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Rationality of Self-Employment:

Do Female and Male Entrepreneurs Differ?

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Abstract

Talk about the rise and future of self-employment must be linked to the discussion about changes in the structure of occupations, labour markets and regulations. At the same time, all different items are embedded within the general trend of a growing knowledge and service society. A main reason for the growing relevance of self-employment can be identified in the employment shift from the industrial to the service-sector. To a large extent this sector is characterized by personnel-intensive or technologically innovative fields of work, often requiring flexible organizational arrangements. Thus the service sector seems to be particularly suitable for self-employed activities.

In light of this, the more or less steady increase of the service sector mirrors changes within the category of self-employment. One of those fundamental changes is the increase in female solo-self-employment as there is prima facie evidence that the rise of self-employment is mostly a rise of micro-firms and solo-self-employment of which especially solo-self-employment is a female domain. But it is not clear, whether the development is primarily driven by necessity in order to take part in the labour market or if those activities reflect new modes of labour market integration revealing new opportunities and markets which are especially due in wide parts to the service and health care sector.

A fundamental question is how gender matters when investigating the above mentioned trends. Do we find specific "gender patterns" within recent developments of an increasing expansion of self-employment e.g. in Germany or will the new chances and risks lead to greater equality of opportunities? Is the increase of solo-self-employment of females driven by the need to earn a living or is it the result of females taking the risks e.g. to become more economically independent?

However, those developments raise the question whether self-employment can be seen as a strategy for women to achieve work-life balance and whether these changes in the organisation of work are leading to an improvement of the quality of (working) life. One of the most consistent findings in studies on women's labour force participation is the negative effect of the presence of young children on the probability of participation. It could be argued that difficulties in combining work and family enhance the transition or entry into self-employment.

Solo-self-employment may deliver possibilities for women to use their strength to overcome weaknesses and opens up opportunities helping to counter threats. In particular, solo-self-employment may deliver options that could lessen the constraints which family care places on women's employment. It may be the case that women place a higher value on nonwage aspects of self-employment than men do and women with greater family responsibilities may trade earnings for the family-friendly aspects of self-employment. Therefore self-employment may reflect the development of more or less successful strategies for coping with the conflicts arising from the difficult balance of self-employment and family life.

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However, can female solo-self-employment be seen as a representation of a new paradigm of employment, which does not fit the well-known traditional type of self-employment? To get more reliable information it is necessary to explore the relationship between self-employment, partner's employment, the household and children. We will examine the influence of personal characteristics, household and labour market characteristics for both mothers and fathers in a family context and their probability to be self-employed as compared to parents who have chosen formal, gainful employment.

The paper combines conceptual thoughts on the development of self-employment within stratified modern societies with empirical reflections based on public census data for Germany. The analysis is based upon German Microcensus data from the Statistical Office Germany which are available for the period from 1989 till 2009. The Microcensus is a representative sample of Germany's population which covers 1 percent of all households in Germany and it contains especially labour market data. Additionally to the descriptive analysis we will carry out multinomial logit regressions of the determinants of self-employment to get more knowledge about the statistical relevance of determining factors.

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1 Introduction

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2 Competing Approaches to Deal with Gender Related Labour Market Disparities

When analysing social structures and patterns of inequality, gender is one of the items which highlights social disparities. Disparities are sometimes interpreted as indicators of discrimination practices. Regarding the fact that divisions of social structure show significant differences in gender participation and in gender distribution, discussion has to evaluate carefully the reasons which are responsible for those gender gaps (Verheul et al. 2012).

In public, but also in academic gender discourse, different explanations can be found why gender imbalances exist and which factors can be held responsible. A more fundamental feminist explanation interprets female over- or underrepresentation as a mirror of male power strategies in society and as proof of the limited power of women to obtain the same positions in the same percentages as held by men. While this position is close to a model of gender domination, a competing position argues more moderately by claiming that the gender division of different social classes and labour market categories is itself a reflection of more complex factors, to which different patterns of gender decisions in education and further education also belong. In particular, we see that gender decisions for different university study subjects are obvious, which initialize the result that engineers and many natural sciences are overwhelmingly male while the teaching profession is dominated by women (Leoni and Falk 2010). Gender based discussion is very rich to show divergent sets of academic argumentation in that respect (Minniti 2010).

Finally, one can interpret the landscape of social and occupational (asymmetrical) distribution not only as a result of societal discrimination practices or divergent individual decisions by genders but as a mirror of complex *household* decisions rather than individual actors' decisions. When following that line of thought, households gain

a status as acting subjects which appear to have their own distinguished rationality to make occupational decisions and to organize the structure and philosophy of life-courses. When employing this perspective, patterns of explanation become more diverse than simple dichotomic black-white modes usually offer and, finally, causes and effects become difficult to separate, which also has to be reflected when teaching entrepreneurship (Heinonen and Hytti 2010).

However, not only household decisions have to be taken into account as a factor of influence but also labour market influences and global contextual changes in economy and society, commonly referred to as the trend of tertiarization (Wölfl 2005, Bögenhold 1996). Last but not least, sectoral changes towards a service sector based economy and society are ongoing in an irreversible way. To bring a complex phenomenon to one denominator, those professional groups that Max Weber (1972, 179) described as the "*poor Intelligentsia and with specialised knowledge*", are meanwhile well on their way to becoming the majority of society. As far as the work, which is not directly done in productive parts of economy and especially manufacturing, will further expand, it will become an important as well as difficult task to capture it in appropriate words (Castells 2010). Common labelling of a knowledge based service sector society fosters new professions, new firms and employment structures, which exemplify a meaning of so-called creative destruction (Schumpeter 1963) in which old facets are continuously substituted by newer ones.

The ongoing trend towards service sector employment serves as an institutional push factor to increase the numbers of the self-employed. By its nature, the self-employment quota in agriculture has always been the highest amongst economic sectors, whereas those in manufacturing represented the smallest group. The self-employment quota in the service sector is much higher than that in manufacturing, which consequently leads to an increase in self-employment when service sector employment increases. The trend towards services has had – among others – the following social and economic/structural effects: (1) Since the self-employment quota in the service sector is higher than in any other branch of the economy apart from agriculture, a shift in the economy towards the direction of an expanded service sector will inevitably lead to a rise in the amount of self-employed activity. A large part of this – currently dubbed 'new self-employment' – is quite simply a structural consequence of tertiarization. Service sector trends generally go hand in hand with processes of outsourcing and it is often difficult to decide which of these the cause is and which is the consequence.

All changes within the division of work and related gendered labour market participation take place within a societal environment. First of all, we have to ask whether the division of occupations is primarily the result of free choice by individual actors rather than of pressure through contextual variables to which factors like unemployment or missing alternatives also belong. Contextual variables exist at different levels, they consist of sectoral trends but also in form of different national managerial styles to influence companies, their organizational structures and industrial relations (Javidan et al. 2006, Tung and Verbeke 2010).

Hence, dynamics in markets and firm population affect the occupational structure, patterns of flexibilization and social mobility. Five interdependent trends regarding the socioeconomic situation of self-employed labourers in the employment system can be found when looking at the past 15 years.

Increased *unsteadiness* of labour market activity with multiple changes between waged work and unemployment or lack of contracts is significant. New forms of occupational dynamics and career patterns are increasing, which are connected to a high degree of uncertainty and which sometimes imply high financial risks. The socioeconomic category of self-employment seems to be in a state of permanent creation and re-creation, and parts belong to a category of vulnerable work. In parallel, a high extent of *destandardisation* within the category of self-employment has become evident. While Kuznets (1966) expected that self-employment ratios would decrease within the course of further economic development, recent cross-national comparisons indicate very diverse tendencies in which self-employment ratios very often increase rather than decrease (Acs et al. 2008).

