The Choice to Become Self-employed: Acknowledging Frictions

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Abstract:

Using data from the European Community Household Panel (ECHP; Eurostat), I develop and calibrate a search model of self-employment that is quantitatively consistent with the unemployment, paid employment and self-employment rates, the transitions between those states and the observed distribution of earnings in self-employment and paid employment. I first report evidence indicating that many individuals choose self-employment as a route out of unemployment. This evidence cannot be captured by existing theoretical models of self-employment that assume a perfectly competitive environment in the labor market and ignore, by definition, market frictions such as unemployment. I construct a model of self-employment where I allow for on-the-job search in both paid employment and self-employment. Workers receive job offers from a wage distribution and business ideas from an income distribution. The model captures the fact that the self-employed earn less in median and in mean than the paid employed and that the distribution of self-employment earnings exhibits greater variation. Unemployed individuals choose self-employment with associated low incomes because their option values in self-employment are better than those in unemployment. Self-employment is a transitory state for these workers who see in self-employment a door to paid employment. The model is then used to analyze the effects of some policies that encourage self-employment.

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1 Introduction

The self-employed are usually classified formally as individuals who earn no regular wage or salary but who derive their income by exercising their profession or business on their own account and at their own risk (Parker, 2009; pp. 11). Self-employment is an important source of employment in developed countries. Around 15 per cent of the workforce in most OECD economies are self-employed (see OECD, Labour Force Statistics).

The common view of the self-employed is remarkably positive in both the public opinion and the literature. They are thought to be creative and highly qualified individuals who have abandoned the comfort of salaried positions to invent new products, production processes, and distribution methods. Thus, self-employed workers are generally regarded as successful entrepreneurs generating high revenues, creating employment opportunities and encouraging technological progress (Acs, 2008; Carree and Thurik, 2008; Mandelman and Montes-Rojas, 2009; Thurik et al., 2008). Policy reports also place special emphasis on entrepreneurship (see, for instance the new Europe 2020 strategy, the EU's growth strategy for the coming decade).

However, there are some puzzles regarding the choice to become self-employed. There is evidence that the self-employed are not well remunerated relative to the paid employed (evidence for the US is available in Carrington et al., 1996; Hamilton, 2000; and Kawaguchi, 2002). Using US data from the 1984 SIPP (Survey of Income and Program Participation), Hamilton (2000) estimated that (i) the self-employed earn less in median than the paid employed; (ii) relatively large proportions of the self-employed are concentrated in the lower and the upper tails of the overall income distribution compared with the paid employed (see also Goodman and Webb, 1994; for US evidence and Meager et al., 1994, 1996 for UK evidence); and (iii) assuming an absence of market frictions in the model (such as unemployment), on average, all individuals except those in the upper quartile of the self-employment income distribution would have earned more, and enjoyed higher future income growth rates, if they had switched into paid employment.[2] Furthermore, based on US data from the Survey of Consumer Finances (SCF) and the Flow of Funds Accounts and the National Income and Product Accounts (FFA/NIPA)

[2]Net profit which is the standard measure reported in data sets, is generally an accounting profit that may be used as the basis for the calculation of net income for tax purposes and is therefore thought to understate the true profits of business owners. To deal with the potential underreporting problem by the self-employed, Hamilton constructs alternative measures of self-employment earnings. He uses two alternative measures, the draw (i.e. amount withdrawn in the form of salary by the entrepreneur) and the equity-adjusted draw, which is the sum of the draw in period t and the change in business equity between the beginning of period t and period $t+1$.

over the period 1989 to 1998, Moskowitz and Vissing-Jorgensen (2002) suggest that self-employment is, on average, unprofitable: returns to capital are too low and risk is too high compared to investment in public equity.

Popular explanations to these puzzles are that being self-employed gives substantial non-pecuniary benefits (Hamilton, 2000; Hurst and Pugsley, 2011) or that the self-employed are overconfident, i.e., the self-employed think they will do better than they actually do (De Meza and Southey, 1996). Thus, some individuals might 'voluntarily' enter self-employment for reasons such as independence, job satisfaction and/or anticipated higher incomes. On the contrary, self-employment may constitute a far less desirable state chosen reluctantly by individuals unable to find a job in paid employment under the prevailing labor market conditions. Thus, Evans and Leighton (1989) and Carrasco (1999) examine the effect of being unemployed on the decision to become self-employed. Evans and Leighton use data from the National Longitudinal Survey of Young Men (NLSYM; 1966-1981) for the US whereas Carrasco's work is based on the Household Budget Continuous Survey (ECPF; 1985-1991) for Spain. They find that unemployment increases the likelihood of entering self-employment. Finally, based on the Working and Living Conditions Survey (ECVT; 1985) for Spain and the Displaced Worker Survey (DWS; 1984, 1986 and 1988) for the US, Alba-Ramirez (1994) find that the duration of unemployment increases the probability of becoming self-employed. Therefore, some individuals might be 'pushed' into self-employed as the only available route out of unemployment.

In this sense, we observe a growth of (mainly empirical) works devoted to the analysis of the determinants of the decision to become self-employed (see Parker's 2009 handbook for a recent review). The number of theoretical contributions on this, however, has been rather low to date (see works by Lucas, 1978; Jovanovic, 1994; and Rissman, 2003, 2007 as notable exceptions), and have certain limitations.

My goals in this paper are threefold. First, on the basis of data drawn from the European Community Household Panel (ECHP; Eurostat), I document some empirical facts on earnings from self and paid employment and transitions to self-employment from both paid employment and unemployment. Among other regularities, I report that (i) unemployed workers are more likely to enter self-employment than paid employed workers are; (ii) the self-employment sector does not pay well, on average, as compared to the paid employment sector (the self-employed earn less in mean and median relative to the paid employed; and self-employment incomes are more unequal than paid employed); (iii) the unemployed are in worse shape when they enter self-employment than when they enter paid employment (they have much longer unemployment periods; they are less likely to

receive unemployment benefits; they think their chances to find the kind of job they look for are worse; and they earn, on average, 37 percent less); and (iv) those entering self-employment from unemployment have lower earnings than those entering self-employment from paid-employment. This gives support to the view of self-employment as the only available alternative to unemployment for certain groups.

The second goal of the paper (and the most important contribution) is to develop and calibrate a model that acknowledges frictions and can jointly replicate the empirical evidence about earnings and transition chances to and from self-employment discussed above.

This model is an extension of the standard search model of unemployment originally due to McCall (1970) where I allow for self-employment and on-the-job search on both paid employment and self-employment. In the model, individuals (either paid employed, self-employed or unemployed) receive job offers from a given wage distribution. Workers also receive business ideas. Those ideas are associated with a self-employment income which is drawn from an income distribution. Both job offers and ideas arrive at a different rate for unemployed, paid employed and self-employed workers.

