scientific and policy interest in this group. Much of the existing research takes the group of self-employed as a more or less homogenous group of entrepreneurs that work on their own account, mainly because of the limitations of large-scale labour force statistics (Schulze, Buschoff and Schmidt 2005). Unfortunately, a one-size-fits-all approach, both in policy and in research, conceals the heterogeneity that is certainly there (OECD 1992; Bosch and Van Vuuren 2010; Bögenhold and Fachinger 2009). Self-employment describes a wide spectrum of entrepreneurship varying from innovative starters to independent professionals and from dependent workers to sole proprietary retailers. As a result, aspects of self-employment have remained understudied while their importance has steadily increased over time. One such specific type of self-employment is the so-called solo self-employed (in Dutch: 'Zelfstandigen zonder personeel' or 'zzp'ers').

Figure 1 The development of solo self-employed and self-employed without employees as a percentage of the gainfully employed population in The Netherlands (2001-2009)



Source: \*Dutch labour force survey, Statistics Netherlands (2010); \*\* Van der Ende, Erken en Streefkerk (2010) based on definition of solo self-employed by EIM

Solo self-employed are characterized by the fact that they sell their own knowledge, skills and abilities to other parties. They do this on their own account and they rely primarily on their human capital to provide these services. Their 'firms' are therefore by definition capital extensive. This feature sets them apart from, for example, franchise retailers whose businesses have an important capital component. Also, the firms of solo self-employed are by definition one-person operations. The group of solo self-employed has shown a steady increase in recent years. Figure 1 illustrates this. In 2009, almost 5% of the Dutch labour market population was classified as solo self-employed. The graph also illustrates that the group is gaining in importance relative to the total group of self-employed without employees. In the wake of this increase, policy attention for the group of solo self-employed is steadily building. Despite several recent publications about solo self-employed (e.g. SER 2010; De Vries & Vroonhof 2010; Berden, Dosker, Riseeuw & Willebrands 2010), much is still unclear about this group. This study contributes to the literature on solo self-employed by looking at their use of networks for production and the relationship to success. Both aspects, success and network behaviour, are particularly interesting in the context of solo self-employment.

Understanding success factors of solo self-employment is interesting because of the inherent volatile environment they operate in. Above all things, solo self-employed offer flexibility to an economy (Böheim and Muehlberger, 2006). As they normally work on a contract basis for larger firms, they are easily added to the workforce in times of growth. In times of economic bust and downsizing, they can also be easily disregarded of by firms. This is a clear advantage for firms. Part of their economic risk is shifted to solo self-employed. In times of prosperity this comes with a premium for the self-employed. In times of an economic bust, they have to rely on previously earned financial buffers. At the level of the national economy, this mechanism mitigates the growth of unemployed in times of economic downsizing. By the same token however, at the individual level, solo self-employed can be expected to face serious problems in periods of decline. In the context of the economic bust of 2009, there is a clear concern that solo self-employed may take the biggest hits. In order to understand these processes, an understanding of the success factors of solo self-employment is important.

Networks of solo self-employed may play an important role in building a robust group of solo self-employed workers. As they are one person operations, based on their human capital, the resources available are by definition limited. Therefore, they are likely to depend heavily on their professional networks for acquisition and mobilizing additional resources if necessary. It can therefore be expected that network position is crucial for the economic performance of solo self-employed. This is also important from a policy point of view. On the one hand, solo self-employed can play a role in the important policy aim of establishing knowledge transfer between economic actors. On the other hand, understanding the networks of self-employed is important in order to support this group as effectively as possible. In the Netherlands, the proliferation of the solo self-employed is generally seen (certainly from a policy perspective) as a positive development. Policies aimed at strengthening this group can benefit from a thorough insight in the ways resources are sought and acquisition is done.

Using survey data from the Netherlands, this paper present an explorative analysis of the networks of the solo self-employed. In the first step, a descriptive analysis of the networks and the motives for being in the networks is provided. In the second empirical step, we explore whether the properties of the networks influence

performance and resilience to the economic bust. However, before turning to the empirical part of the study, we address the theoretical background and previously published relevant literature.

## 2. Theoretical background and existing research

### *Defining the solo self-employed*

One of the major issues in studying solo self-employed is to define them as a group. Solo self-employed share several aspects with business owners, while they also have characteristics that are similar to employees. Solo self-employed, for example, do have business on their own account which is a characteristic they share with business owners. However, much like employees, they do not invest in capital goods. Also, it is common, particularly in some industries, that solo self-employed have important and continuing relationships with only a few client firms (Stanworth and Stanworth, 1995). As a result of the ambiguous nature of the concept, existing studies have focused on the issue whether solo self-employed are best seen as a specific kind of business owners or as a certain type of employees. Basically this translates in discussions on the definition of solo self-employed. Vroonhof et al (2001), for example, list 11 aspects that together define the essence of the solo self-employed. This study does not aim at contributing to this debate. Rather, a practical definition is used that captures the main elements of the solo self-employed. There are three important aspects (De Vries et al, 2010):

- Solo self-employed work at their own account and risk
- There are no other people involved in running the business. This includes employees, family and business partners.
- The main service of the self-employed is its human capital. The business provides knowledge, additional capacity, experience of the owner, but no goods.