At the same time considerable divergencies concerning social situations are emerging, which have become especially clear through their economic activities. One indicator of divergencies is working time. Weekly workloads are very heterogeneous. Many individuals have working hours, which are considerably higher than 40 hours per week, but also significant proportions of marginal working hours can be registered. Different aspects of destandardisation demonstrate a high degree of diversity within self-employment.

In the context of unsteadiness, destandardisation and heterogeneity of different *hybrid forms of labour market activity* are emerging (Folta et al. 2010, Soerensen, Fassiotto 2011). The individual employment biography covers not only different periods of dependent employment and self-employment consecutively, but also the possibility of multiple employment activities and combinations at the same time, e.g. being a free-lance quasi self-employed translator in the morning hours, tutoring pupils in a private coaching institute on an hourly basis in the afternoon, working as a salary-dependent supervisor in a cinema in the evenings, and giving paid tennis instruction at the weekends. Employment patterns and careers increasingly look like a patchwork of nodes functioning sequentially and simultaneously.

The problem in relation to the question of self-employment is that the economic and social material is rich and diverse, from both a theoretical and an empirical standpoint (Verheul and van Stel 2010), because the reservoir of self-employed labour is highly diverse and the socio-economic factors governing people's motives for seeking to move in the direction of self-employment are extremely varied and divergent (Shane 2003). The category of self-employed personnel includes social winners and losers simultaneously, but also new indefinite types have appeared, which are difficult to characterize. Therefore the image of an "entrepreneurial society" (Audretsch 2007) has become multilinear. We observe secular changes of employment and industrial relations, which also affect self-employed workers (Kalleberg 2009, 2011). The scenario is structured quite simply: We observe

increased forces towards heterogenization and segmentation of labour which mirror rising social dynamics and related mobility.

With growing self-employment (Arum and Müller 2004; Bosma et al. 2009; Kelley et al. 2010) new facets in the structure of the labour market and in the division of occupations have emerged (Shane 2008). What is happening at present is paradoxical in that a succession of mega-mergers between economic giants has been announced in recent months and years, while at the same time small companies are visibly sprouting in the shadow of these emerging amalgamations and oligopolies. Small businesses and micro-firms have been growing vigorously for some years Müller and Arum 2004).How is the landscape of self-employment changing and which effects are emerging for those at the lower fringes of economic stability and financial income? The forces which are responsible for the new emergence of those stakeholders are of crucial research interest. Must they be regarded primarily as a result of „pushes" by labour market deficiencies? Are they a response to new lifestyles and working demands, which act as „pulling" factors into self-employment?

3 Empirical Data on Self-employment in Germany

The analysis of self-employment and gender disparities has to acknowledge a bundle of influencing factors, labour market trends towards flexibilization and individualization (Beck 2009), sectoral changes and decision rationalities by households and individual agents, which are based upon ideas of rational choices to maximize individual (household) wealth (Veenhoven 2000) including happiness and life-satisfaction (Andersson 2008, Benz and Frey 2008, Binder and Coat 2010).

Figure 1 shows the development of (absolute) self-employment numbers in Germany between 1996 and 2010. The numbers declined in the sector "agriculture and forestry, fishery", remained nearly stable in "industry", increased slightly in the area of "domestic trade, accommodation and food service activities, transport", especially during the last two years, and they boomed in the field of (other) services.

Figure 2 visualizes these changes as changes of percentages of self-employment. First of all, the rapid increase of self-employment in services becomes clear. In 2010 nearly every second self-employed person belongs to the category of services. If we add the areas of services and of "domestic trade, accommodation and food service activities, transport" which are both taken together in other sets of statistics, nearly three quarters of all self-employment belong to these two areas, while self-employment in industry and agriculture has further shrunken towards one quarter of self-employment population during the last 14 years in Germany.

Figure 1: Number of self-employed people per economic sector
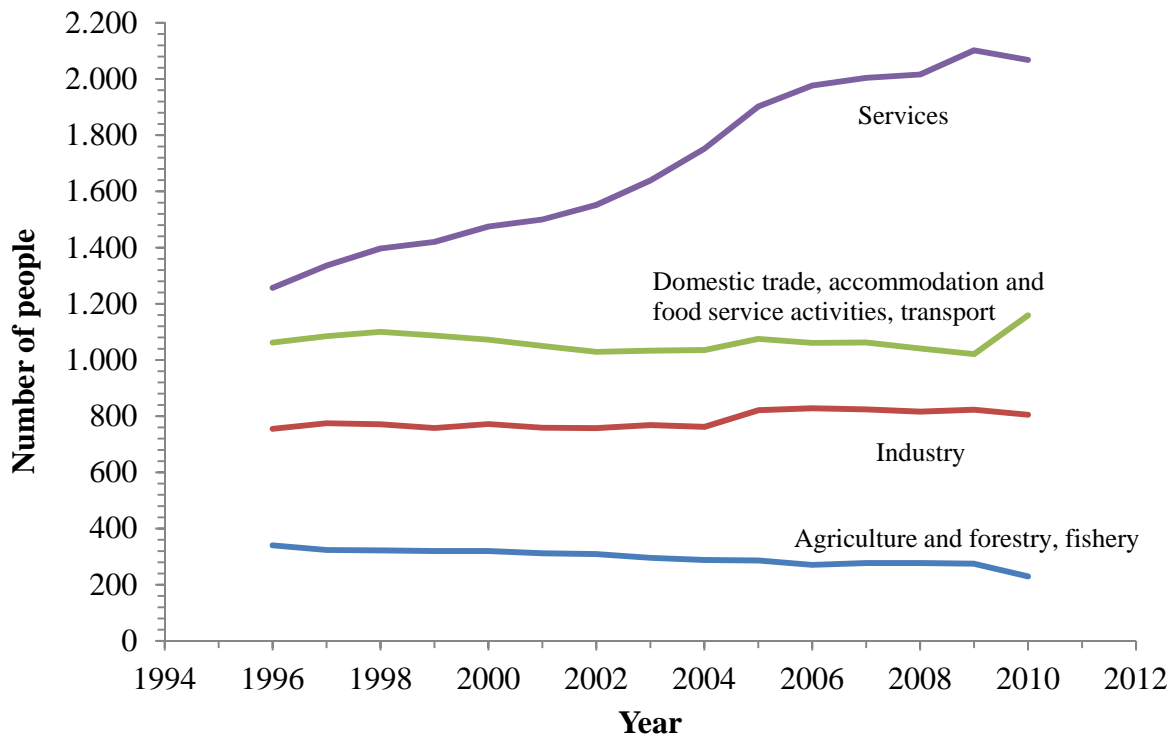
Source: Own calculation on the basis of Piorkowsky/Buddensiek (2011).