The calibrated model is able to reproduce well transitions between unemployment, paid employment and self-employment, and income distributions as observed in the data. It also does a good job in capturing the unemployment, paid employment and self-employment rates. The model is also useful to understand individual self-employment choices and heterogeneity. In this sense, we divide the self-employed into two groups: those with earnings lower than the median paid employed and those with earnings higher than the median paid employed. The model predicts that the transition pattern of those two groups is quite different and that low income self-employment is a less 'stable' group. In particular, the majority of the transitions from unemployment to self-employment are to lower income self-employment, which is also supported by the data. Moreover, most of the transitions from self-employment to paid employment come from the group of the lower income self-employed, which is consistent with the data as well. Unemployed workers choose self-employment despite the corresponding low income because their option values in self-employment are better than those in unemployment. Therefore, they find in self-employment a good route to find a paid employment job.

Finally, the model is used to evaluate the economic and societal benefits of public policies encouraging self-employment (i.e. start-up incentives) which is the third and last goal of the paper. The results show that those policy beneficiaries would have entered self-employment even without the start-ups incentives. As a consequence, those policies

have small effects on the transitions from unemployment to self-employment, leaving the self-employment and unemployment rates practically unchanged.

Existing attempts to develop theoretical models trying to explain self-employment choice, they typically assume a perfectly competitive environment in the labor market (i.e. Walrasian models) in which workers choose between paid employment and self-employment (Lucas, 1978; Jovanovic, 1994). In consequence, the existing models ignore market frictions such as unemployment, by definition. Further, in these models workers enter self-employment if and only if they get higher revenues in this state than in paid employment. Hence, these analyses cannot capture the fact that the self-employed earn less in mean and median than the paid employed.

To the best of my knowledge, the use of search models including the possibility of being self-employed is only available in papers by Rissman (2003 & 2007). As an advantage, her approach also allows for the state of unemployment. However, a contribution of my approach is that, unlike Rissman (2003 & 2007), I am able to explain the earnings puzzle. Also, I do not restrict worker's transition behavior. In this sense, in Rissman (2003) self-employment offers low and fixed earnings and by assumption, it is considered as an inferior state compared to paid employment. Hence the transitions from paid employment to self-employment are excluded from her framework. Concerning Rissman (2007), her work focuses on modeling the transitions among the three labor market states of unemployment, paid employment, and self-employment. In her model, and unlike mine, the paid employed are not allowed to search on the job, and the arrival rates of business ideas and job offers are the same for all workers (they do not depend on their employment state). As an advantage, my model explains the earnings puzzle. Further, my model also allows to match the transitions between unemployment, paid employment and self-employment states and the corresponding rates (whereas Rissman's model overstates the transition from paid employment into self-employment and understates the transition from self-employment into paid employment, leading to a self-employment rate which is too high and a paid employment rate which is too low relative to what is observed in the data).

The remainder of this paper is structured as follows. Section 2 focuses on documenting empirical facts on European data. Section 3 describes the model, and Section 4 calibrates it. Section 5 presents the main quantitative results and Section 6 focuses on the policy analysis. Finally, the concluding remarks of the study are put forth in Section 7.

2 Empirical facts on European data

This section describes some empirical regularities about earnings and transition chances to and from self-employment using European data, which will serve as the empirical reference to be replicated by the later development and calibration of my model. In particular, I use data from the ECHP which is a standardized multi-purpose annual longitudinal survey carried out at the level of the EU-15. It is designed and coordinated by the Statistical Office of the European Communities (EUROSTAT). The target population of the ECHP consists of people living in private households in the national territory of each country. This panel offers information on 60,500 nationally representative households, which include approximately 130,000 individuals aged 16 years and older. One of its attractive features is the high level of comparability across countries and over time. Thus, using the same questionnaire, all members of the selected households in the participating countries are interviewed about issues relating to demographics, labor market characteristics, income, and living conditions. Additional details on the ECHP data can be found in Peracchi (2002).

I restrict my sample to males between the ages of 25 and 59 who report being unemployed, paid employed or self-employed. By doing so, I exclude from my analysis the potential distorting effects of incorporating relatively less stable groups within the labour force. In particular, compared with individuals within the 25-59 age band, those younger individuals are more likely to be enrolled in education whereas elder individuals are more likely to be retired. For the paid employed and self-employed sample, I also exclude those individuals who work part-time (less than 25 hours per week) and those who work in the agricultural sector.[3]

Table 1 summarizes the descriptive statistics of individuals by employment status. On average, and compared with paid employed individuals, self-employed (i) are 2.1 years older; (ii) present lower levels of educational attainment; (iii) work about 10 hours more per week; and (iv) are more likely to work in the construction and services sectors, and less likely to work in the industrial sector.

[3] Sweden has to be excluded from my analysis because this country presents missing values for relevant variables in the analysis.

Table 1. Descriptive statistics

Status	UN (n=19,163)	PE (n=170,461)	SE (n=33,254)
Age (years)	39.7	40.1	42.2
	(10.8)	(9.3)	(9.1)
Recognised third level education (ISCED 5-7)	13.5%	24.9%	21.8%
Second stage of secondary level education (ISCED 3)	31.6%	37.1%	31.1%
Less than second stage of secondary education (ISCED 0-2)	54.9%	38.0%	47.1%
# of hours working per week	—	42.4	52.5
	—	(7.3)	(12.6)
Working in the industrial sector [a]	—	30,8%	16,4%
Working in the construction sector [b]	—	12,0%	21,5%
Working in the services sector [c]	—	57,3%	62,2%

Notes:

(i) standard deviations for continuous explanatory variables in parentheses

(ii) [a] NACE-93 codes C, D and E; [b] NACE-93 code F; [c] NACE-93 codes G to Q

The transition probabilities between the states of unemployment, paid employment and self-employment are shown in Table 2. From this table, it can be observed how unemployed workers look more likely to enter self-employment than paid employed workers. Thus, some individuals might see in self-employment a route out of unemployment, in the absence of wage work opportunities. Further, the relatively high chances of entering paid employment from self-employment may indicate that some workers consider self-employment as a stepping-stone to paid employment.

Table 2. Transition probabilities in %

	Status in t+1		
Status in t	UN	PE	SE
UN	65.3%	30.1%	4.6%
PE	2.4%	96.2%	1.4%
SE	1.3%	6.7%	92.0%

Next, table 3 compares those unemployed workers in period t that enter self-employment in period $t+1$ with those unemployed entering paid employment in period $t+1$. Thus, I observe that those entering self-employment (i) present much longer unemployment periods; (ii) are less likely to receive unemployment benefits; and (iii) think their chances to

find the kind of job they look for are worse. Concerning the attitude of those unemployed entering self-employment next period while job seeking in the 4 weeks before the survey, (i) they took active steps to find a job (either as paid employed or self-employed) with the same likelihood as those becoming paid employed in period $t+1$; and (ii) they contacted a public employment office to become paid employees with only 12% less likelihood than those future wage workers. Or in other words, at least 43% of this group considered paid employment as a job alternative, despite the fact that they ended up working on their own. Finally, although the differences are not statistically significant, they also (i) report that their income situation is more deteriorated compared to last year; and (ii) make ends meet with more difficulty than the group of the unemployed who enter paid employment. In sum, the unemployed seem to be in worse shape when they enter self-employment than when they enter paid employment. This gives support to the view of the self-employed as an alternative to unemployment for certain groups.