Another result of the ambiguity of the concept is a myriad of terms used to describe it<sup>1</sup>. Partly, the terminology used reflects the discussion about the interpretation of the phenomenon. Tennent et al (2005) speak of 'Quasi employees', whereas Star (1981) uses the term 'Quasi businesses'. Other terms used include 'Autonomous workers' (Carby-Hall, 2002), 'Sole traders' (Baines and Robson, 2001), 'Self-employed without employees' (Stanworth and Stanworth, 1995), 'Portfolio workers' (Fraser and Gold, 2001) and 'Dependent self-employed' (Böheim and Muehlberger, 2006). In this study, 'Solo self-employed' (following Vesper, 1980 and Barbieri, 2003) is used as this captures two of the main aspects of the phenomenon: they work alone and for their own account.

### *Networks as sources of small firm success*

The basic premise of much of the research explaining small firm success stems from resource-based and resource dependence theory: "*The value of any economic organisation (firm, business, company) derives from and reflects the value to it of the resources under its control...*" (Lewin and Phelan, 2000). The coarse interpretation is that firms that are able to secure the best and most relevant resources for production will outperform other firms. In this context, resources should be seen as a very broad concept including all inputs for production including capital goods, knowledge, skills, human capital. In the case of solo self-employed,

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<sup>1</sup> Interestingly, this an issue in English only. Although the interpretation may differ, there is a clear consensus about the term in Dutch: Zelfstandigen zonder personeel (ZZP).

given their production processes, human capital and skills are probably the most important resources relevant to the business. There are several ways in which resources can be 'controlled' or accessed. Coase (1937), in his transactions theory, distinguishes between internalised resources and external resources. He states that firms will internalise resources if the transaction costs of attaining the resources on the market are too high. If not, resources can be attracted from outside the organization. In order to attain external resources (with low transaction costs) a good position in relevant networks is pivotal. This is particularly the case for small businesses as their small size caps the resources that are internalised. As a result, it can be expected that smaller firms rely on their external networks in order to extract resources for production. This argument is true *in extremis* for solo self-employed as, by definition, they run one person operations and are thus restricted in the resources available to them. A good network position is thus expected to be important for their economic performance.

Although the general idea of the relationship between network position and firm success is rather straightforward, the elaboration of the issues at hand is more complicated. There are at least three important dimensions that complicate formulating and operationalizing the relationship between network position and success (see also Johannisson, 1998). Firstly, there is the question of determining which types of networks are relevant. Secondly, what is it exactly that entrepreneurs gain from being in the right position in the network? Thirdly, there is the issue of the spatial extent of the networks. All three aspects are briefly addressed below.

In thinking about network types in relation to resources, many researchers distinguish between social networks and professional networks. In the context of entrepreneurship, it has been shown that social capital derived from the social network is extremely important in putting together relevant resources for starting a firm (Dahl and Sorenson, 2009). This also explains why new firms usually start at or near the place of residence of the entrepreneur. Although part of the explanation is that ties to friends and family are important for securing resources to be used in (new) firms, part of the explanation is also that being close to friends and family is preferred by the entrepreneur for sustaining social contacts. Given the small size of the organization of solo self-employed, it is likely that similar processes may be important for them even though this paper does not consider new firms as such. A possible pitfall of regarding social ties, however, is that the business and social aspect can get confounded. Focusing on the business contacts only mitigates this potential pitfall. In this paper, only the internal network of solo self-employed is considered. This implies a focus on the business aspect of networking. It also means, however, that only part of all potential relevant networks is considered.

Turning to motives why self-employed may be involved in networks, there seem to be two aspects that are stressed. First, input output relations and the networks in which this is organized are heavily studied. This is done particularly in urban growth frameworks. As solo self-employed have very little need for inputs – their production process consists only of their own skills –, this aspect is not relevant. Output, however is just as important for solo self-employed as it is for other firms. Finding sources for output is then important, particularly if current output is low. Cooperation in acquisition may be an important motive. Secondly, networking is often related to information distribution or, in the lingo of the urban growth theory, knowledge spill-overs. Donckels and Lambrecht (1995) indeed stress the importance of accessing new information in order for solo self-employed to grow. Although an interesting aspect, also from a policy point of view, it is unclear *ex ante* whether it is important

for solo self-employed. As mentioned before, their product is rather inflexible as it is based on the skills and experiences of the solo self-employed. Demand, however, will also change and solo self-employed will be forced to change their products accordingly.

In addition to the usual aspects of network motives, scale and scope motives may also be important for solo self-employed (Perrow, 1993). Given their limited production capacity, jobs may quickly become too big and additional help is needed. They may need extra capacity because the job is too big (scale), but they may also call in for specialized help for parts of the job that are beyond the skills of the solo self-employed (scope). A good position in the network would then allow solo self-employed to take on bigger jobs.

Finally, the spatial scale of the networks is of interest. Generally, again deriving from urban growth theory, network scale is quite limited. The benefits of knowledge spillovers, for example, have been shown to carry only over a very limited distance.

On the basis of the previous considerations we expect that being involved in professional networks of solo self-employed has a positive effect on the overall performance of the operation.

