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ABSTRACT

Hybrid (Solo)Self-Employment and Upskilling: Is Online Platform Work a Path Towards Entrepreneurship?

The increasing use of online labour platforms as intermediaries for finding work – known as crowdwork or gig work – is a new form of 'hybrid' (solo)self-employment that hinges on the borders of dependent and self-employment. In this study we use a novel international dataset of online platform workers, the Cedefop Crowdlearn dataset, to analyse if engagement in hybrid digital self-employment could augment individuals' skills and hence potentially act as a stepping stone towards fuller entrepreneurship. We also examine if a digital proto-entrepreneurial experience is sustainable over time by analysing crowdworkers' satisfaction from their work. The paper's findings provide some support to the hypothesis that hybrid work experiences, especially when platform work is carried out alongside another dependent job, can facilitate additional and varied skill development done via one's secondary platform activity and potentially spur fuller entrepreneurial commitment. However, such skill formation dividends are deficient for part-time hybrids who are mostly driven towards solo self-employment out of necessity, making their journey from proto- to full entrepreneurship less feasible. Our paper provides additional evidence to the marked diversity and hybridity of different forms of (solo)self-employment in modern labour markets.

JEL Classification: J22, J24, J62, J28, L26, J49

Keywords: hybrid self-employment, platform/gig economy, crowdworkers, skills, learning, entrepreneurship, digitalisation

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1. Introduction[1]

The coronavirus crisis has acted as an accelerator of the digital transition for both individual workers and businesses (van Loo et al, 2021). In addition to inducing the adoption of new flexible ways of remote (digital) working and learning, heightened labour market uncertainty has facilitated the use of alternative, nonstandard, forms of employment. One such new form of 'hybrid' work that hinges on the borders of traditional classifications of paid employment and self-employment is 'crowdwork' - the increasing use of online labour platforms as intermediaries for finding work. Some highlight that crowdwork is a new form of work that can potentially overcome labour market barriers, augment earnings, allow individuals to strike a more desirable work-life balance and develop new skills that could foster alternative career pathways (Eurofound, 2018; Cedefop, 2020). Others see crowdwork more as an extreme form of digital solo-entrepreneurship that masks precarious or 'dependent' employment (Williams and Horodnic, 2018).

With increasing uncertainty in 'traditional' wage and salary employment in recent years, standard employment choice theory posits that the expected value of the self-employment / entrepreneurship option is likely to grow. Early literature acknowledged the key role of discounted future earning streams and their variance as key determinants of the type of employment and occupational choice (Poschke, 2013). Several other pull and push factors have also been noted, including personality traits, goal orientation, personal and socioeconomic background, networks and role-models, work autonomy and self-determination but also constraints in the external labour market environment (Hughes 2003).

But increasing variability and interruptions in earnings for salaried workers implies that the risk-return trade-off underpinning the entrepreneurship choice, conditional for differential individual abilities and risk preferences, is likely to have been distorted (Lucas, 1978). On the other hand, conventional paid employment has seen increasing flexibility associated with digital working modes, which in many ways mimic the advantages of self-employment. Coupled with a greater need for risk hedging in a tumultuous economy, this is likely to increase individuals' preference towards a hybrid entrepreneurial situation, in contrast to directly selecting a full self-employment option (Folta et al., 2010). Indeed, European Labour Force survey data corroborates that in the previous decade there was an increase in the share of mainly part-time self-employed persons without employees (Eurofound, 2017).

With growing hybridisation of work and the increasing prevalence of solo self-employment (Bögenhold and Klinglmair, 2017), including as gig or platform work (Bögenhold et al., 2017), much attention is paid on ensuring that self-employed workers are less subject to higher levels of work precarity and labour market vulnerability (Conen and Schippers, 2019). Decoupling conditions that determine whether a full or hybrid self-employment choice is made out of opportunity and not necessity has been increasingly considered in recent literature (Conen et al., 2016; Eurofound, 2017). But the possibility for workers to develop their skillsets as a means of strengthening their agency over their hybrid self-employed working lives is an area that has not received adequate attention. This is most likely due to the absence of adequate datasets linking solo self-employment experiences, notably in the platform economy, with skill development outcomes.

[1] We are grateful for the stimulus and helpful comments of Professor Wieteke Conen (University of Amsterdam). The views expressed in this publication are those of the authors and do not necessarily reflect those of the European Centre for the Development of Vocational Training (Cedefop).