Figure 2: Percentage of self-employed people per economic sector
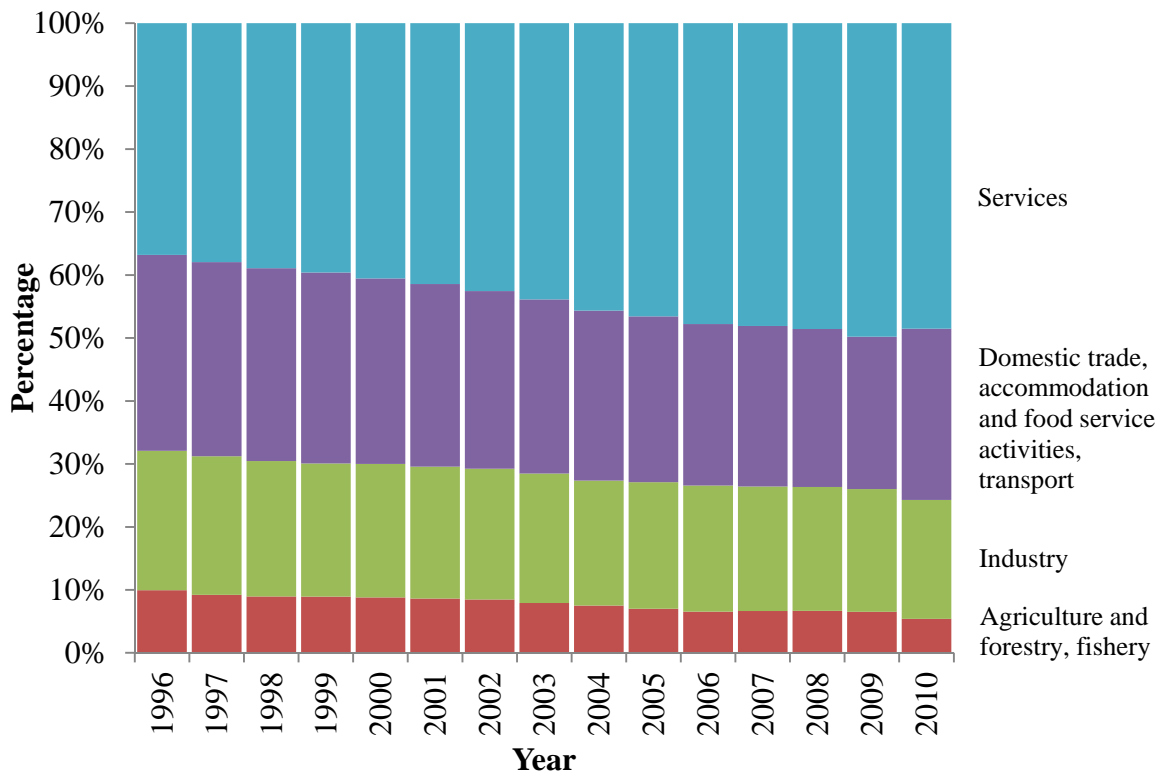
Source: Own calculation on the basis of Piorkowsky/Buddensiek (2011).

Many further specific questions can be added. One central item of interest is concerned with the type of self-employment. To which firms do these self-employed people belong, are they related to "bigger" companies or to small and smallest firms ? Earlier investigations (Bögenhold and Fachinger, 2010, 2012) already highlighted the strong relevance of smallest firms during the economic period of the last 20 years, when the revival of self-employment in Germany was virtually carried out by a revival of micro-firms defined as firms, which are run by owners who have no further employees in their firms. The owners are commonly called solo-self-employed workers.

Distinguishing between economic sectors, gender and the question if self-employed people work with further or without further employees, Table 1 gives further information about trends in self-employment in Germany during the last 15 years.

Table 1: Changes in the Composition of Self-employment 2010 to 1996

All sectors		Agriculture, forestry, fishing		Industry	
2010 to 1996 all	14,1	2010 to 1996 all	-31,8	2010 to 1996 all	28,0
Men		Men		Men	
All	11,5	All	-32,0	All	6,9
Solo	24,2	Solo	-39,2	Solo	39,7
With employees	2,1	With employees	-17,6	With employees	-9,1
Women		Women		Women	
All	23,2	All	-30,8	All	-13,6
Solo	32,4	Solo	-34,6	Solo	-18,5
With employees	14,4	With employees	-23,1	With employees	-9,4

Domestic trade, accommodation, transport		Services	
2010 to 1996 all	1,9	2010 to 1996 all	45,3
Men		Men	
All	7,0	All	35,4
Solo	25,1	Solo	46,5
With employees	-3,9	With employees	25,4
Women		Women	
All	-10,7	All	70,3
Solo	-12,4	Solo	87,2
With employees	-9,4	With employees	51,1

Source: Own calculation on the basis of Piorkowsky/Buddensiek (2011).

Data in Table 1 highlight several previous findings in more detail and with greater clarity: The overall trend towards services pushes not only self-employment but develops differently when distinguishing for men and women and when distinguishing for the type of self-employment (with further employees versus solo-self-employment). Only the agricultural sector features a reduction in self-employment for all categories and both genders while the sectors industry and "domestic trade, accommodation, transport" differ for men and women, showing losses for women and gains for men.

Comparing the two categories of self-employment with employees and without employees shows that "small" entrepreneurs with their micro-firms have increased their weight tremendously between 1996 and 2010 in Germany; female self-employed people even more than male. Significant differences occur when comparing economic sectors: While the proportion of female solo-self-employment declined in industry and in domestic trade, accommodation and transport, male solo-self-employment increased in the same areas at the same time. The increase takes place for nearly 40 % within the category of male solo-self-employment in industry.

The situation within the socioeconomic field of services reflects a contrast: Both genders and all size categories have considerable growth ratios in those 15 years but the increase of female solo-self-employment is extremely high compared with all other figures. Female self-employment gained 70 % in services within 15 years but, here, 87 % in solo-self-employment whereas men merely gained 46 %. In addition to organizational and sectoral change, the growth ratio of female self-employment, mainly in the liberal professions and in diverse further social services, has contributed to and mirrors a drastic transformation in the composition of the labour market.

4 Self-employment by Gender in the German Economy and Society

With growing solo-self-employment, a new social phenomenon in the structure of the labour market and the division of occupations has emerged. We observe not only a rapid tertiarization but also fragmentation and segmentation of labour market trends in which different developments are overlapping each other. Of crucial research interest are the driving forces and the features of self-employment. Are they a response to new lifestyles and working demands, which act as *pull* factors into self-employment or are they driven by needs and necessities? In other words, does solo-self-employment serve as a valve on a pressurized labour market, or must it be regarded more positively as a new option in the classic division of labour through which an increasing number of people find new self-supporting and stable jobs? And, can we verify appropriate trends at the level of genders which indicate different rationalities, opportunities and needs (Lombard 2001, Wellington 2006, Georgellis and Wall 2005)?

Although different developments appear quite similar regarding their directions if we control for gender, fundamental differences remain significant: Female self-

employment is based to a much greater extent upon solo-self-employment and it is much more highly represented in the service sector than male self-employment.

Under the aspect of heterogeneity we also find that a considerable dispersion of workload can be seen. It differs between less than 15 hours per week up to more than 40 hours per week. Those differences have diverse causalities when looking at logics of individual agents. They may mirror bad business situations because of insufficient orders or intended decisions in favour of part-time self-employment. Whereas less than 45 % of women are working more than 40 hours per week, more than 70 % of men report to be working full-time. For women, part-time work seems to be more "normal" than for men. This could be an indication that women use the flexibility of self-employment and the "freedom" of self-determination regarding the workload. On the other hand, the normal case for men leans much more towards full-time work with 40 hours or more than 40 hours per week (Bögenhold and Fachinger 2011).

