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Self-employment and the local business cycle

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Self-employment and the local business cycle

Helena Svaleryd

Department of Economics
Uppsala University
P.O. Box 513
SE-751 20 Uppsala
Sweden
Fax: +46 18 471 14 78

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Self-employment and the local business cycle[♣]

by

Helena Svaleryd[♠]

Uppsala University, UCLS and UCFS

August 28, 2013

Abstract

The business cycle is likely to be of importance for self-employment rates. When the economy is growing, business opportunities open up and encourage the set-up of new firms. In downturns, self-employment may be a way to avoid unemployment. The strength of these *pull* and *push* factors may depend on the amount of human capital a person has. The findings in this paper show that although the local business cycle is of minor importance for total self-employment rates in Sweden, there are heterogeneous effects across groups. People with higher human capital endowments are more likely to be *pulled* into self-employment, while those with lower human capital endowments are to a larger extent *pushed* into self-employment. This pattern is particularly strong for women.

Keywords: Self-employment, local business cycle, panel data
JEL-codes: J21; J24

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[♠] Address: P.O box 513, SE-75120 Uppsala; Phone +46-18 471 5100; Fax +46-18-471 1478; E-mail: helena.svaleryd@nek.uu.se.

1 Introduction

The state of the economy may be of importance for self-employment rates. When the economy is growing there are likely to be new business opportunities that encourage the set-up of new firms. In downturns, self-employment may instead be a way to avoid unemployment. The business cycle may thus act to *pull* and *push* individuals into self-employment, which makes it unclear whether the self-employment rate is likely to be higher or lower in good times. The empirical evidence in the literature also shows conflicting results (see e.g. Blanchflower 2000; More and Muller 2002; Koelling and Thurik 2012).

Push and pull factors may be of importance for different groups depending on, for example, labor market status, education level, access to resources or entrepreneurial skills. Several studies find that being unemployed increases the likelihood of becoming self-employed (see e.g. Evans and Leighton 1990; von Greiff 2009), suggesting that people with weaker attachment to the labor market resort to self-employment to a greater extent. On the other hand, people with more resources in the form of human or financial capital may be more able to exploit business opportunities when they arise.

This paper studies the impact of the local business cycle on self-employment rates in Sweden among the working-age population between 1996 and 2007. More specifically it looks at whether responses to the local business cycle differ depending on the amount of human capital the individual possesses. The hypothesis is that individuals with higher human capital endowments are less likely to become self-employed in a recession since their position on the labor market is stronger. Moreover, they may also have the skills necessary to exploit the business start-up opportunities that arise when the economy is booming. Self-employment among individuals with higher education should thus be more pro-cyclical compared to the self-employment rates among individuals with lower educational attainment. This study contributes to the literature by furthering our knowledge of how different groups are affected by the business cycle.[1]

This is analyzed by studying how the probability of being self-employed is affected by the local business cycles measured as vacancies in the local labor market. The results

[1]Studies of heterogeneous responses to the local business cycle are rare. On exception is Tervo (2006) who finds that the response to local unemployment differs depending on family background: high local unemployment pushes individuals from self-employed families into self-employment, while it lowers the probability to become self-employed for individuals from families where the parents were wage earners.

show that, on average, the local business cycle measured as the local vacancy rate seems to be of minor importance for self-employment rates. For men there is no effect on average and for women a small positive effect. The average effect hides considerable heterogeneity across groups with different education attainment. The findings show that individuals with higher human capital endowments are to a larger extent *pulled* into self-employment, whereas individuals with lower human capital endowments are to a larger extent *pushed* into self-employment. In particular, individuals with a higher education level are more likely to enter self-employment in good times when the local vacancy rate is high. The pattern looks the same for both men and women, but is much stronger for women. For women with compulsory education, self-employment rates are even counter-cyclical. This study adds to the small literature on the effects of local labor market conditions on self-employment rates, and provides evidence on how human capital endowments interact with the local business cycle when people are deciding on whether to become self-employed.

The second section in this paper discusses theoretical considerations and earlier literature. The third section describes the empirical model, while information on data and variables are provided in section four. Section five presents some cross-sectional evidence on the correlation between local labor market conditions and self-employment, before turning to the panel regressions, results and robustness checks. I am also able to present some results on different sectors and choice of organizational form. The last section concludes.

2 Local business cycle and self-employment: theory and literature review

The motives for being self-employed are many. The underlying model guiding this study, as well as most other studies of self-employment, is one where a person becomes self-employed if the net present benefits of becoming self-employed exceed the net present value of the costs involved. The opportunity cost consists of the net market wage he or she can earn as wage employed, and the unemployment benefits that the person will receive if he or she is unemployed.[2] *Pull* factors are then positive in the

[2] Evidence on the connection between expected income and cost of self-employment and the probability to be self-employed is provided in for example: Rees and Shah (1986), De Wit. and Van Winden (1989), Johansson (2000) and Hammarstedt (2009).

sense that they increase the value of being self-employed, or lower the direct cost of starting a firm. *Push* factors, on the other hand, lower the opportunity cost and make self-employment a more attractive option.

The literature points to several factors that may pull individuals into self-employment, such as access to capital or entrepreneurial knowledge, flexible working hours, the desire to be one's own boss or innovation motives.[3] The main push factor studied in the literature is unemployment. Since unemployment lowers the value of not being self-employed, self-employment may be a way to escape unemployment. Several studies show that the unemployed are more likely to become self-employed (see e.g. Carrasco 1999; Evans and Leighton 1990; von Greiff 2009).