A burgeoning literature has nonetheless highlighted the critical role of skills accumulation via hybrid work for spurring the entrepreneurial decision. Such skill development potentially facilitating the transition of individuals to alternative employments, including self-employment, takes place in the form of individuals holding "bundles" or "portfolios" of different (part-time or small) jobs, including entrepreneurial ventures (Paxson and Sicherman, 1996; Fraser and Gold, 2011; Panos et al.; 2015; Pouliakas, 2017). Of growing prominence as a form of multiple jobholding is hybrid entrepreneurship, whereby individuals engage in self-employed activities alongside and outside one's primary wage employment (Folta et al., 2010; Bögenhold and Klinglmair, 2017; Marshall et al., 2019; Bögenhold, 2019). Different forms of multiple jobholding in the digital platform economy, resulting in complementarities in income sources from paid work and distinct platform activities, have also become more evident (Ilsoe et al., 2021).

In this study we use a novel international dataset of online platform workers, the so-called Cedefop Crowdlearn dataset, to analyse if engagement in hybrid digital self-employment, namely one's involvement in online self-employed activities together with another labour market status – a form of "digital proto-entrepreneurship" – could augment relevant skills and hence potentially act as a stepping stone towards full self-employment. To test this hypothesis, we first examine the determinants underlying people's decision to embark on hybrid platform work, with emphasis on motivations and the nature of the hybridity (i.e. platform work combined with a full-time, regular job or other part-time activities). We subsequently investigate whether hybrid platform workers (hereafter "hybrids") benefit from any new skill accumulation, including "entrepreneurial" skills, relative to comparable fully self-employed online platform workers. We relate the extent to which hybrids decide to participate in further skill formation activities to Crowdlearn-specific scales aimed at capturing individuals' underlying attitudes towards entrepreneurship and self-working. To detect whether a digital proto-entrepreneurial experience is sustainable over time and may provide further impetus to becoming a fully self-employed (platform) worker, we also examine the relationship between hybrid work and the satisfaction received by platform work.

The paper's findings, although correlational and not causal, provide some support to the hypothesis that hybrid work experiences, especially those where platform work is carried out alongside another dependent job, can spur commitment to fuller self-employment facilitated by additional and varied skill development done via one's additional self-employed activity. Such continuing skill accumulation is mediated however by individuals' aptitude towards entrepreneurship and own-working, highlighting the significance of stimulating entrepreneurial drive via earlier school education. Our analysis confirms that digital proto-entrepreneurship fosters the development of technical, digital and entrepreneurial-related skills among individuals who are 'testing waters' by engaging in online platform work. However, such skill formation is deficient for part-time hybrids who are mostly driven towards solo self-employment out of necessity and may lack the necessary resources for developing their human capital. Since online platform work yields greater satisfaction to hybrids, our evidence also indicates that a voluntary proto-entrepreneurial experience could facilitate fuller engagement in self-employment in the future.

The structure of this paper is as follows. Section 2 reviews available literature on the rising occurrence of solo self-employment, with focus on online platform or gig work, and on the potential of multiple jobholding and hybrid work for skills development. Section 3 describes the Crowdlearn dataset used in this study. Section 4 outlines the empirical methodology and section 5 discusses the main findings of the empirical analysis. Section 6 concludes with reflections on the implications of our key findings for policy.

2. Literature review

Labour markets across many developed economies have been characterised by a long-term trend towards increasing work fragmentation and growth in non-standard work activities (Katz and Krueger, 2019). While the weakening of labour market and social bargaining institutions is often considered a culprit, the recent advent of new digital technologies, and associated sociotechnical changes in the nature of labour production they entail, has stimulated growth in new online forms of labour provision. As revealed by the 2nd ETUI Internet and Platform Work Survey, about 17% of Europeans provide internet work and 4.3% work through a digital labour platform in a given year (Piasna et al., 2022). Such trends are likely to have been accentuated by the Covid-19 pandemic. Data from the Cedefop 2nd European skills and jobs survey (ESJS), for instance, indicates that about 4 in 10 European adults increased the extent to which they use digital technologies for their work relative to before the pandemic[2].

A key manifestation of digitalisation is the emergence and growth of commercial ecosystems comprising of digital start-ups that populate the so-called platform economy. Such intermediaries - digital labour platforms - have made the possibility of offering labour services in a freelancing or self-employed capacity, known as platform-based work, gig work or crowdwork, a tangible prospect for many individuals (Huws et al., 2016; Kässi and Lehdonvirta, 2018). Due to its temporal and spatial flexibility, it is often argued that platform work may improve the labour market conditions of typically vulnerable or socially excluded individuals, by allowing for the combination of online paid work with other activities - e.g. studies, homecaring, other employment (Eurofound, 2015; Sundararajan, 2016). It could prolong working life (Barnes at al., 2015) or open up career pathways and alternative job opportunities by mitigating high information and transaction costs associated with local or bounded labour markets (Horton et al., 2015).