A large portion of factors is responsible for new contours in the composition of occupations. In academic discourse very often trends are postulated based on empirical speculations since data which can shed reliable light on those questions are not always available. The German Microcensus provides further reliable information regarding the socioeconomic situation of self-employed workers. Figure 3 gives an idea regarding the heterogeneity of the net incomes of self-employed people. What becomes clear is that the incomes cover a broad range of diverse incomes ranging from very small to comparatively high ones. Differentiating for solo-self-employed people and self-employed people working with further employees shows that the incomes of the solo-self-employed are, on average, much lower than those of entrepreneurs with employees.

Figure 3: Net-income of self-employed people, according to self-assessment,
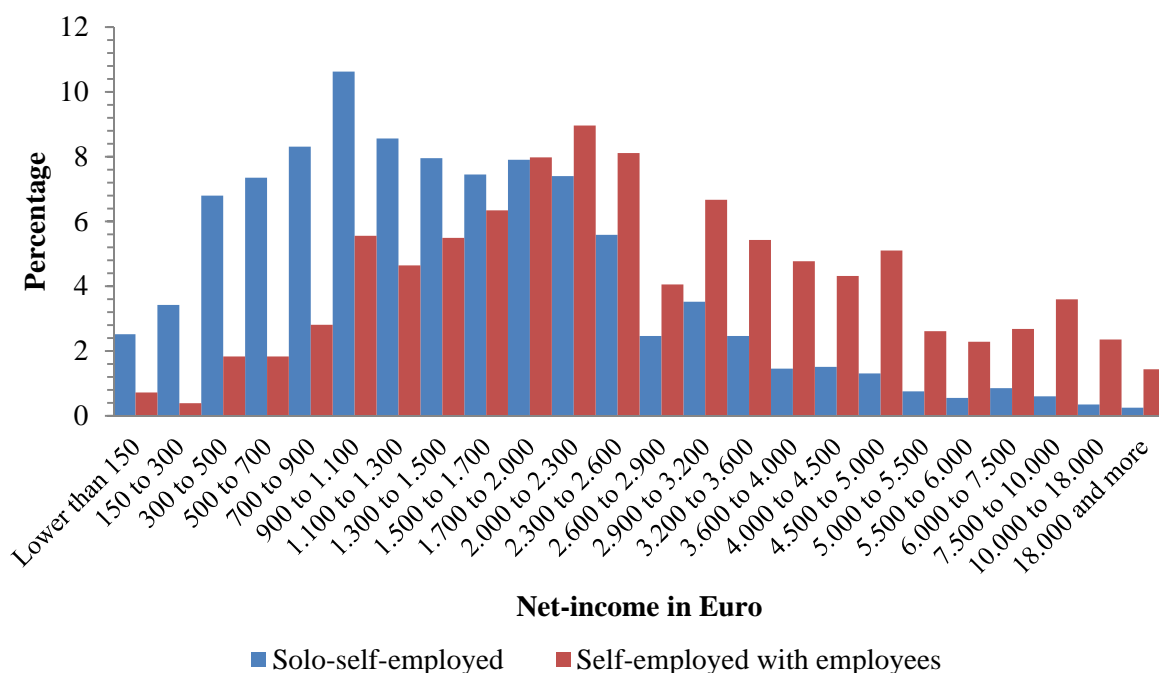
Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

A comparison between male and female solo-self-employment incomes shows that the income distribution differs between men and women (see Figure 4). Both genders cover a range of incomes from lowest incomes to comparatively high incomes, but female incomes are concentrated much more densely at the lower ends than the incomes of men. Since these incomes are net incomes (based on self-assessment) of individual agents, two questions are of specific further interest:

(i.)   Do those incomes stand alone or do they contribute to specific household incomes ?

(ii.)   Are the incomes related to fulltime or part-time work ?

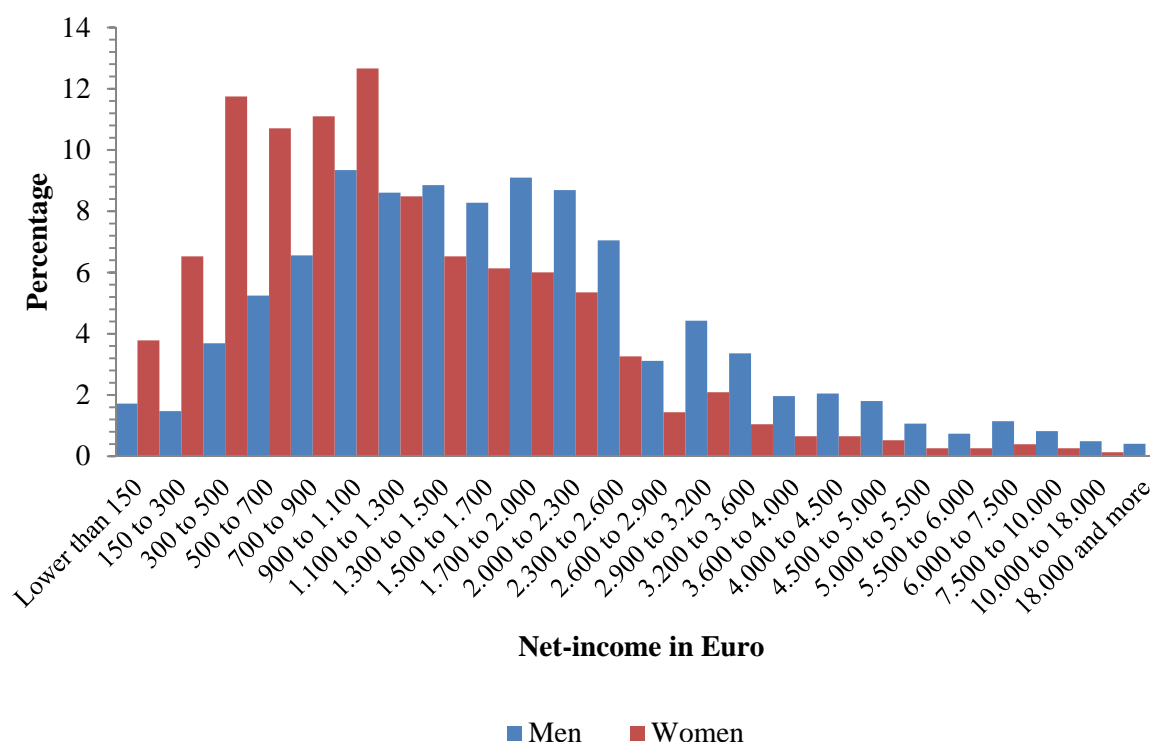**Figure 4: Gender-specific income of solo-self-employed people, according to self-assessment, Germany 2009**

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

As Figure 5 shows solo-self-employed women increasingly work on the basis of a sideline employment which has become a more important economic activity then solo-self-employment on a regular basis.