Other factors discussed in the literature are discrimination and culture. Discrimination in wage employment has been suggested to explain high self-employment rates among some ethnic groups since it makes self-employment more attractive.[4] Although many of the factors described above, such as flexible working hours or the desire to be one's own boss, do not vary over the business cycle, some factors do. In particular, business opportunities are more likely to open up in good times, thereby pulling people into self-employment. In downturns, when employment prospects worsen, people may be pushed into self-employment.

Evidence for the impact of the national business cycle on self-employment is mixed. Evans and Leighton (1990) find support for the push theory: that there is a positive relationship between self-employment and unemployment rates on the national level in the US. In a study of GDP growth on the transition between self-employment, wage employment and unemployment in Germany, Constants and Zimmerman (2004) find a pattern consistent with the conclusion that self-employment is used to escape unemployment. On the contrary, a study by Robson (1998) based on various sources of aggregate data in the UK finds no such evidence of a recession push. In a panel study of OECD countries, Blanchflower (2000) finds that the relationship between self-employment and unemployment rates differs across countries. High unemployment rates seem to increase self-employment in countries such as the UK, Germany and Sweden, decrease self-employment in Austria, while there is no correlation in the

[3] On influence of capital see e.g. Evans and Leighton (1989), Blanchflower and Oswald (1989) and Lindh and Ohlsson (1996). See Dunn and Holtz-Eakin (2000) on intergenerational transfer of human capital, Blanchflower (2000) on flexible working hours and job satisfaction and Koellinger (2008) on innovative motives.
[4] See e.g. Hammarstedt (2006) for a study on Swedish data.

France. A recent study by Koellinger and Thurik (2012) also suggest that the relationship between the self-employment rate business cycles differ across countries. Using data from 22 OECD countries they find that changes in the self-employment rate precedes the global cycle but lags the national unemployment rates. A closer study of each country shows that the relationship with the unemployment rates is only visible for 7 out of the 22 countries.

There are several reasons as to why results could differ across countries. First, different patterns across countries may reflect institutional differences and the way the labor market works. For example, rigid wages may mean that individuals with lower productivity are pushed into self-employment when demand is low; Tax systems may be more or less favorable to risk-taking connected to exploiting new business opportunities. Second, studying a single country makes it difficult to control for policy changes on the national level which may affect self-employment rates. Correlations between the business cycle and self-employment may be blurred by national policy changes affecting self-employment.

By studying correlations with the regional business cycle, the researcher can control for changes in national policy. The literature on the effects of regional business cycles on self-employment also provides rather conflicting evidence. With Canadian data, Moore and Mueller (2002) find that although unemployment increases the likelihood of becoming self-employed, self-employment decisions are independent of the situation on the labor market as measured by the unemployment rate. Ritsilä and Tervo (2002) find that self-employment rates increase when national GDP increases, but find no effects of regional labor market conditions in Finland.

One explanation for the absence of effects of the local business cycle is that aggregate numbers conceal different responses across groups.[5] Groups that are more vulnerable to unemployment may in recessions be more likely to be pushed into self-employment. Arising business opportunities are more likely to be exploited by groups that are less financially constrained, have greater local network access and more suitable entrepreneurial skills. Human capital is a factor that should be important, both for vulnerability to unemployment and the ability to exploit business opportunities.

[5] As mentioned in the introduction Tervo (2006) study heterogeneous responses depending on family background.

3 Empirical specification

To measure human capital endowment this study uses education level as a proxy. The categories are whether the individual has i) only compulsory schooling, ii) high school and iii) some higher education.

How do self-employment rates correlate with the business cycle? And to what extent do they vary with education level? I examine these questions by estimating self-employment equations using the local vacancy rate as proxy for the local business cycle. The empirical model is estimated using a linear specification of the form:

$$Self\,employed_{irt} = \alpha + \beta_0 LM_{rt} + \beta_1 High\ school_{it} + \beta_2 University_{it} + \beta_3 High\ school_{it} \times LM_{rt} + \beta_4 University_{it} \times LM_{rt} + \beta_7 age_{it} + \lambda_t + region_r/ind_i + \varepsilon_{irt}$$

where the outcome *self-employed* is an indicator variable taking value 1 if an individual *i* is self-employed in year *t*. Our variable of interest is *LM* (local labor market), which will be measured with local vacancy rate in region *r* in year *t*. *High school* and *University* are dummies taking value 1 if the individual has as maximum a high school diploma, or some university studies respectively. These variables are interacted with *LM* to study heterogeneous responses to the status of the local labor market. I include *age*, *age^2* and year fixed effects or group specific year fixed effects. To study changes over time, regional or individual fixed effects will be included. ε is the usual error term. Since there may be common shocks to the local labor market, standard errors will be clustered on the regional level. As a robustness check, the model will also be estimated using the Logit model.

The interpretation of the estimates differs somewhat depending on the set of fixed effects included. Regional fixed effects will remove permanent differences across regions that are correlated with self-employment. A change on the local labor market can be correlated with self-employment because i) people living in the region change to/from self-employment, ii) people change region and this systematically correlates with local labor market conditions, or iii) there is a systematic correlation between local labor market conditions and the occupational choice of people entering or exiting the sample. In specifications using individual fixed effects, the sample will be restricted to

individuals who live in the same region during the whole period. In that case, the estimated effects will show how local labor market conditions are correlated with the individual's choice to change to and from self-employment.

The literature has identified several other factors that correlate with self-employment, such as marital status, number and age of children and access to financial capital, which are not included in the empirical model (see e.g. Hammarstedt 2009; Lindh and Ohlsson 1996). For some of these factors, such as number of children, it is not clear how occupational status may be correlated with local labor market conditions and they are therefore unlikely to be important confounders. For other variables, such as access to financial capital, there may be some correlation with the local business cycle. Perhaps access to capital is better when prospects on the market are good. However, the data does not include any measures of access to financial capital and can therefore not be controlled for in the empirical study. Since this is likely to be correlated with education level, it implies that effects of education could partly depend on access to financial capital.