Although the extent to which platform work constitutes a main source of income is still limited, not exceeding 2% of the pre-pandemic European workforce (e.g. Pesole et al., 2018), for some it is an embodiment of the type of virtual Tayloristic workplace transformation one may expect to see in future labour markets. These are, or will be, characterised by remote work provision, work hybridisation, task fragmentation and increasingly solitary work organisation (Huws, 2016; Valenduc and Vendramin, 2016; Wood et al., 2019).

Platform work is also an emerging driver of the phenomenon of solo self-employment, and in particular hybrid entrepreneurship which has received much attention in recent literature (Folta et al., 2010; Bögenhold, 2019). Holding multiple occupational activities where one of them is self-employment is seen by some in a positive light, in the sense that it may act as a conduit of innovation and skills transfer between one's entrepreneurial and regular labour market activity (Marshall et al., 2019). Hybrid entrepreneurship may also foster a more reasoned staged entry into full self-employment, allowing individuals to adopt a low-risk way of testing business ideas, gaining entrepreneurial experience and developing business management skills (Kritskaya et al., 2017). Sceptics emphasise however that hybrid arrangements are more likely to reflect underlying uncertainties in either strand of one's employment; for instance, moonlighting through a wage job because of income instability in self-employment or, vice versa, taking up additional (solo) self-employed tasks to complement one's precarious circumstances in a main job. Such black and white depictions have been disputed though by evidence from actual experiences of hybrid self-employed

[2] https://www.cedefop.europa.eu/en/projects/european-skills-and-jobs-survey-esjs

workers. Hybrids tend to highlight that they strive to exercise agency over their working lives, while facing high levels of insecurity (Murgia and Pulignano, 2019).

The emergence of platform-based work as a new form of hybrid entrepreneurship is likely to have marked implications for the upskilling and reskilling of adult workers. Individuals who engage in the platform economy are often called upon to take full responsibility for their education, skills, professional profile, competing in what is now an open and global job market, and in essence becoming self-investing units of human capital. Most online labour platforms also typically do not provide any form of support or infrastructure for training or development of crowdworkers, so learning and skill development appear to be largely the responsibility of workers themselves (Cedefop, 2020). Furthermore, the extent of task fragmentation and, sometimes, routinisation involved in crowdwork (especially microwork) is also a factor constraining the extent to which workers may develop a holistic portfolio of skills from carrying out such work. Relatedly, skills matching appears to rely more on proprietary sociotechnical mechanisms of platforms, focused on the provision of own skill tests and micro-certification, and less so on publicly accepted and quality-assured education qualifications (Kässi and Lehdonvirta, 2019).

In the face of such idiosyncrasies, several studies have now confirmed that crowdwork can serve as a channel through which individuals may develop and expand their (already well-developed) skills (Barnes et al., 2015; Cedefop, 2020, 2021) and that they tend to use individually and socially-oriented self-regulatory learning strategies to support their work on the platforms. Additionally, they are statistically likely to be as self-efficacious, self-reflective and motivated by learning opportunities within their work tasks as are conventional knowledge workers (Margaryan, 2019a,b).

Little discussed in literature is the relationship between hybrid (solo) self-employment in the gig economy, manifested as combined crowdwork with other employment, with individuals' skill development in what is essentially a secondary labour market activity[3]. Several studies have focused on the job portfolio motive of engaging in multiple jobholding, whereby it is argued that moonlighting is used by some as a conduit towards new jobs and entrepreneurial pursuits (Paxson and Sicherman, 1996; Fraser and Gold, 2011; Panos et al.; 2015; Pouliakas, 2017; Folta et al., 2010)[4]. Individual decisions to embark on labour market mobility and occupational change are modelled as a function of the skills transferability between one's primary and alternative activities, the degree of skills development and learning taking place in one's secondary work and the extent to which the latter alleviates asymmetric information regarding the match between one's abilities and new job / career / business venture requirements (Jovanovic, 1979; Shaw, 1987).

Overall, while there are significant difficulties inhibiting a hybrid entrepreneur's ability to move to new, exclusive, business ventures (Marshall et al., 2019), the extent of skills transfer and new skill development between alternative entrepreneurial and employee role engagements is likely to be a crucial determinant of one's staged transition to full-time self-employment.

[3] Most academic research focused on multiple job-holding is constrained by the fact that there is a dearth of evidence on the skill formation patterns of secondary jobs, as most major skills datasets (e.g. OECD PIAAC, Cedefop's ESJS, national Labour Force surveys) collect detailed information only about one's main job (Pouliakas, 2017).

[4] Cedefop's 2nd ESJS data, for instance, reveals that some of the main reasons people do other jobs or paid work, in addition to one's main job, are to learn new skills (18%), be one's own boss (10%) or make it their main job in the future (5%).