Table 3. Unemployed entering paid employment. vs. unemployed entering self-employment.

	UN → SE (*n=584*)	UN → PE (*n=3,803*)	t-stat. test of equality of means	z-stat of equality of proportions
Unemployment duration (months)	51.0 (3.2)	35.4 (1.1)	4.57***	
Receive unemployment benefits (0-1; 1=yes)	0.34	0.56		-9.04***
Chances of finding the kind of job they look for are bad or very bad (1-4; 1= very bad, 4=good)	2.35 (0.05)	2.48 (0.02)	-2.65***	
Active steps taken to find a job in the 4 weeks before survey (dummy; 1=yes)	0.90	0.91		-0.48
Contacted public employment office in the 4 weeks before survey (0-1; 1=yes)	0.43	0.55		-4.24***
Income situation compared to last year (1-5; 1= clearly deteriorated, 5= clearly improved)	2.42 (0.05)	2.45 (0.02)	-0.61	
Ability to make ends meet (1-6; 1= with great difficulty, 6= very easily)	2.54 (0.05)	2.60 (0.02)	-1.07	

Notes:

(i) standard deviations for continuous explanatory variables in parentheses

(ii) *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level

Table 4 reports information on annual earnings for self-employed and paid employed workers.[4] From this information it can be checked whether the stylized facts about the particular distribution of earnings among both groups described in the previous section are confirmed by this data. In particular, I am interested in comparing earnings of both self and paid employed and test whether (i) the self-employed earn less in mean and/or in median relative to the paid employees; and (ii) self-employment incomes are more unequal than paid employed. In this vein, both facts are confirmed by the descriptive statistics. In particular, concerning inequality of earnings, I find a lower 10th percentile and a higher 90th percentile for self-employed incomes. This comparison suggests that the self-employment sector does not pay well, on average, as compared to the paid employment sector.

Table 4. Annual earnings of paid and self-employed workers

Status	PE	SE
	(n = 153,097)	(n = 27,700)
Mean (st. dev.)	18,252	17,469
	(11,326)	(29,994)
Percentiles		
10%	9,394	4,093
25%	12,487	8,174
50%	16,118	13,156
75%	21,148	20,004
90%	28,767	31,717

Note: Net annual Incomes earned either as paid or self-employed during period t-1, converted to average € of 1996, being corrected by purchasing power parity (across countries) and harmonised consumer price index (across time).

Table 4 only offers a descriptive comparison without taking into account the role of some well known predictors of earnings. In order to correct this limitation, I estimate earnings equations using OLS and random and fixed effects panel data models to compare earnings for self and paid employed individuals where some demographic information as

[4] In order to create comparable incomes for both groups, two filters have been applied to the subsample of paid and self-employed individuals included in Table 1. First, we excluded all individuals that reported earnings equal to 0 (which primarily affected the group of self-employed individuals). Second, in order to strictly present yearly incomes, we restricted our sample to the group of individuals that declared being either paid or self-employed from January to December during period $t-1$.

well as business sector, country and time dummies are included in the regressions. These results are presented in Table 5 below.

Table 5. Annual log earnings of paid and self-employed workers

	OLS		RE		FE	
Independent variables (x)	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Main predictor						
SE (ref. PE) [a]	-0.2651	-24.29***	-0.3162	-57.23***	-0.3175	-38.96***
Demographic characteristics						
Age (years)	0.0644	31.93***	0.0655	38.46***	0.0866	33.89***
Age squared	-0.0006	-25.89***	-0.0007	-31.949***	-0.0007	-23.43***
Basic education [a] (ref.)						
Secondary education [a]	0.1370	27.63***	0.0799	20.28***	0.0200	4.08***
Tertiary education [a]	0.3789	56.37***	0.2220	42.85***	0.0153	2.06**
Constant	8.0380	190.52***	7.9729	215.12***	7.3858	130.11***
# of observations			180,797			
# of individuals			43,720			

Notes:

(i) Standard errors are adjusted for intra-individual correlation when estimating by OLS.

(ii) Given the dependent variable is expressed in natural logarithms, these coefficients effects can be interpreted as the percent change in earnings with respect to predicted earnings for sample means in case of continuous variables. In the context of dummy variables, it reflects the percent change in earnings for a discrete change of the dummy variable from 0 to 1

(iii) [a] Dummy variable

(iv) Business sector, country and time dummies are included in all regressions, although coefficients are not presented.

(v) *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level

The results show how self-employment earnings are, on average, about 32% lower than paid employment ones which is even higher than the difference found by means of descriptive statistics in Table 4. Further, as most empirical studies, I find a positive non-linear impact of age on earnings. The educational attainment of the individual also seems to matter. Thus, as compared with those individuals with basic education, those with secondary education obtain about 8% higher incomes whereas those with university studies obtain about 22% higher earnings.

Table 6 aims to provide further evidence on the effect on earnings of different occupational choice decisions for unemployed individuals. In particular, I estimate earnings

equations using OLS and random effects panel data models to compare earnings for self and paid employed individuals entering from unemployment during their first year as self or paid employed.[5] The panel data structure of the ECHP allows me to follow the same individuals during the observation window (1994-2001). Thus, those who reported to be self-employed in t and unemployed in $t-1$ were classified as self-employed coming from unemployment (UN $\rightarrow$ SE), whereas those who reported to be paid employed in t and unemployed in $t-1$ were classified as paid employed coming from unemployment (UN $\rightarrow$ PE).

Table 6. Annual log earnings of paid and self-employed workers entering from unemployment

	OLS		RE	
Independent variables (x)	Coeff.	t-stat.	Coeff.	t-stat.
Main predictor				
UN $\rightarrow$ SE (ref. UN $\rightarrow$ PE) [a]	-0.3560	-4.20***	-0.3691	-7.88***
Demographic characteristics				
Age (years)	0.0148	0.95	0.0128	0.76
Age squared	-0.0002	-0.95	-0.0002	-0.75
Basic education [a] (ref.)				
Secondary education [a]	0.0119	0.32	0.0164	0.41
Tertiary education [a]	0.0636	1.34	0.0647	1.43
Constant	9.1123	27.87***	9.1480	25.22***
Number of observations	1,184			
Number of individuals	1,171			

Notes:

(i) Standard errors are adjusted for intra-individual correlation when estimating by OLS.

(ii) Given the dependent variable is expressed in natural logarithms, these coefficients effects can be interpreted as the percent change in earnings with respect to predicted earnings for sample means in case of continuous variables. In the context of dummy variables, it reflects the percent change in earnings for a discrete change of the dummy variable from 0 to 1.