4 Data and variables

The empirical analysis is based on register data from Statistics Sweden and data from the Public Employment Services (PES). The data set spans 1996-2007 and includes information on employment, income and education attainment, as well as age and sex for all individuals living in Sweden from the age of 16. In this paper, the population is restricted to men and women aged 30-60. The age restriction serves to focus the study on individuals who are not self-employed while studying, or who become self-employed as a way to partly retire. As is common in studies of self-employment, individuals in the agricultural sector are excluded.

As discussed above, the theoretical model of self-employment predicts that a person becomes self-employed if the net present benefits of becoming self-employed exceed the net present value of the costs involved. The opportunity costs are the earnings he or she can get as wage employed, and the unemployment benefits available if he or she is unemployed. I therefore here study how the occupational choice between self-

employment and wage employment/unemployment correlate with the business cycle[6] on a sample that includes all individuals in Sweden aged 30-60.

Information on employment status comes from November and is based on information from the tax authorities. The definition of self-employment is the one used by Statistics Sweden: an individual is defined as self-employed if he or she in November only had income from his or her own firm. Individuals with income both from an own firm and wage employment are categorized as self-employed if the income from self-employment multiplied with 1.6 is higher than the income from wage employment. The income from self-employment is weighted up with 1.6 because earnings from self-employment are on average lower in comparison to the time spent working.[7] Both self-employed with incorporated business (firms with less than 11 stockholders) and unincorporated business are included. The organizational forms differ in that incorporated firms require an initial capital investment of 100 000 SEK. Another difference is that an incorporated firm has limited liability, implying that the business owner does not have personal responsibility for the financial health of the firm, which is the case in an unincorporated firm. In 2004 Statistics Sweden made some changes to the classification of self-employment, resulting in an increase in the number of self-employed, especially self-employed with incorporated business. To account for this change, an indicator for the years 2004-2007 is interacted with the education dummies and the age.

The data includes information on education level. Dummy variables indicate whether the individual has a low level of education (max 9 years of compulsory schooling), medium level of education (max 12 years of education corresponding to high school) or higher education (studies at university level).

The indicator used to measure the local business cycle is the local vacancy rate. The vacancy rate is calculated as the number of new vacancies remaining more than 10 days after being posted by the Public Employment Services (PES), divided by the population aged 18 to 64. Many studies have used the unemployment rate as a proxy for the

[6] There is some disagreement in the literature on how the self-employment rate should be measured; whether it should be calculated as the share of self-employed of the employed, the workforce or the whole population. As discussed in Blanchflower (2000), differences in which individuals and sectors are included can even account for differences in results across studies. According to the theoretical framework discussed above, the share self-employed in the workforce should be the correct way to measure the self-employment rate.

[7] The factor 1.6 has been calculated from the earnings statistics and is the ratio between the average earnings for full time employed and full time self-employed in the age group 20-64. See Statistics Sweden (www.scb.se) for more information on the methods used to identify employment status.

business cycle. The problem with using the local unemployment rate is that unemployed are also part of the dependent variable and therefore creates a mechanical dependence between the two. The vacancy rate does no suffer from this problem. A potential weakness of this measure is that not all vacancies are reported to PES, since PES have a market share of about 30-40 percent of all recruitments. According to PES, this market share tends to rise when the demand for labor is high and decreases somewhat when demand is low. This measure is however regarded as a good indicator of the demand for labor in the economy.[8] Moreover, what is important for this study is that there are no geographical differences in reporting of vacancies that change over time. There is no indication that the reporting should differ across regions.

Local labor markets are constructed by Statistics Sweden based on commuting patterns. This study uses the local labor market year 2000, when there were 90 local labor markets. Variable definitions and data sources are summarized in the Appendix.

Table 1 displays summary statistics for the total sample and individuals that are self-employed. Summary statistics for men (presented in the upper panel) and women (lower panel) show that 9.7 percent of the population of men and 4.2 percent of women are self-employed. 42 percent of the self-employed men have an incorporated firm, while the share for women is 30 percent. The background characteristics look rather similar for men and women: individuals with university education are less likely to be self-employed and individuals with only compulsory schooling are more likely to be self-employed. Finally, the self-employed are on average almost two years older than the average population age. The vacancy rate is on average 0.67 percent over the period. An inspection of the average vacancy rate for the different groups shows that self-employment is slightly more common in local labor markets where the vacancy rate is high.

[8] For a discussion of the measure, see Public Employment Services (2012)

Table 1. Summary statistics

	Total		Self-employed	
				Men
	mean	*sd*	*mean*	*sd*
Compulsory education	0.217	0.413	0.270	0.444
High school	0.619	0.486	0.615	0.487
University	0.163	0.370	0.115	0.319
Age	44.7	8.90	46.4	8.46
Local vacancy rate	0.00671	0.00267	0.00686	0.00282
Self-employment rate	0.0970	0.296		
Share incorporated Firms			0.422	0.494
No of obs.		22,278,181		2,159,442
				Women
Compulsory education	0.175	0.380	0.196	0.397
High school	0.641	0.480	0.654	0.476
University	0.185	0.387	0.150	0.357
Age	44.8	8.91	46.3	8.48
Local vacancy rate	0.00672	0.00268	0.00692	0.00283
Self-employment rate	0.0423	0.201		
Share incorporated Firms			0.307	0.461
No of obs.	21,841,773		923,343	

5 Results

Before studying the relationship between local labor market conditions and self-employment, we can look at the correlation on the national level. Figure 1 shows the vacancy rate in the economy as a whole and the self-employment rate among employed men age 30-60 for the years 1996-2007.[9] During this time period, it seems as though self-employment rates are negatively correlated with the vacancy rate, with higher rates in the 1990s when the vacancy rate was low and lower rates around the millennium. For women, see Figure 2, there is less of a pattern. As shown by figures in the Appendix, the unemployment rate also shows a correlation with the self-employment rate, which indicates a counter-cyclical pattern in the self-employment rate for men.