Figure 5: Number of solo-self-employed women in the service sector
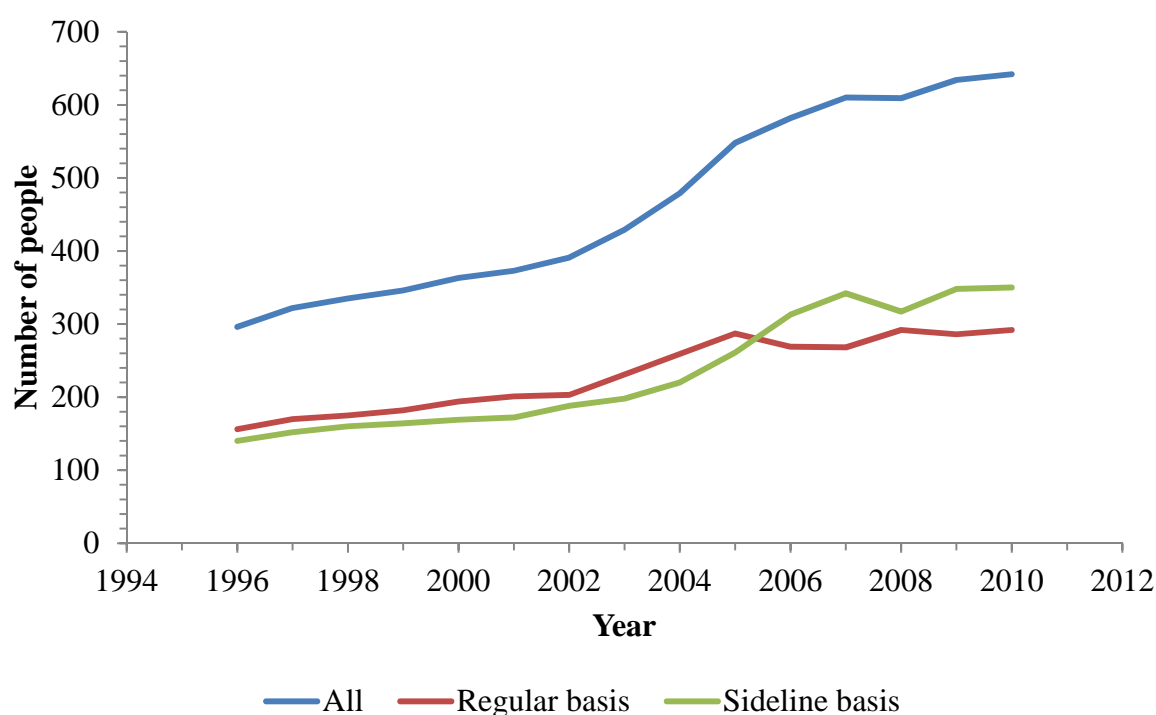
Source: Own calculation on the basis of Piorkowsky/Buddensiek (2011).

When asking for reasons why people work part-time as an entrepreneur, huge differences between genders and between the status of the different agents (solo-self-employed, self-employed with employees, employee) can be found. A huge difference between men and women is the factor that women say that they work part-time (instead of full-time) because they have private or family commitments or that they care for a child or disabled person (see Table 2).

Table 2: Reason for working part-time

Men

	Solo-Self-Employed	Self-Employed with employees	Employees
Full-time employment not available	17,2	5,8	38,8
Education	8,8	3,8	14,6
Illness, accident	3,3	3,8	7,0
Private or family commitments	5,1	7,7	5,1
Full-time employment not possible or not wanted	39,8	53,8	23,5
Caring for child or disabled person	2,9	1,9	3,1
n.a.	23,0	23,1	7,8
All	100,0	100,0	100,0

Women	Solo-Self-Employed	Self-Employed with employees	Employees
Full-time employment not available	10,9	5,9	20,1
Education	5,3	1,5	3,5
Illness, accident	1,8	2,9	2,1
Private or family commitments	20,8	23,5	23,8
Full-time employment not possible or not wanted	27,1	25,0	21,0
Caring for child or disabled person	21,7	25,0	26,3
n.a.	12,4	16,2	3,2
All	100,0	100,0	100,0

Source: Own calculation on the basis of Piorkowsky/Buddensiek (2011).

To obtain more reliable information about the factors behind those statements, it is necessary to explore the relationship between self-employment, partner's employment, the household and children. Our analysis examines the influence of personal characteristics, household and labour market characteristics for both mothers and fathers in a family context and their probability of being self-employed as compared to parents who have chosen formal, gainful employment. Observing labour market data at a level of households allows an investigation of the forms of work hybridity (Folta and Delmar 2010) as a strategy to combine different income sources of different household agents to a common whole on a rational basis.

Data in Table 3 throw light on the family and/or household background of those entrepreneurial agents who were treated as full-time or part-time entrepreneurs in our previous discussion. Now, when turning to the perspective of households, completely new horizons emerge. While female solo-self-employed people and female employees contribute to a household income in about 48 % of the cases (compared to 27 for self-employed people with employees), which is not the strongest income source of the household, one can interpret the data in the sense that a very wide share of the female agents simply want to gain additional income in order to contribute to the overall volume of household income.

Table 3: Relationship between main income earner and the reference person representing the household

Men

	Solo-Self-Employed	Self-Employed with employees	Employees
Main income earner in the household is the reference person and is an independent farmer	5,9	4,4	0,0
Main income earner in the householdachieves highest income class by him-/herself	59,6	70,1	75,2
Main income earner in the household achieves the highest income class jointly with additional person	5,4	4,1	5,0
Other main income earner (reference person in the household)	7,0	8,2	3,6
Person in the household with main income earner being an independent farmer (full time)	0,3	0,1	0,2
Person achieving the highest income class, but not main income earner	1,3	0,9	2,1
Person declaring income, but not in the highest income class	15,2	6,5	12,2
Person does not declare income, but other members of the household provide details for individual incomes	4,6	4,9	0,9
Person does not declare income, no other household members declare income	0,7	0,8	0,8
Total	100,0	100,0	100,0

Women	Solo-Self-Employed	Self-Employed with employees	Employees
Main income earner in the household is the reference person and is an independent farmer	0,3	0,4	0,0
Main income earner in the household achieves highest income class by him-/herself	34,9	46,6	38,0
Main income earner in the household achieves the highest income class jointly with additional person	1,5	2,0	1,7
Other main income earner (reference person in the household)	2,8	4,0	1,3
Person in the household with main income earner being an independent farmer (full time)	1,3	1,1	0,4
Person achieving the highest income class, but not main income earner	4,3	9,3	6,2
Person declaring income, but not in the highest income class	47,4	27,1	48,7
Person does not declare income, but other members of the household provide details for individual incomes	4,0	3,8	0,6
Person does not declare income, no other household members declare income	3,6	5,8	3,0
Total	100,0	100,0	100,0

Source: Own calculation on the basis of Piorkowsky/Buddensiek (2011).

Taking together reasons for working part-time (Table 2) and information provided in Table 3 the interpretation comes to mind that especially female part-time entrepreneurship is led by a rationality geared towards generating additional income for the financial package of a household. An argumentation which highlights different gender aspects in entrepreneurship by emphasizing new meanings of reliability and risk-moderation (Hytti 2005) may find specific proof here. A life course can be adequately interpreted as a story from birth to death, which includes different transitions and trajectories. These changes also affect entrepreneurship and provide underlying sense to rationalities within entrepreneurship and related agents within economic and societal developments. During one´s life course, entrepreneurship can be a source of income among other sources, and its role in the income portfolio changes. Consequently, it makes sense to understand entrepreneurship in the larger context of employment, career, life course and personal well-being. Therefore the

biographical perspective of looking at life courses as lives of cohorts in transition is a further axis of discussing intentions and choices (Kohli 2007, Mayer 2009).

These turbulences within the existing organisations – the need to downsize, rationalise, delayer, outsource, restructure, flatten or shape the organisation for the future – have changed the concept of a career from the perspective of the individual. From a positive point-of-view, it has been suggested that the changes enhance the emergence of a new 'boundary-less career' or 'portfolio career', where individuals accumulate skill and personal reputation as key career resources through frequent movements between firms and in and out of self-employment and job opportunities that extend beyond a single employment setting. In other words, employment relations are increasingly in transition, working contracts become insecure and work often becomes precarious, which emerges as a more visible downside of current labour markets and societies (Kalleberg 2009).