### **3. Data and methodology**

#### *Data*

As stressed before, the solo self-employed are characterized by specific traits that separate them from traditional entrepreneurs. They combine an entrepreneurial attitude with the knowledge, skills and abilities of a (specialized) employee. Therefore it can be difficult, even for the individual itself, to make a clear distinction between being self-employed and being an employee<sup>2</sup>. Such a concept can be subject to cultural interpretations or individual preferences and can easily result in differences with various official definitions of entrepreneurship (Meager 1994, p. 184). For instance, there can be specific standards for minimum hours spent in the firm or a minimum numbers of clients to meet the requirements for business tax rebates. As Labour Force Surveys rely mainly on the respondents' self-definition, the data in these surveys should be interpreted with care.

In order to avert these shortcomings, a different approach to the data collection process was used. Instead of relying on self-definition we used a firm register based on the trade register of the Dutch Chamber of Commerce as a sample frame. Since July of 2008 it is mandatory for all businesses and legal entities, including firms without personnel, to register at the trade register. This provided the advantage that we could target the vast majority of solo self-employed, while maintaining an official definition of solo self-employment.

The primary means of data gathering in this study was a telephonic survey in the form of a panel amongst enterprises with only one employed person in the Netherlands. This panel specifically targets the solo self-employed and consists of at least one thousand, but ideally two thousand respondents across all industries. It is executed by EIM Business and Policy Research as part of a long term research

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<sup>2</sup> For a more detailed review on the difficulties concerning the (self)definition of self-employment we refer to Meager (1994, pp 184-185).

program on SMEs and entrepreneurship<sup>3</sup>. The *Solo Self-Employment Panel* is annually repeated with a frequency of two waves per year. Panel attrition is handled by filling up the sample to two thousand respondents once a year. The response rates and the respondents involvement of panels such as these largely exceed that of random surveys. Specially trained interviewers conduct the fieldwork with help of Computer Assisted Telephonic Interview (CATI) software.

The sample used in this study is the pilot wave or the so-called baseline measurement. It consisted of approximately one thousand respondents that were contacted in December of 2009. To achieve this sample firms were selected from the DMCD company database<sup>4</sup>, which contains more than 95% of all Dutch companies. Firms with only one employed person were approached according to a stratified sample plan in all economic sectors, with oversampling in the service sector (for a detailed overview see section on sector structure). All successfully contacted firms were screened according to the following requirements to determine whether the respondent could be classified as a genuine solo self-employed:

- Carrying out entrepreneurial activities;
- Holding a Private limited liability company or a Sole trader;
- Having no further employees (except oneself);
- Not having fellow business partners;
- No substantive professional involvement of family members in the business.
- Mainly engaged in selling their own knowledge skills and abilities instead of selling of goods.

The first three requirements correct for false entries in DMCD. If respondents did not meet all of these aspects they were excluded from further analysis. The total response rate, including screen-outs was 49%, while the net response rate was 29%. This resulted in 1.038 completed interviews, of which 127 formed a control group. Subsequently, we used the weightfactors to correct for disproportional stratification and oversampling in the Service sector.

One of the main conclusions in an earlier study on the solo self-employed (De Vries et al. 2010) is the striking diversity of the group. The resilience to the economic bust of 2009, for example, varies between the different sectors the solo self-employed are active in. Also, an indication that the network structure and cooperation strategy may vary across sectors is given by Bakker et al (2010), where interorganizational collaborations are measured among SMEs. They find that there is a higher concentration of inter-organizational collaboration in Business Services than for instance in Trade & Repair or Hotels & Catering. Table 1 shows the aggregation and the number of cases per group. In order to retain sufficient cases per sector we have grouped the sectors together into 6 broadly defined sectors.

#### Sector structure

Sector	N	%	Sector	N	%	Sector	N	%
Agriculture	63	6	Agriculture	63	6	Agriculture	63	6
Manufacturing	25	2	Manufacturing	25	2	Manufacturing	151	15

<sup>3</sup> EIM Business and Policy Research carries out a long term research program on small and medium-sized enterprises (SMEs) and entrepreneurship, which is being financed by the Dutch Ministry of Economic Affairs.

<sup>4</sup> This database is proprietary of Marktselect and forms an improved version of the trade register of the Dutch Chamber of Commerce.

Construction services	101	10	Construction	126	12	and construction		
Construction	25	2						
Trade and repairs	105	10	Trade and hospitality	121	12	Trade and Transport	154	15
Hospitality	16	2						
Transport	25	2	Transport and storage	33	3			
Storage / Wholesale	8	1				Business Services	385	37
Interim Management	69	7	Interim Management and HRM	80	8			
HRM	11	1						
ICT	46	4	ICT, communication and media	130	13			
Comm. and marketing	38	4						
Media	45	4						
Education and training	52	5	Education and training	52	5			
Financial services	100	10	Financial and judicial Services	124	12			
Judicial services	24	2						
Health care	78	8	Health care	78	8	Health care	78	8
Other Services	207	20	Other services	207	20	Other services	207	20
Total	1038			1038			1038	

Table 1: Sector structure

In the analyses we also take into account the main location of the solo self-employed. Particularly the Randstad area (West) has specific characteristics that may influence the network building and economic resilience of the solo self-employed. It is the area with the highest population and firm density. In addition, it is central to the country making it easier for the solo self-employed to extend their networks outside of the home region into other parts of the Netherlands.