[9] As mentioned before in 2004 Statistics Sweden made some changes to the classification of self-employment that resulted in an increase in the number of self-employed. Since both series exist for 2003, the years 2004-2007 have been adjusted by multiplying with the ratio between the two series in 2003.

Figure 1. Vacancy and self-employment rates among men 1996-2007, in percent

Source: Public Employment Agency and Statistics Sweden

Figure 2. Vacancy and self-employment rates among women 1996-2007, in percent

Source: Public Employment Agency and Statistics Sweden

5.1 Long-term differences across regions

A visual inspection of the national level data shows that self-employment among men is more common in an economic downturn when the vacancy rate is low. This is in line with Blanchard's (2000) finding that there is a positive relationship between unemployment and self-employment rates in Sweden during the period 1966-1996. Before studying whether changes in local labor market conditions show a similar pattern, we can look at the correlation between self-employment and local labor market conditions in a cross-section. The relationship is likely to reflect long-term differences across regions, both labor market conditions and other permanent differences such as industry structure, geographical components, etc. Table 2 displays the results from regressions on the pooled data controlling for year fixed effects. The first two columns show the result for women and columns 3 and 4 the results for men.

The estimates presented in the first column show that a woman is more likely to be self-employed if she resides in a labor market region with a high vacancy rate: a standard deviation increase in the local vacancy rate increases self-employment by about 0.5 percentage points or 12.0 percent. The results presented in column 3 imply that for men the size of the effect is 0.9 percentage points or 9.1 percent.[10]

Next I study whether there are differences depending on the individual's education level. The reference group, here and throughout the paper, is people with only compulsory schooling. According to the results presented in columns 2 and 4, individuals with a higher education level are even more likely to be self-employed in regions with high vacancy rates compared to individuals with a lower education level. For women the difference is statistically significant, but for men there is no statistically significant difference between individuals with a high and low education level. The estimated effect of a one standard deviation increase in local vacancy rate for women (men) with university level studies is 0.7 (1.0) percentage points or 20.3 (14.5) percent. The results thus show that in regions with high vacancy rates a larger share of the workforce choose to be self-employed. This pattern is especially pronounced for men and women with high education.[11]

The estimated effects of the different individual characteristics are similar to other studies on Swedish data: self-employment increases with age, but at a diminishing rate,

[10] A standard deviation of the vacancy rate in the sample of regions is 0.002915.
[11] When the estimates are in italic it means that the total effect of the local labor market is statistically significant.

and individuals with higher education are less likely to be self-employed (see e.g. Hammarstedt, 2006). Overall, these results suggest that people are to larger extent pulled rather than pushed into self-employment. This pattern is, as predicted, stronger for people with higher human capital endowments.

Table 2. Cross-sectional study of local labor market conditions and self-employment

				Probability self-employed
		Women		Men
	(1)	(2)	(3)	(4)
Local vacancy	1.741***	0.910***	3.010***	2.859***
Rate	(0.310)	(0.226)	(0.382)	(0.471)
×High School		*0.811****		*0.0803*
		(0.246)		(0.472)
×University		*1.493****		*0.552*
		(0.244)		(0.393)
High School	-0.00298**	-0.00813***	-0.0192***	-0.0197***
	(0.00133)	(0.00150)	(0.00159)	(0.00296)
University	-0.0123***	-0.0224***	-0.0499***	-0.0538***
	(0.00341)	(0.00252)	(0.00261)	(0.00393)
Age	0.00509***	0.00511***	0.0114***	0.0114***
	(0.000484)	(0.000488)	(0.000236)	(0.000238)
Age^2	-4.86e-05***	-4.88e-05***	-0.000107***	-0.000107***
	(5.12e-06)	(5.18e-06)	(2.57e-06)	(2.58e-06)
Year FE	x	x	x	x
Obs.	21,841,773	21,841,773	22,278,181	22,278,181
R-squared	0.002	0.003	0.009	0.009

All regressions estimated using OLS. Standard errors clustered on regional level. *** indicate statistically significant at 1 percent, ** at 5 percent and * at 10 percent level. Estimates in italic mean that total effect of the local labor market variable is statistically significant at the 10 percent level.

5.2 Local business cycle and self-employment

Figure 1 indicates negative relationships between the vacancy rate and the self-employment rate. The cross-sectional evidence however suggests that self-employment is positively related to the vacancy rate. It is not clear how to interpret the different results. The problem with studies on the national level is that it is not possible to take other factors that affect self-employment on national level into account. Cross-sectional studies, on the other hand, suffer from the problem that the effect of the vacancy rate may reflect permanent differences across regions. A panel study of different regions

can solve some of these problems since it is then possible to control for both permanent differences across regions and changes on the national level that may influence the level of self-employment.

So does the local business cycle matter for self-employment rates? To investigate this question I now proceed to the panel study. Table 3 and Table 4 present the estimates from a panel study of the effect of changes in local labor market conditions on self-employment for women and men respectively.