5 Some Results from the Binary Logistic Regression

5.1 Employees and self-employment

Over the past decades, a restructuring of the labour market has taken place, which has led to diminishing differences between the employees and self-employed people – due on the one hand to outsourcing and on the other hand to more possibilities for taking up a business, especially as in the services sector a high start-up capital is not necessary. Often, when starting up a business, one can manage this from one's own pocket and may remain independent of banks and collateral for loans. However, core workforces are outsourced by companies in order to carry out the very same activity with the status of self-employed worker. They work regularly for only one enterprise or contractor and can be characterised as fictitious self-employed.

Therefore the relevance of the special variables, e.g. individual characteristics connected with self-employment, may have decreased.

To gather more information about the significance of the explanatory variables, binary logistic regression was undertaken. In the first step, we took a look at the differences between self-employed people and employees. The employment status was coded with

0 = employees and
1 = self-employed

The following variables were chosen as predictors

- Economic sectors: services; agriculture and forestry, fishing; industry, and domestic trade, accommodation, transport
- Gender
- Age
- Highest level of education (ISCED97)
- Actual working time
- Number of children below the age of 3.

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The descriptive statistics are presented in Tables A-1 and A-2. From the data set, we excluded the cases, where no information was given regarding the level of education (N = 496).

According to the scientific use file for 2009, the labour force consists of around 38.64 million people, with 45.8 % females. Most people work in the service sector (51.4 %). In the industry sector 22.3 % are employed and in the primary sector only 2.3 %. Regarding the highest level of education (ISCED97), most people in Germany have a level of ISCED 3b (45.8 %).

For the regression we chose the following the reference categories

- Services for economic sector
- ISCED 6 for highest level of education (ISCED97)
- Male for gender
- 3 children

As we have about 34.3 million employees and approx. 4.2 million self-employed, the prediction of the simple model with only the constant gives quite a high value for the correct percentage as can be seen in Table 4.

Table 4: Classification Table

				Predicted	
				self	Percentage
Observed			Employee	Self-Employed	correct
Step 0	self	Employee	34,3330	0	100.0
		Self-Employed	4,222	0	.0
	Overall Percentage				89.0

Constant is included in the model; cut value is .500

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

The model predicts 89 % of the responses correctly without using any independent variable additionally. The result indicates that without any further information, we would be correct in 89 % of the cases, when we suggest that that particular person is an employee. Therefore a better fit of the model will be not easy to achieve, as only 11 % are not correct. Some further information is given in the following tables.

Table 5: Variables in the Equation

		B	S. E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-2.096	,016	16,513.519	1	.000	.123

The predicted odds of being self-employed are 0.123 if only the intercept is used in the model. As can be seen from the statistics of the variables not in the equation (Appendix Table A-3), the number of children and some values of the education variable (ISCED 3b, ISCED 4a, b, n.a.) are not significant. All other variables seem to

contribute to a better prediction. Information about the goodness of fit is presented in the following table.

Table 6: Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	4,269.157	18	,000
	Block	4,269.157	18	,000
	Model	4,269.157	18	,000

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

The simple model has a poor fit: the chi square has 18 degrees of freedom and a value of 4,269.157. This indicates that the predictors may have a significant effect. However, the values for the test statistics are not convincing. Nagelkerkes R^2 is .210 and therefore quite low as is Cox and Snell's R-Square.

Table 7: Model Summary

Step	-2 Log likelihood	Cox & Snell R square	Nagelkerkes R square
1	22,372.365	.156	.210

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

The results for another test statistic, the Hosmer-Lemeshow-Test are shown in Appendix Table A-4. The table reveals the same outcome: a poor fit. Additionally, the number of actually observed versus the number of predicted people in each group can be compared. The division into ten subgroups shows quite remarkable differences, especially for the self-employed people (Appendix Table A-5), thus backing up the results of the other measures. The Classification Table 8 shows that the value of the overall percentage is only 0.6 higher than the value in the model with only the constant term. Furthermore, it can be seen that merely 9.5 % are correctly classified for the self-employed.

Table 8: Classification Table

			Predicted		
				Self	Percentage
	Observed		Employee	Self-Employed	correct
Step 1	self	Employee	34,1626	171	99.5
		Self-Employed	3,823	400	9.5
	Overall Percentage				89.6

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

To complete the information about the regression, in Table 9 the statistics for each predictor are given.

Table 9: Variables in the Equation, Step 1

	B	S. E.	Wald	df	Sig.	Exp(B)
Services			837.570	3	.000	
Agriculture and forestry, fishing	1.186	.086	191.839	1	.000	3.273
Industry	-1.181	.062	357.661	1	.000	.307
Domestic trade, accommodation, transport	.489	.042	136.598	1	.000	1.630
Age	.047	.002	848.417	1	.000	1.048
Actual working time	.034	.001	836.379	1	.000	1.034
female	-.408	.039	109.694	1	.000	.665
ISCED 1			614.176	9	.000	
ISCED 2	-.155	.163	.901	1	.342	.856
ISCED 3a	-1.357	.456	8.857	1	.003	.257
ISCED 3b	1.019	.174	34.475	1	.000	2.770
ISCED 3c	.018	.151	.014	1	.907	1.018
ISCED 4a, b	.610	.161	14.305	1	.000	1.840
ISCED 5a	.906	.155	34.044	1	.000	2.475
ISCED 5b	.860	.153	31.418	1	.000	2.364
ISCED 6	1.219	.180	46.061	1	.000	3.384
n.a.	.481	.405	1.410	1	.235	1.617
3 children			36.092	3	.000	
No child	.445	.077	32.955	1	.000	.560
1 child	.499	.273	3.347	1	.067	1.647
2 children	.941	1.303	.522	1	.470	2.563
Constant	-5,653	.176	1030.768	1	.000	.004

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

The Wald Statistic for most of the variables is quite high, indicating some relevance of predictors. However, the number of children and some ISCED values for education have a low Wald statistic and are not significant. Factors of relevance are the economic sector, age, working time and gender.

With respect to the economic sectors, the possibility of being self-employed is higher for the primary sector and the sector with domestic trade, accommodation and transport, and lower for the industry than for the service sector. People are also more likely to be self-employed if they are older. The positive sign of the actual working time indicates that on average self-employed people are working longer. Regarding the education level it can be seen that for people with a low level the possibility to be self-employed is low. However, for ISCED 2 and 3a the Wald statistic is low, therefore those variables are not statistically significant. On the contrary, there are two statuses in particular, ISCED 3b and ISCED 6, where the B values indicate that people with those levels of education are very likely to be self-employed.

Overall, the binary logistic regression regarding the differences between being self-employed or having a job shows a rather weak model fit. This indicates that there are no major differences between the people in those two statuses.

However, in the literature it is argued that the group of self-employed people is very heterogeneous and sometimes being solo-self-employed or working for a company is nearly the same regarding the individual characteristics – those solo-self-employed are sometimes characterised as "scheinselbständig" (self-employed in name only). Therefore, differences may occur when comparing solo-self-employed with self-employed people with employees.

5.2 Self-Employment and Solo- Self-Employment

To get a better understanding of the self-employed, we took a closer look at the differences between self-employed and solo-self-employed people. In the sub-sample only people who are self-employed are included. The employment status is coded with

0 = self-employed with employees and
1 = solo-self-employed

The dependent variable which measures the solo-self-employment is equal to 1 if the respondent is solo-self-employed and 0 otherwise. The logistic regression model is used to estimate the factors which influence solo-self-employment if someone is self-employed.