#### 4. Descriptive results

In the descriptive analysis of the data, we focus on the three dimensions as introduced in the theoretical section. First, we look at the reasons for cooperation between the solo self-employed. This answers the question about the benefits of networking. Once again, it is useful to note that by focusing on cooperation between solo self-employed, not all networking activities are included. Contacts with larger firms, family and friends are not included. Table 2 shows to what extent solo self-employed cooperate and also their main motives for cooperation. Almost half of all solo self-employed have cooperated with another solo self-employed in the previous year. Two reasons stand out. Firstly, solo self-employed turn to colleagues when a job is too big to be handled alone. Scale advantages have to be organized outside of the solo organization they have. Secondly, they work together in obtaining assignments and jobs to work on. In a sense, this is the mirror image of the first argument. In the first situation, the solo self-employed asks someone to help whereas in the second situation they are asked to help someone else. This further stresses the importance of obtaining scale advantages as a motive for cooperation. This corroborates the findings by Donckels and Lambrecht (2005) who also stress the importance of obtaining a certain scale level of production through networking.

Not quite as important, but still substantive is the fact that every tenth solo entrepreneur mentions knowledge sharing and organizing innovation as an important reason for seeking contact with other solo self-employed. This somewhat contradicts the focus of most existing research in which the flow of information and ideas is seen as the most important reason for networking. Although it is difficult to compare these



figures because a clear benchmark is lacking, the smallness of the ‘firms’ may again be an important aspect in explaining this.

	%	N (total)
Cooperation with other solo self-employed	46	1048
Reasons for cooperation:		
Cooperation on one job (scale arguments)	54	472
Got jobs through other solo self-employed	42	472
Joined acquisition	23	472
Network building	34	472
Knowledge sharing and innovation	9	472
Other benefits	8	472

Table 2: Motives for cooperation

As to the development of cooperative networks between solo self-employed, Table 3 shows the gestation of the networks. The solo self-employed were asked what was the most important way in which their networks have developed. It is clear that official organizations geared towards networking play a minor role. Only 12% of the respondents met their main business partners through branch or networks organizations. Social networks are much more important, although they are not the main route in which the networks are developed. This contradicts existing research on smaller firms which tend to stress the importance of social networks (Dahl and Sorenson, 2009). Possibly, our focus on the business side of networking accounts for this relative small share. We find that previous jobs and the general professional networks of the solo self-employed are most important for developing networks. This is in line with the fact that cooperation is sought mostly in order to acquire or finish jobs (see Table 2).

	%	N (total)
Social network (family, friends)	23	
Through previous assignments	38	
General professional network	27	
Branch organizations	6	
Network organizations	6	
		466

Table 3: Network gestation

The third aspect of the networks is the spatial extent (Table 4). As expected, most networking activity takes place at the local scale (within the municipality). This probably reflects the social embeddedness of the entrepreneurs. It has been shown that start-up firms act very locally because they can extract resources for production at the local level (Dahl and Sorenson, 2009). Solo self-employed also show a mainly local orientation. Nevertheless, the regional (province) and national level are also significant for building a network. It is difficult to interpret the shares as proper benchmark studies are lacking at this point. In addition to the spatial extent of the production network, we also mapped the spatial market areas of the solo self-employed. It can be conjectured that solo self-employed are spatially flexible because of their small size and lack of fixed capital inputs. Still, it seems that their market areas are fairly local: 55% of all output is realized within 25 km from the main working place (either home or office). Again, these shares are difficult to

interpret because of a lack of comparison studies. It is interesting to note (Table 5), however, that the solo self-employed in the West of the country (NUTS I level) act more locally, probably reflecting the higher population, firm densities and consequent business opportunities in this part of the country.

	%	N (total)
Mainly Local	38	
Mainly Regional	27	
Mainly Nationwide	30	
Mainly International	5	
		472

Table 4: Spatial extent of cooperation

NUTS I	% output within 25 km	N
North	61.1	145
East	61.4	218
West	48.3	434
South	62.8	181
National Average	55.8	978

Table 5: Spatial extent of output

### *Sector differences*

De Vries et al. (2010) found significant sector differences in the way that solo self-employed cope with the economic downturn. This reflects the heterogeneity of the group. Solo self-employed include very different types of activities, from construction workers to interim managers and from health care workers to all sorts of consultancy businesses. Although the use of human capital as main production factor ties these businesses together, the actual day-to-day activities can be very different. This can also influence the spatial extent and use of networks. Tables 6 and 7 summarize the sectoral differences in the properties of the production and output networks. The most archetypical sectors are probably the manufacturing and construction sector and the business services. Solo self-employed in manufacturing and construction show dense cooperative networks: 71% of all solo self-employed cooperate with other solo self-employed. Here, the motive of building scale efficiencies through cooperation seems important. If a job is too big or beyond the skill set of the solo self-employed, assistance is found. This also accounts for the local nature of the network. The networks in business services, including consultancy and interim management, show a more national character. Cooperation is not as important, but still 52% of the solo self-employed cooperate. The spatial scale of cooperation is, however, not local. Possible explanations could be that the solo self-employed are more commute tolerant. The higher educational level in this sector is higher, which could account a difference in commute tolerance. In addition, the services are not necessarily provided on site. Whereas manufacturers and construction workers are working on site, consultancy businesses do not necessarily need to be on site all the time in order to do the job. Cooperation with other solo self-employed is therefore also less restricted by space. Table 7 confirms this idea. The output of business services is much less local than the output of solo self-employed in manufacturing and construction.