(iii) [a] Dummy variable

(iv) Business sector, country and time dummies are included in all regressions, although coefficients are not presented.

(v) *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level.

[5] Fixed effects panel data models cannot be applied given the relatively small data set in this exercise. The same occurs in Tables 7 and 8.

The dependent variable is the annual log income for paid employed or self-employed that come from unemployment. To ensure comparability, the same filters applied in Tables 4 and 5 have been used (see footnote 4). Our main predictor (UN $\rightarrow$ SE) has a strong negative effect meaning that those self-employed individuals coming from unemployment earn, on average, 37 percent less than those unemployed entering salaried work. It could be argued that some unemployed becoming self-employed would probably prefer a job in paid employment but the lack of salaried jobs may have 'pushed' them into self-employment.[6]

As regards our control variables, our results show marginally significant differences between those self or paid employed individuals (entering from unemployment) with tertiary education compared to those holding only primary education.

Table 7 aims to compare earnings of self-employed depending on whether they entered from unemployment or paid employment. Thus, those who reported to be self-employed in $t, t-1, \ldots, t-i+1$ and unemployed in $t-i$ for some $i \in \{1, \ldots, 6\}$ were classified as self-employed coming from unemployment (UN $\rightarrow$ SE), whereas those who reported to be self-employed in $t, t-1, \ldots, t-i+1$ and paid employee in $t-i$ for some $i \in \{1, \ldots, 6\}$ were classified as self-employed coming from paid employment (PE $\rightarrow$ SE). I am interested in individuals that remained in the same business during the period $t, \ldots, t-i+1$. Therefore, in order to be classified as UN $\rightarrow$ SE or PE $\rightarrow$ SE, I also impose that the individual reports that the year he started his job (as self-employed) was the same for every $t, \ldots, t-i+1$.[7] I also make use of both OLS and random effects panel data models where the dependent variable is the annual log income for self-employed that come from unemployment or paid employment.

[6] An alternative explanation might be the fact that some time can be needed until a business generates substantial profits and, hence, earnings can be low the first years operating a business. However, salaries are also more likely to be low during first years. In this vein, we estimated complementary regression to observe evolution of earnings for both self and paid employees during their first 4 years within the same business or salaried job position. Our results indicate that, 4 years after starting, earnings of self and paid employed increases by about 28% and 9,5%, respectively. In other words, we observe some degree of convergence in earnings for both groups but differences in favor of paid employees are still noticeable. These estimations are not presented for brevity and are available upon request.

[7] Actually, the year that the individual started working should be $t-i+1$.

Table 7. Annual log earnings of self-employed workers entering from unemployment or paid employment

	OLS		RE	
Independent variables (x)	Coeff.	t-stat.	Coeff.	t-stat.
Main predictor				
UN → SE (ref. PE → SE) [a]	-0.2052	-2.44**	-0.1866	-2.01**
Demographic characteristics				
Age (years)	-0.0077	-0.17	0.0152	0.30
Age squared	0.0001	0.19	-0.0002	-0.29
Basic education [a] (ref.)				
Secondary education [a]	-0.0412	-0.46	0.0087	0.10
Tertiary education [a]	-0.1117	-0.95	-0.0243	-0.22
Duration dependence				
Job tenure as self-employed (years)	0.1212	3.84***	0.1184	3.55***
Constant	8.0887	6.40***	7.3265	6.15***
Number of observations	988			
Number of individuals	491			

Notes:

(i) Standard errors are adjusted for intra-individual correlation when estimating by OLS.

(ii) Given our dependent variable is expressed in natural logarithms, these coefficients effects can be interpreted as the percent change in earnings with respect to predicted earnings for sample means in case of continuous variables. In the context of dummy variables, it reflects the percent change in earnings for a discrete change of the dummy variable from 0 to 1.

(iii) [a] Dummy variable.

(iv) Business sector, country and time dummies are included in all regressions, although coefficients are not presented.

(v) *** denotes significance at the 1% level; ** denotes significance at the 5% level; * denotes significance at the 10% level.

It can be observed that self-employed incomes are about 19% lower for those entering from unemployment, as compared to those who started from paid employment. This may reflect that unemployed workers that become self-employed have a lower reservation wage than the one of those entering from paid employment. In other words, unemployed individuals might be willing to start up even if expected profits are low (i.e. necessity based decision) whereas paid employees would enter self-employment if expected profits are sufficiently high (i.e. opportunity based decision). Finally, we observe as each additional year of experience as self-employed increase earnings by about 12% whereas we do not identify any significant effect of formal education.

3 The model

3.1 Model description

In this section I present the basic environment. There is a continuum of risk-neutral and infinite-lived workers. All workers are ex ante identical. The measure of workers is normalized to one. Workers discount time at rate β.

At any point in time a worker can be in one of three distinct states: unemployed, paid employed or self-employed. Unemployed individuals enjoy some flow utility b (typically including the value of leisure and unemployment insurance benefits). Job offers arrive randomly at rate $\lambda_i, i \in \{un, pe, se\}$, where un, pe and se denote unemployment, paid employment and self-employment respectively. Therefore, I allow those job offer arrivals rates to be different for unemployed, paid employed and self-employed workers. When an offer arrives, the individual has the option of accepting a wage w which is randomly drawn from the known and fixed distribution $F_{PE}(w)$. A paid employed worker loses her job with probability δ_{pe}.

To become self-employed, workers first need to have a business idea. Business ideas arrive randomly at rate $\zeta_i, i \in \{un, pe, se\}$. Thus, also business ideas arrive at a different rate to unemployed, paid employed and self-employed workers. Each idea has associated a self-employment income x which is randomly drawn from the known and fixed distribution $F_{SE}(x)$. The self-employed have their business failing for exogenous reasons at rate δ_{se}.

Let U be the value of being unemployed. U satisfies the following Bellman equation:

$$\begin{aligned} U = b + \beta\lambda_{un} E_w \left[\max\left\{V^{PE}(w), U\right\}\right] + \\ +\beta\zeta_{un} E_x \left[\max\left\{V^{SE}(x), U\right\}\right] + \beta(1 - \lambda_{un} - \zeta_{un})U \end{aligned} \tag{1}$$

Where $V^{PE}(w)$ is the value of a paid employed worker with wage w and $V^{SE}(x)$ the value of a self-employed worker with income x. Unemployed workers receive flow utility b. At rate λ_{un} they receive a job offer. They will accept the job offer if the expected value is greater than the value of unemployment. Analogously, an unemployed worker will receive a business idea at rate ζ_{un}. They will implement that idea if the expected value is greater

than the value of unemployment. If they receive neither a job offer nor a business idea, they will remain unemployed next period.