A logistic regression analysis was conducted to predict solo-self-employment using as predictors
- Economic sectors: services (reference category); agriculture and forestry, fishing; industry, and domestic trade, accommodation, transport
- Gender
- Age
- Age squared
- Highest level of education (ISCED97)
- Actual working time
- Number of children below 3.

However, in a first estimation, age squared and the number of children was not significant regarding the Wald statistics. Therefore, as the inclusion of irrelevant variables can result in a poor model fit, we omitted those variables for the final estimation. The basic information is given in Appendix Tables A-6 and A-7.

In 2009 the number of self-employed people was ca. 4.2 million, with 31.2 % females. Most self-employed people work in the service sector (53.1 %). The percentage of self-employed in the industry sector with 8.1 % is quite low. The percentage of 2.3% n the primary sector is an expression of the structural changes of the economy. Regarding the highest level of education (ISCED97), most people have a level of ISCED 3b or ISCED 5 a first stage of tertiary education (34.1 % resp. 42.9 %).

For the regression we chose the following reference categories
- Services for economic sector;
- ISCED 1 for highest level of education;
- male for gender.

Table 10: Classification Table

| | | | | Predicted | |
| | | | | selbst | |
	Observed		Self-Employee	Solo-Self-Employed	Percentage correct
Step 0	selbst	Self-Employed	0	1,858	
		Solo-Self-Employed	0	2,364	100.0
	Overall Percentage				56.0

Constant is included in the model; cut value is .500

The model predicts 56.0 % of all cases correctly without any additional information. Using only the intercept will therefore lead to results which are no better than "tossing a coin".

Table 11: Variables in the Equation

		B	S. E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	.241	.031	60,325	1	.000	1.272

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

The predicted odds of being self-employed are 1.272, if only the intercept is used in the model.

Taking a look at the table with the statistics of the variables not in the equation (Appendix Table A-8)shows that ISCED 3b, 4a and4b have a relative high significance

which is the same result as for the overall labour force. However, for all other variables the significant is less than 0.001.

As is the case for the overall model, the model for the sub-sample seems to have a poor fit: the chi square has 15 degrees of freedom and a value of 691.932.

Table 12: Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	691.932	15	.000
	Block	691.932	15	.000
	Model	691.932	15	.000

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

The values for the test statistics are also relatively low, indicating a poor fit. Nagelkerkes R² is 0.202 and Cox and Snell's R-Square is 0.151, indicating a weak relationship between prediction and grouping.

Table 13: Model Summary

Step	-2 Log likelihood	Cox & Snell R square	Nagelkerkes R square
1	5,101.361	0.151	0.202

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

However, the Hosmer-Lemeshow-Test reveals better results (Appendix Table A-9). The significance is 0.816, which means that the hypothesis has to be rejected and therefore the model seems to be a good fit.

This is also documented in contingency table for the Hosmer and Lemeshow Test, where the differences of the number of actually observed and the number of predicted people in each group is shown (Appendix Table A-10).

The classification table shows that the value of the overall percentage is 10.9 higher than the value in the model with only the constant term. The model predicts 66.9% of the responses correctly. The estimation for the self-employed is 54.1 % and for the solo-self-employed 75.3 % are correctly classified.

Table 14: Classification Table

	Observed		Predicted		Percentage correct
			Selbst		
			Self-Employed	Solo-Self-Employed	
Step 1	Selbst	Self-Employed	1,036	823	55.7
		Solo-Self-Employed	576	1,789	75.7
	Overall Percentage				66.9

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

To complete the information about the regression, in Table 15 the statistics for each predictor are given.

Table 15: Variables in the Equation, Step 1

	B	S. E.	Wald	df	Sig.	Exp(B)
Services			95.474	3	.000	
Agriculture and forestry, fishing	.283	.144	3.844	1	.050	1.327
Industry	-.723	.130	30.986	1	.000	.485
Domestic trade, accommodation, transport	-.627	.082	59.133	1	.000	.534
Age	-.015	.003	23.624	1	.000	.985
Actual working time	-.032	.002	290.873	1	.000	.968
female	.133	.078	2.939	1	.086	1.142
ISCED 1			112.707	9	.000	
ISCED 2	.318	.328	.942	1	.332	1.375
ISCED 3a	-.104	.956	.012	1	.914	.902
ISCED 3b	.689	.354	3.776	1	.052	1.991
ISCED 3c	,340	.303	1.259	1	.262	1.405
ISCED 4a, b	,262	.323	.659	1	.417	1.300
ISCED 5a	-.314	.309	1.032	1	.310	.731
ISCED 5b	.099	.308	.104	1	.747	1.104
ISCED 6	-1.265	.352	12.895	1	.000	.282
Constant	2.439	.345	49.910	1	.000	11.463

Source: Own calculations based on the scientific use file of the Microcensus of the Federal Statistical Office Germany.

The Wald Statistic for most of the variables is quite high, indicating the relevance of predictors.

- Regarding the economic sector, the results indicate that with respect to the service sector the possibility to be solo-self-employed in the industry sector and the sector of domestic trade, accommodation, and transport is lower. That means that it is more probable that we can find solo-self-employed people in the service sector.
- With respect to age, the negative sign shows that on average, solo-self-employed people are younger than self-employed people with employees.
- The actual working time for solo-self-employed is lower than the working time for self-employed people with employees. This is also a plausible result, as the solo-self-employed more often work part-time, as the descriptive analysis has shown.
- Gender also contributes to the model, as the positive B indicates that the solo-self-employed group tends to have significantly more females than males.
- Concerning the education level, the results show that with a higher level of education it is more likely to have employees. It can be also seen that people with a special form of education e.g. ISCED 3b and c as well as 4a, b are more likely to be solo-self-employed. Especially interesting is the negative B for ISCED 6. This group consist to a larger part of Free Profession (legal representative, solicitor, physician, auditor, tax advisor and related professions), which need to have a high education level and e.g. physicians have to a larger part a doctoral degree.

6 Appendix

For the analysis the German Microcensus data from the Statistical Office Germany are used, where the EU Labour Force Survey is integrated[1]. The Microcensus is a representative survey, covering 1 % of the total population of Germany. It is a cross section household panel with detailed information about the household composition and the labour market participation of household members. The Microcensus offers information "[…] in a detailed subject related and regional breakdown on the population structure, the economic and social situation of the population, families, consensual unions and households, on employment, job search, education/training and continuing education/training, the housing situation and health."; (Körner and Puch 2011: 26).

Researchers can use a so called scientific use file, which is offered by the Statistical Office Germany for special analysis at their own office and do not have to rely e.g., on published statistics (Schimpl-Neimanns and Herwig 2011, Boehle and Schimpl-Neimanns 2010). An analysis of the scientific use files however will give slightly different results than the official statistics, as it is an adjusted subsample of 70% of the Microcensus to guarantee data anonymity. However, this will only have a minor effect on the results, as the analysis focusses on the basic structure and not on single information. Overall, 489.349 people are included in the scientific use file.

Still there are some problems concerning the collection of the data which are more serious: Most of the data is self-reported. It cannot always be assumed that the interviewee is well informed e.g. about the economic sector to which his activities as a self-employed belong, regarding his actual working time in the week, in which the interview took place, or with respect to the normal working time per week.

Additionally the definition of some variables has changed over time, e.g. for the economic sectors, which makes it difficult to analyse the development over time.

Another aspect has to be mentioned. The Microcensus is a cross section survey. So the information about the labour market participation only reflects the situation at the time of the interview. Therefore, no information about the career of the people is available and it cannot be analysed, e.g. how a working life has evolved starting as an employee, becoming solo-self-employed, and – if successful – hiring some employees. Also, the effects of children on the labour market supply of women over time, e.g. how it changes as children grow older, cannot be examined.