Sector	% Cooperate	Mainly local	Mainly regional	Mainly national	N
Agriculture	27	53	35	12	17
Manufacturing and Construction	71	57	33	9	108
Trade and Transport	29	30	32	38	44
Business Services	52	27	20	53	200
Health care	40	48	29	23	31
Other services	36	37	35	28	75
Total	N = 1039				475

Table 6: Cooperation and spatial extent of network by sector

Sector	% output within 25 km	N
Agriculture	44.5	59
Manufacturing and Construction	63.7	146
Trade and Transport	54.8	139
Business Services	46.2	375
Health care	87.7	77
Other services	60.3	183

Table 7: Spatial extent of output by sector

## 5. Relating the network position to success

A good position in relevant networks helps in obtaining the proper resources and information for operation. Given the fact that solo self-employed have a small organization by definition, access to additional resources can be expected to be particularly important. This section presents the results from a logistic regression analysis that relates the success of solo self-employed to the position and use of networks.

### *Econometric framework*

The dependent variable in the analyses is based on the question whether in 2008-2009 the solo self-employed was able to retain or increase the turnover of the business (1) or that there was a decrease (0). As the study period coincides with the start of an economic crisis, the dependent variable can be interpreted as a sign of resilience against an adverse economic tide. Given the economic bust, we consider attaining a stable level of turnover as a good sign.

As we are interested in the role of network position in the explanation of success, the main explanatory variables used in the regression are the questions whether a solo self-employed cooperates with other solo self-employed (1 = yes, 0 = no) and the local embeddedness of the business in terms of turnover realized within 25 kilometer of the main location of production (i.e. home or the business location). Also, membership of a professional organization is included as explanatory variable. The first variable addresses the production side. To what extent are solo self-employed able to access additional resources for production? A positive effect is expected: Cooperating solo self-employed are expected to have better access to resources and they are also in a better position for finding new assignments. This is also illustrated by the motives for cooperation mentioned (Table 2); many jobs are allocated through the network of solo self-employed. In order to tease out whether the

motives for networking are also important in explaining success, we also include regressions in which we include the different reasons for cooperation. In these regression, we distinguish between scale-arguments (too little capacity for the job), scope-arguments (too little specific expertise for the job), acquisition and knowledge / innovation.

The local embeddedness of solo self-employed in terms of output could have two effects. On the one hand, local networks are often stronger than networks over longer distance. A good position in a local network could then lead to increased resilience of the firm. On the other hand, the development of and search for new opportunities can be hampered when an entrepreneur is locked-in a local or regional network. This would limit the possibilities of entrepreneurs to deal with adverse circumstances.

Finally, the model includes several control variables that are generally used in explaining firm success (for instance Brüderl and Preisendorfer 1998). The control variables fall into three categories: individual traits of the entrepreneur, characteristics of the business and the location of the business.

At the individual level gender and age are included. Younger entrepreneurs are generally more ambitious and focused on growth than older entrepreneurs. Therefore, we expect a negative effect of age on the resilience of the solo self-employed. Also, the opportunity costs for younger solo self-employed may be higher because they generally have less built-up capital. This provides them with an incentive to keep pushing for a good result of the business. For gender we have no a-priori theoretical expectation, although existing studies have shown that women take the step to self-employment after careful preparation (e.g. ESFC 1994, p.3). This may translate into a stronger resilience to the economic bust than male solo self-employed.

At the business level, firm tenure, size (turnover) and sector are included as control variables. Firm tenure is measured in age. Younger firms are expected to grow more rapidly than older firms. Size (income in the previous year) has been included as it provides information on the quality of the firm. It is likely that successful solo self-employed are the last to be hit by an economic downturn and therefore more likely to retain (or even increase) their turnover levels. In contrast, given the limited production capacity of solo self-employed, increasing turnover may be difficult if production capacity is already at its peak. Sector is included as it has been that there are quite substantial sector differences in dealing with the economic downturn (De Vries et al. 2010). In order to capture these effects, the industry of the solo self-employed is used as control variable. Next to the broad categories of manufacturing and business service, the health sector is included because it contains relatively many solo self-employed.

Finally, the region in which the business is located is used as a control. It has been shown that economic developments are location specific in the Netherlands. The north, for example, usually trails the development of the national economy with one or two years (Gardenier et al. 2008, p.5) This can be partly explained by differences in the sector structure. It could, however, also indicate institutional differences and differences in demand development.