The value function of a paid employed worker with wage w is given below:

$$V^{PE}(w) = w + \beta\lambda_{pe}E_{w'}\left[\max\left\{V^{PE}(w'), V^{PE}(w)\right\}\right] +$$

$$+\beta\zeta_{pe}E_x\left[\max\left\{V^{SE}(x), V^{PE}(w)\right\}\right] + \tag{2}$$

$$+\beta\delta_{pe}U + \beta(1 - \lambda_{pe} - \zeta_{pe} - \delta_{pe})V^{PE}(w)$$

Paid employed workers receive wage w. They can receive another job offer while paid employed at rate λ_{pe} that they will accept if the expected value is greater than the value of paid employment with wage w. Paid employed workers receive business ideas at rate ζ_{pe}. They lose their job with probability δ_{pe}. If they receive neither another job offer nor a business idea nor a job destruction shock, they will remain paid employed with wage w next period.

The value function of a self-employed worker with income x is:

$$V^{SE}(x) = x + \beta\lambda_{se}E_w\left[\max\left\{V^{PE}(w), V^{SE}(x)\right\}\right]$$

$$+\beta\zeta_{se}E_{x'}\left[\max\left\{V^{SE}(x'), V^{SE}(x)\right\}\right] \tag{3}$$

$$+\beta\delta_{se}U + \beta(1 - \lambda_{se} - \zeta_{se} - \delta_{se})V^{SE}(x)$$

Self employed workers receive income x. They receive a job-offer at rate λ_{se}. They will accept this job offer if the expected value is greater than the value of self-employment with income x. Self-employed workers can receive another business idea which arrives at rate ζ_{se}. The self-employed have their business destroyed with probability δ_{se}. If they

receive neither a job offer nor another business idea nor a job destruction shock, they will remain self-employed with income x next period.

3.2 Definition of Equilibrium

A steady-state equilibrium is a set of value functions U, $V^{PE}(w)$, $V^{SE}(x)$ for every w in the support of the wage distribution and every x in the support of the self-employment income distribution that solve (1), (2) and (3). Given those policy values, unemployment, paid employment and self-employment rates can be derived as well as transition probabilities between those three states. Those policies also imply equilibrium wage and self-employment income distributions $\tilde{F}(w)$ and $\tilde{G}(x)$.

4 Calibration

Since the model cannot be solved analytically, it is simulated numerically. The data used in the estimation is based on the ECHP which was described in section 2. Since one of the objectives of this paper is to examine the effects of start-up incentives to self-employment, I first focus on the benchmark case in which there are no such policies. Some of the countries in the sample used in section 2 implemented policies during the period $1994 - 2001$ very similar to the one that I will intend to replicate later in this paper. Therefore, I drop these countries from the sample used for this calibration.[8]

I choose the wage offer distribution F and the self-employment income distribution G to be log normal, so that $log(w) \sim N(\mu_{PE}, \sigma^2_{PE})$ and $log(x) \sim N(\mu_{SE}, \sigma^2_{SE})$.[9] I set the time period to be one quarter, which is lower than the frequency of the employment data I use because typical job finding rates are higher. The data used to compute some of the targets have annual frequency, and I aggregate the model appropriately when matching those targets. The discount rate is set so that the implied yearly interest rate is 3 percent and hence $\beta = 0.9925$. The rest of the parameters are set to match some moments in the data. Several data targets are chosen and the log squared distance between them and the equivalent statistics produced in the benchmark model economy is minimized with respect to those parameters. The parameters left to be set are:

[8] I only drop the observations of the years in which the policies were in effect in those countries. Those observations correspond to Germany, Spain, Austria (starting in 1998), Ireland (starting in 1999) and Italy (starting in 2000).

[9] Log normality is a reasonable assumption about the realized distribution of wages observed in the data.

- Unemployed's flow utility: [b], 1 parameter;
- Job and business destruction rates $[\delta_{pe}, \delta_{se}]$, 2 parameters;
- Arrival rates of job offers [λ_{un}, λ_{pe}, λ_{se}], 3 parameters;
- Arrival rates of business ideas [ζ_{un}, ζ_{pe}, ζ_{se}], 3 parameters;
- Coefficients of the log normal distribution functions for paid employment wages and self-employment income [μ_{pe}, σ_{pe}, μ_{se}, σ_{se}], 4 parameters.

I choose the values for those 13 parameters to pin down the following moments generated by the model:

- The unemployment and paid employment rates (2 targets),
- The transition probabilities (6 targets):
  a. from paid employment to unemployment
  b. from self-employment to unemployment
  c. from unemployment to paid employment
  d. from unemployment to self-employment
  e. from paid employment to self-employment
  f. from self-employment to paid employment
- The mean and standard deviation of the residuals from Mincer equations for paid and self-employed (4 targets).
- The difference between the means of the residual from Mincer earnings equations for paid employment wages and self-employment income of workers coming from unemployment (1 target).

I use the residuals from the earnings distributions because workers are homogeneous in the model. I estimate the equation $\ln z_{it} = \beta_0 + controls + \varepsilon_{it}$ where z is equal to the wage if the individual declares to be paid-employed and is equal to self-employment income if the individual declares to be self-employed. I control for age, education, sector, country and waves. Then I calculate the mean and standard deviation of the residuals ε_{it} for both paid and self-employed.[10]

[10] For the last target, I calculate the mean of the residuals ε_{it} from the previous regression for paid and self-employed coming from unemployment and take the difference.

There are 13 parameters to pin down 13 targets. I choose these moments because I would like the model to capture the earnings and transitions observed in the data. The last moment is chosen so that the model captures the self-employed earning less than the paid-employed when coming from unemployment. As observed in section 2, it is a salient feature that the self-employed coming from unemployment are in worse shape than the paid-employed coming from unemployment. Intuitively, the moments for the rates and the transition probabilities contain information about the parameters for the job and ideas arrival rates and the destruction rates. The earnings residuals are closely related to the parameters of the coefficients of the income distributions.

The performance of the model in matching calibration targets is described in Table 8.

Table 8. Matching the moments

Moment	Value	
	Data	Model
av log inc PE	0.056	0.039
sd log inc PE	0.388	0.459
av log inc SE	-0.308	-0.295
sd log inc SE	1.064	1.044
av. log. inc UN→PE – av. log. inc. UN→SE	0.638	0.653
Unemployment rate	0.072	0.062
Paid employment rate	0.774	0.759
Transition prob. UN-PE	0.282	0.249
Transition prob. UN-SE	0.047	0.046
Transition prob. PE-SE	0.015	0.015
Transition prob. SE-PE	0.064	0.065
Transition prob. PE-UN	0.019	0.021
Transition prob. SE-UN	0.012	0.012

The economic environment presented and estimated above generates an economy which closely follows certain labor features of the European economies. However, the unemployment rate and the transition probability from unemployment to paid employment are slightly too low. Although there is the same number of moments and parameters, the match of moments is not perfect due to tensions between different moments. Calibrated parameter values can be found in Table 9. The values for the calibrated parameters impliy that the self-employed receive both job offers and business ideas with a much higher

frequency than the unemployed and the paid employed. In addition, the failure rate is lower for the self-employed as compared with the paid-employed. As a consequence, the option values of the self-employed are high compared to the ones of the paid-employed.