Starting with women, results presented in Table 3 column 1 show that on average there is a positive effect of changes in local vacancy rate on the probability to be self-employed. The effect is small: a standard deviation increase in the vacancy rate increases self-employment with 2.3 percent, suggesting that the average effects found in the cross-sectional study to a large extent reflect permanent differences across regions that correlate with the self-employment rate.

Are there heterogeneous effects depending on a person's human capital endowment? As can be seen in the second column, in comparison to the reference group, women with higher education are more likely to be self-employed when vacancy rates are high. The estimated differential effects across groups are therefore similar to the cross-sectional evidence presented in Table 2 column 2. A standard deviation increase in the vacancy rate increases self-employment among highly educated women with 7.6 percent. Not only are there statistically significant differences across groups, the total effect is statistically significant showing that self-employment among women with only compulsory schooling is counter-cyclical, whereas self-employment among women with higher education is pro-cyclical.

The estimated effects of local vacancies presented in the second column depend on several things. First, a change in the labor market conditions can be correlated with a change in an individual's choice between wage employment and self-employment. Second, the composition of people may change because individuals move region or because some enter/exit the sample. To isolate the different mechanisms I first exclude all individuals who move to another region during the period. As can be seen in the third column, the results do not change much by restricting the sample to individuals who stay in the same labor market region. In the fourth column, the year fixed effects are replaced by educational group×year fixed effects to allow self-employment among

different educational groups to be on different trends. The estimates remain unchanged; if anything, the estimated difference across educational groups is a bit larger.

To isolate the effect of the local business cycle on individual behavior, the regional fixed effect is exchanged for an individual fixed effect. The results in columns 5 and 6 show a similar pattern to the previous results. However, the negative effect of the local labor market conditions on women with low education now disappears. This suggests that the effect was due to those women entering (and exiting) the sample being to a lesser (and larger) extent self-employed in times when local labor market conditions were good. Remember that people enter the sample aged 30 and exit aged 60. Since the negative effect does not arise from women in the sample changing to self-employment when the local vacancy rate is high, the effect is due to the self-employment pattern of women entering and exiting the sample. Self-employment among women with higher education is cyclical also in this specification. The results are stronger for women.

Table 3. Local business cycle and self-employment among women

					Probability self-employed	
	(1)	(2)	(3)	(4)	(5)	(6)
			Sample include individual who do not change region			
Local vacancies	0.333**	-0.423**	-0.591***	-0.862*	-.0580	0.181
	(0.150)	(0.195)	(0.199)	(0.439)	(0.148)	(0.135)
×High		*0.678****	*0.934****	1.060*	*0.476****	*0.198**
School		(0.255)	(0.268)	(0.534)	(0.0459)	(0.111)
×University		*1.323****	*1.732****	*3.032****	*1.001****	*0.665****
		(0.299)	(0.293)	(0.818)	(0.0689)	(0.162)
Region FE	x	x	x	x		
Ind. FE					x	x
Year FE	x	x	x		x	
Year*group FE				x		x
Mean dep var	0.0423		0.0426			
No. obs.	21,841,773	21,841,773	19,980,252	19,980,252	19,980,252	19,980,252
No of ind.					2,306,787	2,306,787

All specifications include age, age^2. To account for the change in categorization in 2003, the education variables and individual fixed variables are allowed to have a different impact before and after the change. All regressions estimated using OLS. Standard errors clustered on regional level. *** indicate statistically significant at 1 percent, ** at 5 percent and * at 10 percent level. Estimates in italic mean that total effect of the local labor market variable is statistically significant at the 10 percent level.

The results for men are presented in Table 4. Interestingly, the results are quantitatively similar to the results found for women, but much weaker. The results in the first column show that on average there is no effect of local labor market conditions. Including interactions with education level, results presented in column 2 show that self-employment among men with high education is pro-cyclical. Restricting the sample to men who live in the region the whole period strengthens the result (see column 3). To study whether men change occupational status depending on local labor market conditions, the regional fixed effect is replaced by an individual fixed effect. The results presented in the two last columns show that men with higher education are more likely to switch to (switch from) self-employment when local labor markets are good (bad). Including education group×year fixed effects, results presented in columns 4 and 6, weakens the estimated differences between educational groups.

To summarize, local labor market conditions have no (for men) or weak (for women) effect on self-employment on average. However, there are differences across groups to support the hypothesis that people with higher human capital endowments are to larger extent pulled rather than pushed into self-employment.

Table 4. Local business cycle and self-employment among men

						Probability self-employed
	(1)	(2)	(3)	(4)	(5)	(6)
			Sample include individual who do not change region			
Local vacancies	0.363	0.371	0.103	0.336	-0.171	0.217
	(0.251)	(0.261)	(0.262)	(0.433)	(0.296)	(0.293)
×High		-0.0585	0.206	-0.00105	0.471***	0.00575
School		(0.386)	(0.404)	(0.673)	(0.0794)	(0.136)
×University		*0.119*	*0.866****	0.504	*1.180****	*0.569***
		(0.399)	(0.321)	(0.845)	(0.218)	(0.284)
Region FE	x	x	x	x		
Ind. FE					x	x
Year FE	x	x	x		x	
Year*group FE				x		x
Mean dep var	0.0969		0.100			
No. obs.	22,278,181	22,278,181	20,202,350	20,202,350	20,202,350	20,202,350
No of ind.					2,359,855	2,359,855

Specification in columns 1, 2, 5 and 6 include age, age^2. To account for the change in categorization in 2003, the education variables and individual fixed variables are allowed to have a different impact before and after the change. All regressions estimated using OLS. Standard errors clustered on regional level. *** indicate statistically significant at 1 percent, ** at 5 percent and * at 10 percent level. Estimates in italic mean that total effect of the local labor market variable is statistically significant at the 10 percent level.