	Dependent Variable: 0 – Declining turnover, 2008-2009 (N = 256) 1 – Growing or stable turnover, 2008-2009 (N = 446)
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Explanatory Variables	Model 1	Model 2	Model 3	mfX
<b>Constant</b>	0.43 (0.37)	0.17 (0.43)	0.24 (0.47)	
<b>Personal characteristics:</b>				
Age:				
<35	0.59 (0.34)*	0.68 (0.35)*	0.69 (0.35)**	0.12
35-44	0.54 (0.24)**	0.52 (0.24)**	0.52 (0.24)**	0.11
45-55	0.22 (0.21)	0.26 (0.21)	0.25 (0.21)	0.06
>55	Ref	Ref	Ref	
Gender (Male = 1)	-0.37 (0.20)*	-0.39 (0.21)*	-0.40 (0.21)*	-0.09
<b>Firm characteristics:</b>				
Firm tenure:				
<2 years	0.77 (0.37)**	0.92 (0.38)**	0.91 (0.38)**	0.18
2 – 3 years	0.40 (0.32)	0.40 (0.32)	0.54 (0.33)	0.12
4 – 5 years	0.39 (0.34)	0.39 (0.34)	0.55 (0.35)	0.12
6 – 9 years	0.13 (0.32)	0.13 (0.32)	0.23 (0.32)	0.05
10 – 19 years	0.11 (0.30)	0.11 (0.30)	0.20 (0.31)	0.04
>20 years	Ref	Ref	Ref	
Turnover in 1000€				
<10	-0.68 (0.28)**	-0.95 (0.30)***	-0.98 (0.30)***	-0.24
10-25	-0.23 (0.27)	-0.43 (0.28)	-0.46 (0.28)	-0.11
25-50	-0.47 (0.26)*	-0.55 (0.26)**	-0.57 (0.26)**	-0.13
50-100	-0.10 (0.26)	-0.09 (0.27)	-0.11 (0.27)	-0.03
100<	Ref	Ref	Ref	
Manufacturing	0.11 (0.25)	0.10 (0.26)	0.07 (0.26)	0.02
Service Industry	0.16 (0.19)	0.30 (0.19)	0.29 (0.19)	0.07
Health Care	0.56 (0.36)**	0.74 (0.37)**	0.70 (0.37)**	0.14
<b>Networks</b>				
Cooperation (1 = yes)		-0.46 (0.18)**	-0.46 (0.18)**	-0.10
% of turnover in local region		0.01 (<0.00)***	0.01 (<0.00)***	<0.00
Member of Branch Organization		0.06 (0.17)	0.06 (0.17)	0.01
<b>Regional Dummies</b>				
North			0.29 (0.31)	0.06
East			-0.05 (0.26)	-0.01
West			-0.07 (0.22)	-0.02
South			Ref	
2 log-likelihood	-440.51	-431.16	-430.30	
Nagelkerke R-square	0.04	0.06	0.07	
N	702	702	702	

Table 8: Explaining economic resilience of solo self-employed  
\*, p<0.10; \*\*, p<0.05; \*\*\*, p<0.01

Table 8 summarizes the results from the regression analysis. The base model (model1) includes the individual and business characteristics. Then, iteratively, the network (model2) and consecutively regional characteristics (model3) are included. The overall statistics of the model indicate that it is difficult to explain the resilience to the economic bust. Still, it is common for logit analyses to have quite low pseudo R-square scores. Model 1 includes control variables at the individual and business level. It shows several interesting results that are robust in all versions of the model. Firstly, men perform significantly worse than female solo self-employed. This gives

further substantiation that although fewer women become self-employed, they have a better preparation and consequent performance. The effect of age is as expected; younger business owners are better able to be resilient to the economic bust.

At the business level, the previous income level is the strongest predictor of success. Solo self-employed with bigger operations have a greater chance of remaining successful. There seems to be an important path dependence in the success of the solo self-employed, which is logical in the sense that apart from the business environment the solo self-employed are unlikely to change dramatically in a short period. In contrast to other firms, there is only one person involved with roughly the same resources for production, i.e. the human capital of the owner. The result also suggests that indeed the worse performing (or at least smaller) solo self-employed are hit first by an economic downturn. This is as expected.

Turning to the impact of the network variables in Models 2 and 3, we find a positive effect of local embeddedness of turnover and a negative effect of cooperation with other solo self-employed. Membership of a network organization is not important in explaining difference in resilience to the economic bust.

The negative sign of cooperation is unexpected. The general idea is that networking increases access to resources and in this case also access to jobs, which would in turn lead to a stable and possibly increasing turnover. However, given the cross sectional set-up of the regression, the effect is not necessarily a causal link from networking to success. The casual link may be the other way: poorer performing solo self-employed are 'forced' to participate in networks in order to search for jobs. This would then explain the negative effect. The effect is sizeable as is indicated by the marginal effect in the last column. Solo self-employed that cooperate have a 10% lower probability of a stable or growing turnover. From a multinomial analysis (Appendix A) it becomes clear that the negative sign is mainly driven by solo self-employed that have a stable turnover in the period in the economic bust. This suggests that if turnover is in jeopardy solo self-employed access their networks. However, there is no significant difference between declining and growing firms (although there is a negative sign). This could indicate that growing solo self-employed use their networks in a different way and that the negative argument for entering networks does not apply for them.

The positive effect of local embeddedness also suggests that networking is associated with poorer performance. Generally, one would expect the market areas to increase with success, mainly because the market may be saturated at one point. This is, for example, shown by Donckels and Lambrechts (1995) who find that for small firms focusing on the home market hampers growth. This argument, however, rests on the assumption that the production capacity can grow by hiring employees. For solo self-employment production capacity is given and geographical expansion is not necessary when the production capacity is used up in the own region. This would again suggest that expansion of the market area is a necessity when business is slow. Better performing solo self-employed can manage with the local market. This would also indicate a negative selection effect into networking rather than a causal link from networking to success.

Finally, in Model 3, regional dummies are included. This only has limited influence on the results. All variables are robust to including regional dummies and none of the regions performs significantly better or worse from the reference category 'South'.

In order to further understand the possible reasons for the negative sign of cooperation, within the subset of cooperating solo self-employed, the reasons for cooperation are assessed in relation to success and resilience. Table 9 shows these results.