Table 9. Calibrated Parameter Values

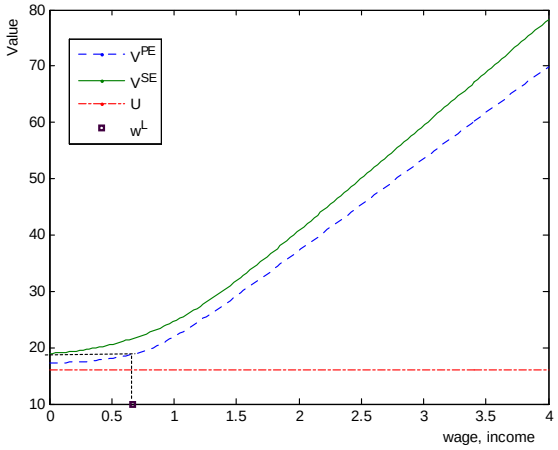
Parameter	Value	Parameter	Value
b	0.015		
δ_{pe}	0.006	δ_{se}	0.004
λ_{un}	0.073	ζ_{un}	0.012
λ_{pe}	0.216	ζ_{pe}	0.020
λ_{se}	0.911	ζ_{se}	0.061
μ_{pe}	-1.233	μ_{se}	-1.786
σ_{pe}	0.597	σ_{se}	0.913

The value U, and the value functions $V^{PE}(w)$ and $V^{SE}(x)$ are plotted in figure 1 as a function of w and x. The value functions for the paid and the self employed are increasing in w and x respectively. The value of being both paid and self-employed is always higher than the value of being unemployed. That is, $V^{PE}(w) > U$ and $V^{SE}(x) > U$ for every possible w and x in the support. It can be observed how for the same level of earnings, the value of being self-employed is higher than the value of being paid-employed. That is, $V^{SE}(z) > V^{PE}(z)$ for all z. It can also be observed from figure 1 that there exists some wage w^L -which will become important later when defining the reservation values- such that the paid employed with wages $w < w^L$, will implement any idea they receive.[11] Therefore, both the unemployed and the paid employed with low wages will implement any business idea they receive. The self-employed with low incomes wait until they draw a high wage in paid employment or a better self-employment idea. They do not accept low wages in paid-employment because next period, if they remain self-employed, they will receive another job offer with a high probability. Therefore, the earnings of the self-employed are lower than the earnings of the paid employed. The values of the coefficients of the log normal distributions imply a larger variance on the self-employment income distribution $G(x)$ than in the paid employment wage distribution $F(w)$. The self-employed in the upper tail of the equilibrium income distribution have been lucky enough to get a good business idea. The self-employed with high incomes often come from another business

[11] If $w < w^L$, then $V^{SE}(x) > V^{PE}(w)$ for all x.

because the arrival rate of ideas for the self-employed is higher than the one for the paid employed. On the other hand, as previously discussed, those in the lower tail of the realized self-employment income distribution accepted those ideas because of the better option values of self-employment. All this can explain the larger variance on the self-employment income distribution compared with the paid-employment wage distribution.

Figure 1. Value functions



The parameter value of the job arrival rate when self-employed λ_{se} is particularly high. This is in part due to the high transition rate from self-employment to paid-employment in the data. Also, this is necessary to make self-employment more valuable than paid-employment and thus, to explain the mean earnings in paid and self-employment.

Table 10. Effects of a decrease in the arrival rate of job offers when self-employed λ_{se}

λ_{se}	0.91	0.55
av log inc PE	0.039	-0.016
sd log inc PE	0.459	0.456
av log inc SE	-0.295	-0.182
sd log inc SE	1.044	0.949
av. log. inc UN→PE – av. log. inc. UN→SE	0.653	0.645
Unemployment rate	0.062	0.061
Paid employment rate	0.759	0.760
Transition prob. UN→PE	0.249	0.250
Transition prob. UN→SE	0.046	0.046
Transition prob. PE→SE	0.015	0.012
Transition prob. SE→PE	0.065	0.055
Transition prob. PE→UN	0.021	0.021
Transition prob. SE→UN	0.012	0.013

Table 10 compares the effects of decreasing λ_{se} from 0.91 to 0.55.[12] When λ_{se} decreases, the transition rates from self-employment to paid-employment and from paid employment to self-employment decrease. Also, the average earnings of the paid and self-employed decrease as well as the standard deviation of self-employment incomes. Those effects are mainly a consequence of a decrease in the difference between V^{SE} and V^{PE} for low w and x.[13] To better understand those changes, I will define $x^R_{pe}(w)$ as the reservation income that makes the worker is indifferent between being paid employed at wage w and self-employed with income $x^R_{pe}(w)$, i.e., $x^R_{pe}(w)$ solves

$$V^{SE}(x^R_{pe}(w)) = V^{PE}(w) \tag{4}$$

From figure 1, it is clear that $x^R_{pe}(w)$ is well defined for $w > w^L$.[14] Also, let $w^R_{se}(x)$, be the reservation wage for which the worker is indifferent between being self-employed with productivity x and paid employed with wage $w^R_{se}(x)$, i.e., $w^R_{se}(x)$ solves

$$V^{SE}(x) = V^{PE}(w^R_{se}(x)) \tag{5}$$

Obviously, $x^R_{pe}(w)$ and $w^R_{se}(x)$ are simetric with respect to the 45^0 line. Figure 2 compares the effect of decreasing λ_{se} on reservation paid employment wages for self-employed as a function of their income $w^R_{se}(x)$ and reservation self-employment income for paid employed as a function of their wages $x^R_{pe}(w)$.[15] For low values of w and x, as λ_{se} decreases, $w^R_{se}(x)$ decreases while $x^R_{pe}(w)$ increases. Since $w^R_{se}(x)$ decreases, the low-income self-employed accept more low-wage paid employment. At the same time, the increase in $x^R_{pe}(w)$ makes the paid employed with lower earnings less likely to implement low-income self-employment ideas.[16] Consequently, the mean wage of the paid employed would decrease whereas the mean income of the self-employed would increase. For higher values of w and x there is essentially no change. As it has been shown, a high value of λ_{se} is necessary to capture the earnings distributions as observed in the data.

[12] For $\lambda_{se} > 0.16$, still $V^{PE} > U$ and $V^{SE} > U$. The value of $\lambda_{se} = 0.55$ was chosen as an illustration. Instead, any $\lambda_{se} \in [0.16, 0.91]$ could have been chosen and the effects would have been qualitatively the same.