5.3 Robustness of results

This section studies the robustness of the results for alternative definitions of self-employment and alternative assumptions regarding the functional form of the empirical model.

To check the sensitivity for the definition of self-employment, I remove all observations where the individual has income from both self-employment and wage employment, removing individuals that are both self-employed and employees at the same time. There may be individuals who are both self-employed and wage earners making them difficult to categorize. The problem with this approach is that I remove individuals who change employment mode within the year, and therefore have income from both self-employment and wage employment. The results presented in Table 5 show that for women the results remain unchanged. For men there is no longer a positive effect of the vacancy rate on self-employment among highly educated (results in column 3). When studying changes in individuals' behavior, results presented in

column 4, there is still a positive correlation between the local vacancy rate and self-employment among men with higher education.

Table 5. Alternative definition of self-employment

				Probability self-employed
	Women		Men	
	(1)	(2)	(3)	(4)
Local	-0.740*	0.0794	0.157	0.157
vacancy rate	(0.383)	(0.112)	(0.352)	(0.262)
×High School	0.825*	*0.174**	0.101	-0.00952
	(0.440)	(0.0989)	(0.483)	(0.132)
×University	*2.317****	*0.572****	-0.167	*0.468**
	(0.646)	(0.157)	(0.644)	(0.266)
Region FE	x		x	
Individual FE		x		x
Year*group FE	x	x	x	x
Mean dep var	0.0346		0.0854	
Obs.	19,493,255	19,493,255	19,403,394	19,403,394
No of ind.		2,296,613		2,336,793

The sample includes only individuals who do not change local labor market. All specifications include age, age^2. To account for the change in categorization in 2003, the education variables and individual fixed variables are allowed to have a different impact before and after the change. All regressions estimated using OLS. Standard errors clustered on regional level. *** indicate statistically significant at 1 percent, ** at 5 percent and * at 10 percent level. Estimates in italic mean that total effect of the local labor market variable is statistically significant at the 10 percent level.

The empirical model is then estimated using the Logit model instead of the linear probabilistic model. A limitation with the linear model is that it can make predictions which imply that the probability of being self-employed is more than one or less than zero. This is not a problem with the Logit model, although it requires other assumptions about the functional form. Reassuringly, the results presented in Table 6 are similar to the results when using the linear model. One difference compared to the estimates using the linear model is the positive effect of the local vacancy rate also for men and women with only compulsory schooling in the individual fixed effect model (results presented in columns 2 and 4). However, the results showing that individuals with higher human capital endowment are more likely to be self-employed when the local business conditions are good do not seem to be sensitive to the choice of model.

Table 6. The logit model

			Probability self-employed	
		Women		Men
	(1)	(2)	(3)	(4)
Local	-19.93**	10.01**	-0.126	5.133*
vacancy rate	(9.464)	(4.360)	(4.000)	(2.680)
×High School	21.94**	*6.984*	3.956	*-2.107*
	(10.76)	(4.784)	(5.761)	(3.078)
×University	*79.51****	*24.66****	*21.44***	*6.536*
	(19.33)	(6.012)	(10.02)	(4.509)
Region FE	x		x	
Individual FE		x		x
Year FE	x	x	x	x
Obs.	21,841,773		22,278,181	

All specifications include age, age^2. To account for the change in categorization in 2003, the education variables and individual fixed variables are allowed to have a different impact before and after the change. All regressions estimated using logit. Standard errors clustered on regional level. *** indicate statistically significant at 1 percent, ** at 5 percent and * at 10 percent level. Estimates in italic mean that total effect of the local labor market variable is statistically significant at the 10 percent level.

5.4 Differences across sectors and organizational form

This section will look closer at possible different effects across sectors, as well as how the situation on the local labor market correlates with whether the self-employed choose to run an unincorporated or incorporated firm.

We know that the characteristics of self-employed differ across sectors (see e.g. Tillväxtverket 2012). Could the differences across educational groups be a consequence of them being active in different sectors, where self-employment rates correlate differently with the business cycle? Two sectors are used to study this question: hotel/restaurant and business services.[12] Self-employment is more common within the hospitality sector: 11.2 percent of the women and 23.3 percent of the men working in the sector are self-employed. In the business services sector, the share is 8.1 percent for women and 13.6 percent for men.

As can be seen in Table 7, the characteristics of self-employed differ across the two sectors. According to the results presented in columns 1 and 5, women and men with

[12] Hotels and restaurants 55000 – 56000 and business services SNI 72000 – 74601. About 2 percent of the employees are dropped because they are not matched to an industry code.

higher education are less likely to be self-employed in the hotel and restaurant sector. For business services, results presented in columns 3 and 7, individuals with higher education are as likely as individuals with a lower education level to be self-employed.

What about the effect of the local business cycle on self-employment? According to the results presented in columns 1 and 5, self-employment in the hotel and restaurant sector is higher among men but not women when the local vacancy rate is high. For business services, results presented in columns 3 and 7, self-employment is highly pro-cyclical among both men and women.

Next, interactions between education level and the local vacancy rate are included (see columns 2, 4, 6 and 8). The heterogeneous effects depending on education level differ between sectors. For the hotel and restaurant sector, the pattern looks the same as the previous study of all individuals: self-employment among men and women with higher education is higher when the labor market conditions are good. Interestingly, the opposite pattern is found in the business services sector. Individuals with higher education, compared to individuals with only compulsory schooling, are less likely to become self-employed when the local vacancy rate is high.