		Dependent Variable: 0 – Declining turnover, 2008-2009 (N = 142) 1 – Growing or stable turnover, 2008-2009 (N = 220)		
Explanatory Variables		Model 1	Model 2	Mfx
Constant		0.23 (0.68)	0.19 (0.71)	
<b>Personal characteristics:</b>				
Age:				
<35		0.94 (0.44)**	1.02 (0.44)**	0.21
35-44		0.62 (0.35)**	0.75 (0.36)**	0.17
45-55		0.11 (0.31)	0.19 (0.32)	0.04
>55		ref	ref	
Gender (Male = 1)		-0.78 (0.29)***	-0.82 (0.29)***	-0.18
<b>Firm characteristics:</b>				
Firm tenure:				
<2 years		0.66 (0.61)	0.66 (0.60)	0.12
2 – 3 years		0.11 (0.49)	0.11 (0.49)	0.03
4 – 5 years		0.31 (0.52)	0.38 (0.52)	0.09
6 – 9 years		-0.20 (0.58)	-0.20 (0.48)	-0.05
10 – 19 years		0.21 (0.48)	0.27 (0.47)	0.06
>20 years		ref	ref	
Turnover in 1000€				
<10		-0.13 (0.46)**	-0.14 (0.47)**	-0.28
10-25		-0.42 (0.41)	-0.32 (0.42)	-0.08
25-50		-0.13 (0.34)***	-0.14 (0.37)**	-0.27
50-100		-0.34 (0.35)	-0.33 (0.35)	-0.08
100<		ref	ref	
Manufacturing		0.55 (0.36)	0.55 (0.37)	0.12
Service Industry		0.38 (0.29)	0.34 (0.30)	0.08
Health Care		0.90 (0.55)	0.82 (0.55)	0.17
<b>Networks</b>				
Joined Acquisition			-0.12 (0.26)	-0.03
Cooperation on scale			-0.29 (0.25)	-0.07
Cooperation of scope			0.52 (0.29)*	0.12
Cooperation on knowledge			0.61 (0.41)	0.13
% of turnover in local region		0.01 (<0.00)	0.01 (<0.00)*	<0.00
Member of Branch Organization		0.05 (0.23)	0.01 (0.24)	<0.00
<b>Regional Dummies</b>				
North		0.44 (0.43)	0.52 (0.45)	0.12
East		0.11 (0.36)	0.15 (0.37)	0.4
West		0.15 (0.33)	0.21 (0.33)	0.05
South		ref	ref	
2 log-likelihood		-221.25	-21.99	
Nagelkerke R-square		0.09	0.10	
N		362	362	

Table 9: Explaining economic resilience of solo self-employed  
\*, p<0.10; \*\*, p<0.05; \*\*\*, p<0.01

The models are set-up in a similar way as in the first analysis. First, a benchmark model is done including all background variables. Then, the network variables are included. In this case, the variables indicate the reasons cooperation. Model 1 shows that the background variables influence resilience in the same way as in the first models for the entire sample. Then, looking at the reasons for cooperation, it becomes clear that they convey little information as to why cooperation has a negative overall effect (see Table 9). Cooperation for acquisition reasons has a negative sign, which corroborates earlier findings that solo self-employed tend to reach out to other solo self-employed if business is slow (Myler 2009). The effect is not significant though. The only significant effect is cooperation on scope. It has a positive sign and it indicates that cooperation in order to bring in additional skills in a project has a positive effect. This probably goes for solo self-employed with sufficient orders that may be somewhat beyond their field of expertise. The analysis, however, is not very informative in terms of further substantiating the negative effects found in the analysis of the whole sample (Table 2). In the multinomial analysis (Appendix B), however, we do find some additional clues as to why there may be a negative effect for cooperating. Cooperating on scope is connected to success and interestingly cooperation for acquisition is related to poor performance when comparing the growing and declining solo self-employed. This indeed suggests that the reason for cooperation is related to the success of the business of a solo self-employed.

## 6. Conclusion

This paper has explored the use and properties of networks of solo self-employed. This group of entrepreneurs, which is a one-person business without substantial capital investments, is on the increase in the Netherlands. Our knowledge about this group of entrepreneurs is still limited and this makes tailoring policy measures towards this group difficult. To this end, this study explored the gestation, motives and spatial extent of the networks. In addition, the network position is related to the success of the solo self-employed.

The first conclusion concerning the motives for cooperating with other solo self-employed is that cooperation is most importantly related to executing and acquiring assignments together. By definition, the scale of the operations ran by solo self-employed is limited. The network seems to be an important way to obtain external scale efficiencies by recruiting other solo self-employed to help. This is in contrast with existing ideas about network benefits in which information sharing and consequent innovation is generally stressed. The focus on acquiring and executing jobs is also reflected in the development of the networks. The solo self-employed build their professional networks mostly through professional contacts. It seems that social networks are not as important for this group of entrepreneurs as it is for other groups of entrepreneurs. Consistent with existing studies, however, official institutions such as branch organizations are only moderately important for building networks. Finally, the spatial extent of the networks is quite limited. The networks are mainly locally oriented.

In terms of success, it is found that a good network position is negatively related to the stabilization or growth of turnover. Given the importance of cooperation because



of executing and acquiring jobs, the negative effect could be a sign of negative selection into cooperation. Solo self-employed that perform worse are more likely to seek cooperation. This is in line with previous studies that, on the basis of case-study work, come to a similar conclusion. It seems that suffering solo self-employed are more likely to enter into cooperation to secure new jobs. Thriving solo self-employed are more likely to use networks for securing additional skills for carrying out jobs.