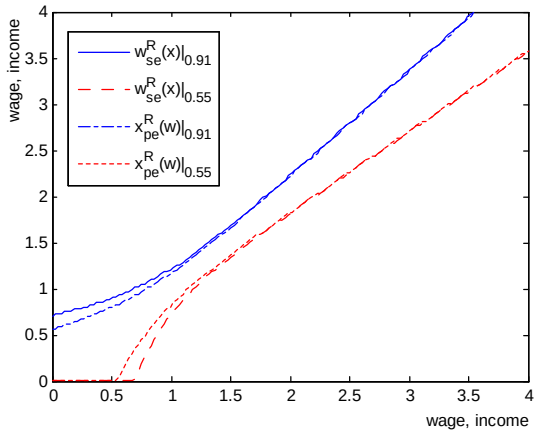
[13] All else equal, the decrease in λ_{se} imply worse option values for the self-employed and, consequently, V^{SE} decreases. Therefore, $V^{SE}(z) - V^{PE}(z)$ becomes smaller.

[14] As previously explained, when $w < w^L$, $V^{SE}(x) > V^{PE}(w)$ for all x.

[15] Again, for any $\lambda_{se} \in [0.16, 0.91]$, the effects would be quantitatively the same.

[16] Also notice that w^L decreases for a lower value of λ_{se}. Thus, the number of paid employed that implement any idea they receive also decreases.

Figure 2. Effects of decreasing λ_{se} from 0.91 to 0.55 on $w^R_{se}(x)$ and $x^R_{pe}(w)$



5 Results

In order to better understand the mechanism of the model, I will study separately the pattern of the self-employed with low incomes from those with high incomes. I will show that the transition patterns are different for both groups. This is closely related with the literature on "Necessity" and "Opportunity" self-employment. Since 2001, the Global Entrepreneurship Monitor (GEM) has discussed two rather different types of self-employed (see Reynolds et al., 2002). The differentiation focuses on the motivation of the entrepreneur to start his or her venture. On the one hand, those who have chosen to be self-employed to take advantage of a market opportunity are defined as opportunity self-employed. On the other hand, those who have chosen to be self-employed by lack of salaried jobs are defined as necessity self-employed.[17]

I divide the self-employed into two groups: necessity self-employed and opportunity self-employed. I will use the following approach to identify those two groups. I define someone as necessity self-employed if he accepted the typical job in paid employment. By typical, I take the median paid employed. Let w^{med} be the wage of the median paid employed worker. Then, the threshold x^{NE} is obtained from the model satisfying the equation[18]:

[17] Opportunity and necessity entrepreneurs are defined by individual's answers to a survey question. Each respondent was asked to indicate whether he was starting and growing his business to take advantage of a unique market opportunity (opportunity entrepreneurship) or because it was the best option available (necessity entrepreneurship).

[18] x^{NE} is well defined since $w^{med} > w^L$

$$V^{SE}(x^{NE}) = V^{PE}(w^{med}) \tag{6}$$

I define the self-employed with incomes below x^{NE} as necessity self-employed and the self-employed with incomes above x^{NE} as opportunity self-employed. Table 11 describes the transitions from unemployment and paid employment to necessity and opportunity self-employment generated by the model. Table 12 contains the transitions from necessity and opportunity self-employment to any other state. As mentioned earlier, the model predicts that the transition pattern of those two groups is quite different. In particular, necessity self-employment is a less 'stable' group. Most of the transitions from unemployment to self-employment are to necessity self-employment. Moreover, the majority of the self-employed who enter paid employment are the necessity self-employed. Therefore, they find in self-employment a good route to find a paid employment job. By contrast, the transitions out of opportunity self-employment are scarce. Thus, the mechanism of the model is the following. Unemployed or paid employed with low wages choose self-employment despite having low self-employment incomes because their option values in self-employment are better than those in unemployment and in paid employment. They stay in self-employment until they find a better paid employment job. For them, self-employment is a transitory state.

Table 11. Annual Transition Probabilities
to Necessity and Opportunity Self-employment

	Status in *t+1*			
	Model		Data	
Status in t	SE^{NE}	SE^{OP}	SE^{NE}	SE^{OP}
UN	0.044	0.002	0.039	0.008
PE	0.012	0.002	0.010	0.004

Table 12. Annual Transition Probabilities from Necessity and Opportunity Self-employment to Other States

Model				
	Status in *t+1*			
Status in t	UN	PE	SE^{NE}	SE^{OP}
SE^{NE}	0.013	0.126	0.853	0.081
SE^{OP}	0.012	0.013	0.000	0.975
Data				
Status in t	UN	PE	SE^{NE}	SE^{OP}
SE^{NE}	0.012	0.107	0.666	0.215
SE^{OP}	0.000	0.019	0.255	0.726

Tables 11 and 12 also describe the transitions between the four states of unemployment, paid employment, necessity self-employment and opportunity self-employment observed from the data.[19] Since I calibrated to the Mincer residuals, I apply to the data the threshold x^{NE} obtained in the model. In the data, I define someone who is self-employed as necessity self-employed if the Mincer residual is less than $log(x^{NE})$. In the contrary case, I define this self-employed as opportunity self-employed. By doing so, I can compare the results generated by the model with the observations from the data. The transition pattern generated by the model is confirmed by the data. Note that those transitions are not a target in the calibration. The transitions that the model is not able to capture are those from necessity self-employment to opportunity self-employment and from opportunity self-employment to necessity self-employment. This can be expected for two reasons. First, in the model the self-employed cannot go voluntarily from a higher to a lower income in self-employment without a period of unemployment. Since the time period is set quarterly, the few transitions from opportunity self-employment to necessity self-employment correspond to opportunity self-employed that had their business destroyed and entered necessity self-employment after some spell of unemployment. Second, self-employment incomes presumably have high variation from one year to the other making self-employment earnings uncertain. This uncertainty is not present in the model since the self-employed will get at least the same income in period $t+1$ as in period t if

[19] The sample used to construct tables 12 and 13 is slightly different from the sample used in the calibration. It is necessary to take into account the self-employment income variable to differentiate between necessity and opportunity self-employed. Individuals declare their income corresponding to the year prior to the survey. In order to strictly present yearly incomes, it is necessary to obseve the incomes in $t+1$ and $t+2$ of the self-employed individuals in t and $t+1$ respectively. Therefore, individuals are followed for 3 consecutive periods whereas they were only observed for 2 consecutive periods in the calibration.

their business is not exogenously destroyed, i.e., if they do not become unemployed. The failure of the model to capture these transitions suggests that idiosyncratic uncertainty in self-employment incomes may then be important to understand these transitions.