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[1]   For   a   more   detailed   description   of   the   data   see https://www.destatis.de/EN/Meta/abisz/Mikrozensus _e.html [accessed 27/05/2012, 11:35 am], Statistisches Bundesamt 2012, Körner and Puch 2011: 26 ff., Körner and Puch 2009.

Table A-1: Case Processing Summary

Unweighted Cases		N	Percent
Selected Cases	Included in Analysis	222,373	99.8
	Missing Cases	496	.2
	Total	222,869	100,0
Unselected Cases		0	,0
Total		222,869	100,0

Table A-2: Number of people in 1,000, Germany 2009

Economic Sectors	N	Percent
Agriculture and forestry, fishing	877	2.3
Industry	8,632	22.3
Domestic trade, accommodation, transport	9,286	24.0
Services	19,845	51.4
Gender		
Male	20,936	54.2
Female	17,704	45.8
Highest level of education (ISCED97)		
ISCED 1 - Primary level of education	857	2.2
ISCED 2 - Lower secondary level of education	4,680	12.1
ISCED 3 - Upper secondary level of education		
ISCED 3a (designed to provide direct access to ISCED 5A)	1,566	4.1
ISCED 3b (designed to provide direct access to ISCED 5B)	17,699	45.8
ISCED 3c (designed to prepare students for direct entry into the labour market	222	.6
ISCED 4a, b (Post-secondary non-tertiary)	2,956	7.7
ISCED 5 - First stage of tertiary education		
ISCED 5a (university of applied science, university)	6,240	16.1
ISCED 5b (vocational college)	3,759	9.7
ISCED 6 (Doctoral degree)	579	1.5
n.a.	83	.2

Economic Sectors	N	Percent
Agriculture and forestry, fishing	877	2.3
Industry	8,632	22.3
Domestic trade, accommodation, transport	9,286	24.0
Services	19,845	51.4
Gender		
Male	20,936	54.2
Female	17,704	45.8
Highest level of education (ISCED97)		
ISCED 1 - Primary level of education	857	2.2
ISCED 2 - Lower secondary level of education	4,680	12.1
ISCED 3 - Upper secondary level of education		
ISCED 3a (designed to provide direct access to ISCED 5A)	1,566	4.1
ISCED 3b (designed to provide direct access to ISCED 5B)	17,699	45.8
ISCED 3c (designed to prepare students for direct entry into the labour market	222	.6
ISCED 4a, b (Post-secondary non-tertiary)	2,956	7.7
ISCED 5 - First stage of tertiary education		
ISCED 5a (university of applied science, university)	6,240	16.1
ISCED 5b (vocational college)	3,759	9.7
ISCED 6 (Doctoral degree)	579	1.5
n.a.	83	.2
Total	38,640	100.0

Table A-3: Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Services	968.772	3	,000
		Agriculture and forestry, fishing	413.685	1	,000
		Industry	558.399	1	,000
		Domestic trade, accommodation, transport	168.476	1	,000
		Age	921.495	1	,000
		Actual working time	1,408.268	1	,000
		female	406.055	1	,000
		ISCED 1	1,066.859	9	,000
		ISCED 2	173.219	1	,000
		ISCED 3a	16.191	1	,000
		ISCED 3b	.384	1	,536
		ISCED 3c	265.083	1	,000
		ISCED 4a, b	.009	1	,925
		ISCED 5a	311.082	1	,000
		ISCED 5b	309.762	1	,000
		ISCED 6	201.093	1	,000
		n.a.	.003	1	,954
		3 children	1.496	3	,683
		No child	1.094	1	,296
		1 child	.124	1	,725
		2 children	.264	1	,607
	Overall Statistics		4,195.104	18	,000

Table A-4: Hosmer-Lemeshow-Test

Step	Chi-square	df	Sig.
1	48.722	8	,000

Table A-5: Contingency Table for Hosmer and Lemeshow Test

		Employee		Self-Employed		
		Observed	Expected	Observed	Expected	Total
Step 1	1	3,793	3,815.046	63	41.544	3,857
	2	3,734	3,768.437	122	86.843	3,855
	3	3,708	3,727.563	147	127.302	3,855
	4	3,674	3,680.856	180	173.091	3,854
	5	3,626	3,621.174	227	231.771	3,853
	6	3,559	3,546.425	296	308.569	3,855
	7	3,485	3,444.696	370	410.193	3,855
	8	3,339	3,295.718	516	559.346	3,855
	9	3,103	3,048.213	750	805.006	3,853
	10	2,312	2,384.415	1,551	1,478.691	3,863

Table A-6: Case Processing Summary

Unweighted Cases		N	Percent
Selected Cases	Included in Analysis	24,571	100.0
	Missing Cases	0	.0
	Total	24,571	100.0
Unselected Cases		0	,0
Total		24,571	100.0

Table A-7: Number of people in 1,000, Germany 2009

Economic Sectors	N	Percent
Agriculture and forestry, fishing	282	6.7
Industry	341	8.1
Domestic trade, accommodation, transport	1,357	32.1
Services	2,243	53.1
Gender		
Male	2,903	68.8
Female	1,319	31.2
Highest level of education (ISCED97)		
ISCED 1 - Primary level of education	53	1.3
ISCED 2 - Lower secondary level of education	248	5.9
ISCED 3 - Upper secondary level of education		
ISCED 3a (designed to provide direct access to ISCED 5A)	164	3.9
ISCED 3b (designed to provide direct access to ISCED 5B)	1,439	34.1
ISCED 3c (designed to prepare students for direct entry into the labour market	6	.1
ISCED 4a, b (Post-secondary non-tertiary)	322	7.6
ISCED 5 - First stage of tertiary education		
ISCED 5a (university of applied science, university)	1,080	25.6
ISCED 5b (vocational college)	732	17.3
ISCED 6 (Doctoral degree)	169	4.0
n.a.	9	.2
Total	4,223	100.0

Table A-8: Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Services	140.168	3	.000
		Agriculture and forestry, fishing	1.803	1	.000
		Industry	29.875	1	.000
		Domestic trade, accommodation, transport	82.675	1	.000
		Age	34.335	1	.000
		Actual working time	403.923	1	.000
		female	75.739	1	.000
		ISCED 1	161.006	9	.000
		ISCED 2	.260	1	.000
		ISCED 3a	16,23.099	1	.000
		ISCED 3b	12.816	1	.536
		ISCED 3c	7.030	1	.000
		ISCED 4a, b	76.473	1	.925
		ISCED 5a	8.200	1	.000
		ISCED 5b	53.504	1	.000
		ISCED 6	.205	1	.000
	Overall Statistics		4195,104	18	.000

Table A-9: Hosmer-Lemeshow-Test

Step	Chi-square	df	Sig.
1	4.436	8	.816

Table A-10: Contingency Table for Hosmer and Lemeshow Test

		Employee		Self-Employed		
		Observed	Expected	Observed	Expected	Total
Step 1	1	331	328.285	91	93.776	422
	2	277	280.107	145	142.134	422
	3	245	246.710	177	175.332	422
	4	220	218.968	202	203.197	422
	5	197	195.032	225	226.990	422
	6	179	173.288	243	249.110	422
	7	155	149.194	267	272.579	422
	8	114	122.617	308	299.437	422
	9	80	90,045	343	332.345	422
	10	61	54.189	362	369.474	424

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