Although these results are interesting, they are a bit difficult to interpret since people may move to other sectors when local labor market conditions change.

Table 7. Local business cycle and self-employment: different sectors

	Probability being self-employed if working in sector							
	Women				Men			
	Hotel and restaurants		Business services		Hotel and restaurants		Business services	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Local	0.624	-1.957	1.514***	2.604**	2.443**	-2.500	2.431***	6.271***
vacancy rate	(0.650)	(1.209)	(0.376)	(1.043)	(1.008)	(2.075)	(0.629)	(1.103)
×High School		3.250**		*-0.672*		*6.676****		-4.130***
		(1.516)		(1.033)		(2.122)		(0.767)
×University		3.260*		-2.202*		4.210*		-4.153***
		(1.811)		(1.130)		(2.518)		(0.983)
High School	0.0847**	0.0611	0.0121***	0.0162**	-0.0960***	-0.137***	0.0550	0.0877**
	(0.0422)	(0.0492)	(0.00361)	(0.00816)	(0.00645)	(0.0172)	(0.0378)	(0.0378)
University	-0.0190**	-0.0410**	-0.00283	0.0106	-0.125***	-0.0469	0.0470	0.0799**
	(0.00829)	(0.0170)	(0.00335)	(0.00924)	(0.00880)	(0.0465)	(0.0389)	(0.0399)
Mean dep var	0.116		0.0806		0.233		0.136	
Region FE	x	x	x	x	x	x	X	x
Groupe*Year FE	x	x	x	x	x	x	X	x
Obs.	327,683	327,683	1,112,598	1,112,598	333,148	333,148	1,731,950	1,731,950

All specifications include age, age^2. To account for the change in categorization in 2003, the education variables and individual fixed variables are allowed to have a different impact before and after the change. All regressions estimated using OLS. Standard errors clustered on regional level. *** indicate statistically significant at 1 percent, ** at 5 percent and * at 10 percent level. Estimates in italic mean that total effect of the local labor market variable is statistically significant at the 10 percent level.

Finally, some results on the choice of organizational form and the local business cycle. The results presented in Table 8 show how the probability to have an incorporated firm if self-employed is affected by the individual's characteristics and the local business cycle. As can be seen in in all specifications, men and women with university education are more likely to have an incorporated firm if self-employed. Potential explanations to this pattern are that they may find it easier to make the initial capital investment of 100 000 SEK, or find the form more suitable or profitable for the type of service or good they are producing.

Next we turn to the correlations between organizational form and the local business cycle. The results in columns 1 and 4 show no effect, on average, of the local vacancy rate on self-employment. Turning to the model that allows for heterogeneous responses across educational groups we can see an interesting pattern. The results in column 2 show that having an incorporated firm if self-employed is less common among highly educated women, compared to women with less education, when the local vacancy rate is high. However, when studying changes in self-employed women's behavior, the results (presented in column 3) show that highly educated women are more likely to switch to incorporated firm when the vacancy rate is high. These opposite results in the two specification suggest that highly educated women who enter (exit) self-employment in good (bad) times are more likely to run (have run) an unincorporated firm.

For men the results from both the specification with a region fixed effect (column 5) and the specification with an individual fixed effect (column 6) show that men with higher education are more likely to run an incorporated firm when the vacancy rate is high.

How should these results be interpreted? It is not clear how the business cycle should affect the choice to have an incorporated or an unincorporated firm. One explanation for the result that highly educated individuals are more likely to switch to an incorporated firm when the vacancy rate is high could be that it is then easier to access financial capital, especially for individuals with higher education.

Table 8. Local business cycle and organizational form of self-employment

	Probability having a incorporated firm if self-employed					
	Women			Men		
	(1)	(2)	(3)	(4)	(5)	(6)
Local	-1.534	-0.152	-0.477	-0.875	-1.827	-0.178
Vacancy rate	(1.401)	(1.578)	(0.523)	(1.348)	(1.945)	(0.367)
×High School		-0.805	0.579		0.724	0.00412
		(2.153)	(0.505)		(1.159)	(0.359)
×University		*-5.278****	*1.843***		4.500*	*0.992**
		(1.829)	(0.760)		(2.607)	(0.572)
High School	0.0190	0.0263		0.276***	0.271***	
	(0.0198)	(0.0162)		(0.0415)	(0.0434)	
University	0.123***	0.157***		0.378***	0.350***	
	(0.0386)	(0.0442)		(0.0420)	(0.0512)	
Region FE	x	x		x	x	
Individual FE			x			x
Year*group FE	x	x	x	x	x	x
Obs.	923,343	923,343	850,797	2,641,791	2,641,791	2,017,249
No of ind.			192,129			403,145

Estimations presented in columns 3 and 6 only include individuals who stay in the same region. All specifications include age, age^2. To account for the change in categorization in 2003, the education variables and individual fixed variables are allowed to have a different impact before and after the change. All regressions estimated using OLS. Standard errors clustered on regional level. *** indicate statistically significant at 1 percent, ** at 5 percent and * at 10 percent level. Estimates in italic mean that total effect of the local labor market variable is statistically significant at the 10 percent level.

6 Concluding discussion

This paper has investigated whether self-employment rates are correlated with the local business cycle. When the economy is growing, business opportunities open up to encourage the set-up of new firms. In downturns, self-employment may be a way to avoid unemployment. These *pull* and *push* factors may be of different importance depending on the amount of human capital a person has. The findings in the paper support this hypothesis: individuals with a higher education level are more likely to be self-employed in regions where the vacancy rates are high than individuals with lower education. This pattern is especially strong for women. A part of this regional variation can be explained by regional fixed effects reflecting long-lasting differences across regions. There is, however, still a correlation between self-employment and the local

vacancy rate, suggesting that individuals with higher education, compared to individuals with only compulsory schooling, are pulled into self-employment when business opportunities arise. The only group for which the probability of self-employment is counter-cyclical is women with low education. A reason for why previous studies have failed to find a relationship between self-employment and business cycle on regional level could be that different groups are affected differently by the business cycle.