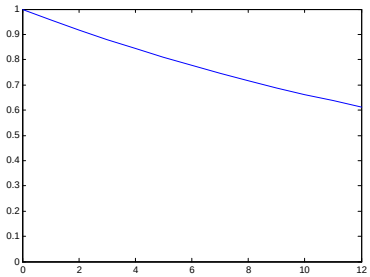
Figure 3 characterizes the transition pattern of the necessity self-employed. I start at $t = 0$ with the entire pool of the necessity self-employed, that are distributed according to $\tilde{G}(x)$ with x below x^{NE}. Panel (a) shows the percentage of the necessity self-employed at $t = 0$ that have not transitioned to another state, as a function of time.[20] At $t = 0$ this percentage equals one. As it can be observed, necessity self-employment is a transitory state. After one year ($t = 4$), 14.5 percent of the necessity self-employed moved to another state. Panels (b), (c) and (d) show the percentage of the necessity self-employed at $t = 0$ who have made at least one transition to unemployment, paid employment or opportunity self-employment respectively as a function of time (I am not considering any event that happens after this first transition). At $t = 0$ this percentage equals zero. The results indicate that most of the transitions out of necessity self-employment occur to paid employment.[21]

[20] Time period is equal to one quarter

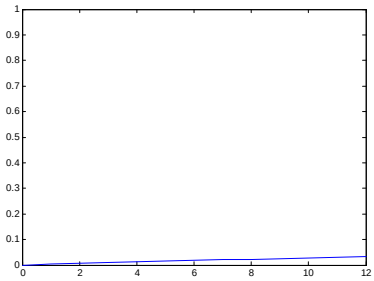
[21] At every t, the four transition percentages sum up to one.

Figure 3. Evolution of the Necessity Self-employed.

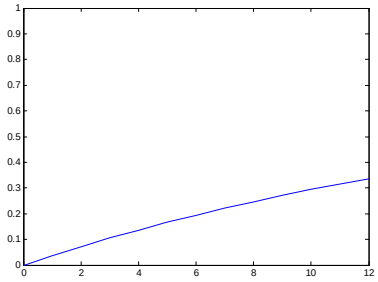
(a). Necessity Self-employed who have not Transitioned to other States



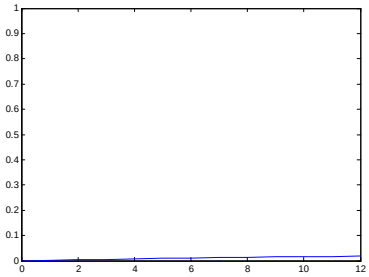
(b). Transitions from Necessity Self-employment to Unemployment



(c). Transitions from Necessity Self-employment to Paid Employment



(d). Transitions from Necessity to Opportunity Self-employment



6 Policy Analysis

In this section, I evaluate the effect of some policies encouraging self-employment. In particular, I will intend to replicate the "Bridging Allowance" policy which is a real policy that has been implemented in Germany since 1985. Unemployed individuals who want to start their own business, are supported by the 'Bridging Allowance' (BA, Überbrückungsgeld) programme (see Pfeiffer and Reize, 2000; Caliendo, 2008). Its main goal is to cover basic costs of living and social security contributions during the initial stage of self-employment. BA supports the first 6 months of self-employment by providing the same amount as a recipient of a BA would have received if he or she had remained unemployed. (plus a lump sum to cover social security contributions).

Following the BA, some start-up incentives are given to the unemployed workers who enter self-employment. Those start-up incentives consist on certain amount of money k that the self-employed coming from unemployment receive during their first period as self-

employed. As in the BA policy, we will set k equal to 6 months of unemployment benefits. Since the unemployment benefits are not explicitly defined in the model[22], I will consider them equal to 50% of the mean income of a worker. In the benchmark case, the unemployment benefits caused certain Government spendings To keep the Government spending constraint, the unemployment benefits will be changed accordingly (i.e. depending on how the unemployment rate varies after implementing the policy, the unemployment benefits will decrease or increase).

Table 13 compares some moments generated by the model with and without start-up incentives. It can be observed that the results with and without start-up incentives are very similar. The transitions from unemployment to self-employment and the unemployment and self-employment rates are practically unchanged. The reason is that for a given level of earnings, the value of being self-employed is very high and consequently, the unemployed would implement any business idea they would receive. Therefore, these policy beneficiaries would have entered self-employment even without the start-ups incentives. In our model economy, the start-up incentive policy has redistribution effects. Compared with the benchmark case, the amount of unemployment benefits that the unemployed receive decrease. The reduction on unemployment benefits compensates the spending on start-up incentives paid to the unemployed who enter self-employment. However, this redistribution has small effects in the unemployment and self-employment rates.[23]

The model presented here sheds doubt on the view that encouraging self-employment will be beneficial for growth. In this sense, more self-employment does not necessarily mean more "entrepreneurship". Instead, it may put workers in a fair less desirable situation where they are not very productive. More research is needed to determine the effects of these policies in the data.

[22] b which was defined as the flow income of unemployment, can be thought as $b = b_1 + b_2$, where b_1 is the monetary unemployment benefit (paid by the government) and b_2 is the leisure value (if positive) or stigma and boredom (if negative).

[23] I plan to study what happenen in the data when such subsidies were given

Table 13. Moments generated by the model with and without start-up incentives.

Moment	without start-up incentives	with start-up incentives
av log inc PE	0.039	0.038
sd log inc PE	0.459	0.460
av log inc SE	-0.295	-0.295
sd log inc SE	1.044	1.043
av. log. inc UN→PE – av. log. inc. UN→SE	0.653	0.654
Unemployment rate	0.062	0.061
Paid employment rate	0.759	0.759
Self-mployment rate	0.179	0.179
Transition prob. UN→PE	0.249	0.249
Transition prob. UN→SE	0.046	0.046
Transition prob. PE→SE	0.015	0.015
Transition prob. SE→PE	0.065	0.065
Transition prob. PE→UN	0.021	0.021
Transition prob. SE→UN	0.012	0.012

7 Conclusion

The main contribution of this paper is to build a model of self-employment with frictions that quantitatively explains the unemployment, paid employment and self-employment rates, the transitions between those states and the observed distribution of earnings in self-employment and paid employment.

Toward this end, I first show evidence indicating that many individuals choose self-employment as a route out of unemployment. Among other regularities, I document that (i) unemployed workers are more likely to enter self-employment than paid employed workers are; (ii) self-employment sector does not pay well, on average, as compared to paid employment; and (iii) unemployed are in worse shape when they enter self-employment than when they enter paid employment which gives support to the view of self-employed as the only available alternative to unemployment for certain groups. These facts motivate extending the existing theoretical works.

The model, once calibrated by means of data from the European Community Household Panel (ECHP; Eurostat), captures the fact that the self-employed earn less and have larger earning variance than the paid employed. It also predicts that self-employment is a temporary option for many workers. Thus, most of the self-employment with low incomes came from unemployment. These individuals, despite having low earnings, enter

self-employment because their option values in self-employment are better than those in unemployment. For those workers, self-employment is seen as a door to paid employment. The model is then used to determine the effects of some policies that encourage self-employment.

The paper highlights the importance of considering unemployment when studying the decision to enter self-employment. The analysis can be extended in several directions. In the benchmark model self-employment income is not subject to uncertainty. Therefore, the income of self-employed individuals that do not change of job or business, will not change from one period to the other. It would be interesting to study the effect on individuals choices of allowing for variation in the self-employment income. Another interesting extension would be to study the transitions between unemployment, paid employment and self-employment over the life cycle.

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