Apart from the possible negative relationship between cooperation and success, networks of cooperation are also very diverse. There are distinct differences between sectors. Finally, the networks are locally oriented. This further complicates formulating generic policies aimed at cooperation networks of solo self-employed. However, it is clear from this study that stimulating solo self-employed to cooperate is not necessarily a recipe for success. Motives for entering networks are diverse and networks may attract solo self-employed that are doing poorly. The results from this study suggest that establishing a solid basis for solo self-employed to build on is more important. Their individual characteristics and experiences are important in explaining success.

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## Appendix A: Networks and success, multinomial logit

	Base category = declining turnover (N = 256)	
Explanatory Variables	Stable turnover (N = 260)	Increasing turnover (N = 186)
<b>Constant</b>	-0.08 (0.51)	-1.37 (0.61)**
<b>Personal characteristics:</b>		
Age:		
<35	0.42 (0.41)	1.01 (0.41)**
35-44	0.49 (0.26)*	0.54 (0.31)*
45-55	0.61 (0.24)	0.16 (0.29)
>55	ref	ref
Gender (Male = 1)	-0.32 (0.23)	-0.57 (0.25)**
<b>Firm characteristics:</b>		
Firm tenure:		
<2 years	0.11 (0.42)	2.14 (0.53)***
2 – 3 years	0.13 (0.36)	1.36 (0.50)***
4 – 5 years	0.22 (0.38)	1.31 (0.52)**
6 – 9 years	0.02 (0.34)	0.74 (0.52)
10 – 19 years	0.07 (0.34)	0.62 (0.49)
>20 years	ref	ref
Turnover in 1000€		
<10	-0.50 (0.34)	-1.74 (0.38)***
10-25	-0.08 (0.32)	-1.00 (0.35)***
25-50	-0.33 (0.30)	-0.86 (0.32)***
50-100	0.23 (0.30)	-0.59 (0.34)*
100<	ref	
Manufacturing	0.37 (0.28)	-0.43 (0.35)
Service Industry	0.20 (0.22)	0.43 (0.24)*
Health Care	0.86 (0.40)**	0.49 (0.44)
<b>Networks</b>		
Cooperation (1 = yes)	-0.63 (0.20)***	-0.21 (0.22)
% of turnover in local region	0.01 (<0.00)***	0.01 (<0.00)***
Member of Branch Organization	-0.10 (0.19)	0.28 (0.22)
<b>Regional Dummies</b>		
North	0.15 (0.34)	0.64 (0.40)
East	-0.32 (0.29)	0.37 (0.33)
West	-0.20 (0.24)	0.20 (0.30)
South	ref	ref
2 log-likelihood	-698.86	
Nagelkerke R-square	0.08	
N	702	
*, p<0.10; **, p<0.05; ***, p<0.01		

## Appendix B: Type of network use and success, multinomial logit

	Base category = declining turnover (N = 142)	
Explanatory Variables	Stable turnover (N = 115)	Increasing turnover (N = 105)
<b>Constant</b>	-0.32 (0.76)	-1.24 (1.00)
<b>Personal characteristics:</b>		
Age:		
<35	0.45 (0.52)	1.85 (0.57)***
35-44	0.43 (0.40)	1.28 (0.48)***
45-55	0.01 (0.36)	0.48 (0.44)
>55	ref	ref
Gender (Male = 1)	-0.58 (0.34)*	-1.15 (0.35)***
<b>Firm characteristics:</b>		
Firm tenure:		
<2 years	-0.19 (0.70)	1.76 (0.84)**
2 – 3 years	-0.33 (0.53)	0.76 (0.76)
4 – 5 years	0.04 (0.58)	1.01 (0.77)
6 – 9 years	-0.35 (0.51)	0.15 (0.76)
10 – 19 years	0.06 (0.51)	0.71 (0.74)
>20 years	ref	ref
Turnover in 1000€		
<10	-0.65 (0.54)	-1.81 (0.59)***
10-25	-0.07 (0.48)	-0.64 (0.51)
25-50	-0.93 (0.42)**	-1.42 (0.44)***
50-100	0.06 (0.39)	-0.91 (0.45)**
100<	ref	ref
Manufacturing	0.73 (0.40)*	0.29 (0.48)
Service Industry	0.05 (0.34)	0.78 (0.37)**
Health Care	0.83 (0.59)	0.82 (0.67)
<b>Networks</b>		
Joined Acquisition	0.26 (0.30)	-0.62 (0.31)***
Cooperation on scale	-0.23 (0.28)	-0.34 (0.32)
Cooperation of scope	0.36 (0.32)	0.75 (0.36)**
Cooperation on knowledge	0.53 (0.48)	0.72 (0.49)
% of turnover in local region	0.01 (<0.00)	0.01 (<0.00)*
Member of Branch Organization	0.04 (0.27)	-0.04 (0.30)
<b>Regional Dummies</b>		
North	0.39 (0.49)	0.84 (0.57)
East	0.08 (0.40)	0.38 (0.48)
West	-0.02 (0.36)	0.64 (0.44)
South	ref	ref
2 log-likelihood	-349.08	
Nagelkerke R-square	0.12	
N	362	
*, p<0.10; **, p<0.05; ***, p<0.01		