This paper also provides some evidence on heterogeneous effects in different sectors and the connection between the local business cycle and the choice of organizational form as self-employed. For example, it is found that highly educated men and women are more likely to switch to an incorporated firm when local labor market conditions are good. Since starting an incorporated firm requires an initial investment, the result may indicate that access to financial capital is important for the choice of organizational form. These are results that pose interesting questions about the effect of the business environment, and are left for future research.

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Appendix

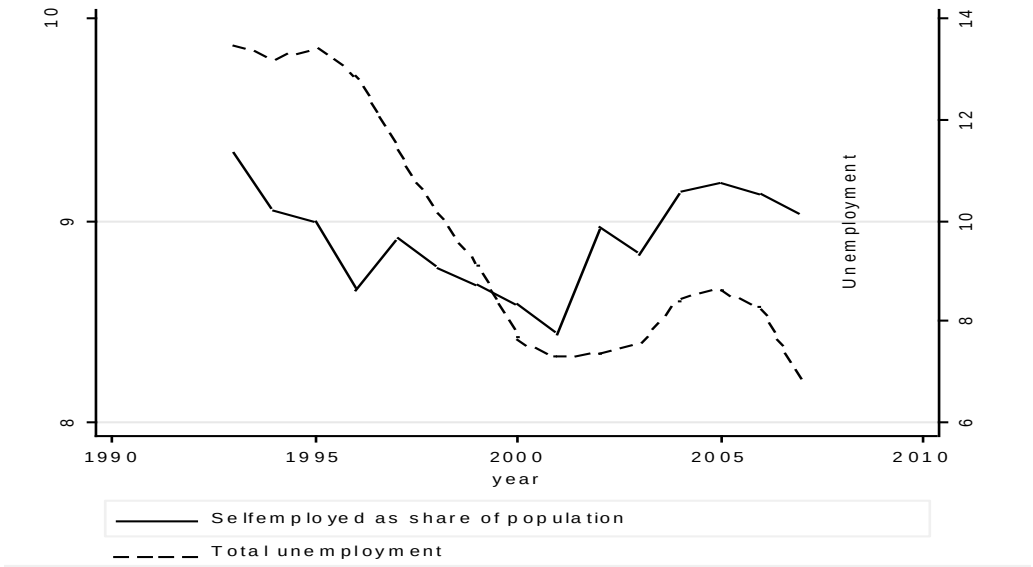

Figure A 1. Unemployment and self-employment among men 1993-2007

Source: Statistics Sweden

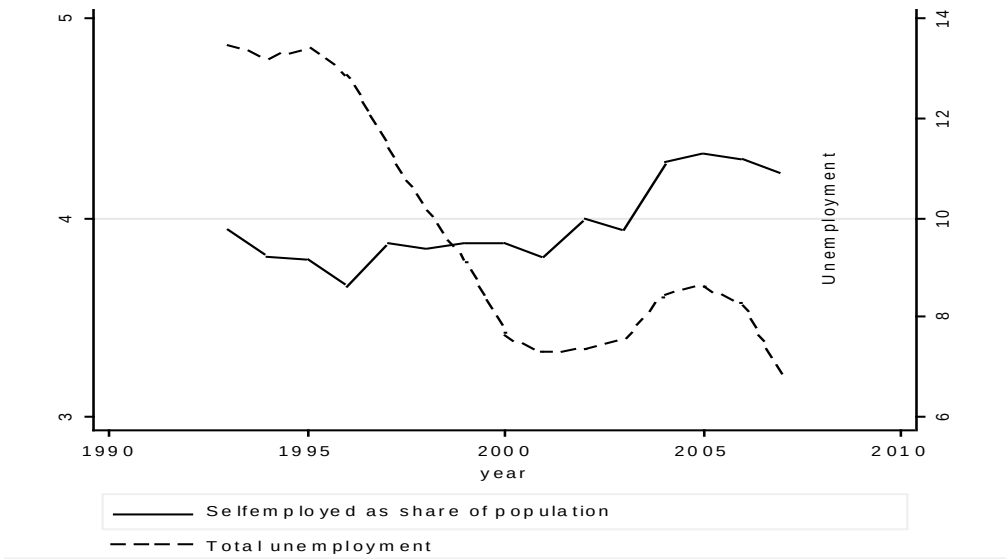

Figure A 2. Unemployment and self-employment among women 1993-2007

Source: Statistics Sweden

Table A 1. Detailed variable description

Variables	Description	Source
Local vacancies	Vacancies registered/population age 18-64	Swedish public unemployment service
Local unemployment	Registered as open unemployed or in program age 18-64/population age 18-64	Swedish public unemployment service
Local labor market region	Constructed by Statistics Sweden using commuting patterns in the year 2000.	Swedish Statistics
Self-employed	A dummy which take the value 1 if the individual is categorized by Statistics Sweden as being self-employed based on information on source of income in November, and 0 otherwise.	Income and population register (LOUISE), Swedish Statistics
Incorporated firm	A dummy which takes the values 1 if the self-employed in incorporated firm, and 0 if self-employed in unincorporated firm.	As above
Compulsory schooling	<10 years of education	As above
High School	10-12 years of education	As above
University	>12 years of education	As above
Age		As above
Sex		As above

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