3. Data and descriptive statistics

The study uses a novel international dataset of digital platform workers, Cedefop's Crowdlearn dataset[5]. The Crowdlearn dataset contains information on a sample of about 2,005 individuals from six EU countries (Finland, France, Germany, Italy, Romania, Spain) and the UK[6] who offer their labour services in a freelancing/self-employed capacity, using popular online labour market platforms (Upwork, Fiver, PeoplePerHour, Amazon Mechanical Turk) as intermediary agents. The full Crowdlearn dataset used in this paper merges two waves of the survey, the first of which – hereby referred to as CrowdlearnOF - was carried out in 2019 and collected a sample of 1,001 platform workers engaging mostly in online freelance work (Cedefop, 2020). The second wave – CrowdlearnMW – was collected in 2020 and augmented the sample with information from 1,004 microworkers (Cedefop, 2021). Further details regarding the sampling methodology approach is available in the Annex.

The final combined Crowdlearn sample contains 2,005 crowdworkers working from the United Kingdom (31%), Italy (21%), Germany (16.5%), Spain (18%), Romania (6%), Finland (4%) and France (4%). Roughly one third of the combined sample are female workers (30%), while there is a greater gender balance in the CrowdlearnOF sample[7]. The mean age of the sample is 32 years while a significant share of the Crowdlearn respondents are holders of either a postgraduate degree (28%) or an undergraduate degree (31%), consistent with previous literature (Pesole et al., 2018; Piasna et al., 2022).[8] Further sample descriptive statistics, including breakdowns of key variables for both Crowdlearn (OF and MW) samples, are discussed extensively in Cedefop (2020).

In addition to key demographic and socioeconomic information (age, gender, nationality, education level, general labour market experience), the Crowdlearn survey collects data on the nature of tasks performed by platform workers (15-item scale e.g. routine, skills complexity and variety, creativity based on Margaryan et al., 2011, 2013; Morgeson et al., 2006) and other platform work characteristics (e.g. share of total income earned on platforms, platform work hours, experience with platform work, number of completed tasks). A particularly important question of relevance for this study is a 17-item battery aiming to detect individuals' primary motivation for doing platform work (e.g. be own boss, primary/secondary source of income, cannot find traditional work, gain extra technical skills). The

[5] Cedefop's Crowdlearn data are publicly available and can be downloaded from the following link: https://www.cedefop.europa.eu/en/projects/digitalisation-and-future-work/application-form-access-cedefop-crowdlearn-survey

[6] Both surveys collected information from Finland, France, Germany, Italy, Romania, Spain and the UK, while France was added in the CrowdlearnMW wave due to the growing prominence of microwork in this country (Tubaro and Casilli, 2019). The selection of countries was based on archetypes to adequately represent different geographical regions and economic and welfare regimes across Europe.

[7] The gender imbalance in the combined sample reflects the skewed distribution towards males that exists in the Amazon Mechanical Turk microworker platform (Difallah et al., 2018), but other studies have also indicated that crowdworkers tend to be mostly males (Huws et al., 2016; Pesole et al., 2018).

[8] In terms of the CrowdlearnOF sample, the largest primary job categories are Writing and Translation (31%), Creative and Multimedia (28%) and Software Development and Technology (12%), followed by Sales and Marketing Support (10%), Clerical and Data Entry (9%) and Professional services (8%). By contrast, microworkers are more likely to be carrying out survey completion tasks (85%), while about a half engage in content access, information finding, interpretation and analysis and verification and validation tasks. Overall, there are important differences in the nature of work carried out by online freelancers versus microworkers (with over 64% of the latter carrying out routine tasks as opposed to the more complex tasks carried out by the former), their underlying motivations to undertake crowdwork (the former being more motivated by a need to be an own boss and work flexibility, while the latter by intrinsic satisfaction and secondary income reasons), share of income earned from platform work and the extent to which they engage in communication activities with platform clients and other crowdworkers (Cedefop, 2021).

survey also contains a specific question on whether individuals consider themselves to be an entrepreneur and a specific battery focused on detecting individuals' latent propensity to be self-employed.

Focusing on the specific aim of this paper, the Crowdlearn data enables investigation of the skills formation and learning people do as part of their online platform activities, in relation to their main labour market status. A key novelty of the survey is that information is obtained on the extent to which individuals developed a set of 10 distinct skill groups (e.g. technical, foreign language, communication, freelancing, obtaining work in platforms, learning, computer literacy, personal dispositions, organisational, analytical) as part of their platform work. This is based on a unique taxonomy developed as part of the Crowdlearn project, based on qualitative interviews with platform workers and key platform stakeholders. The survey has also adapted a carefully designed and pre-tested survey instrument, the Workplace Learning in Crowdwork Questionnaire (WLCQ) (Margaryan, 2019a,b, 2022), originally developed to measure learning practices within conventional knowledge work occupations.[9] This scale consists of 14-items focused on how crowdworkers learn, individually and collectively, by performing their work[10]. Crowdlearn also contains an extensive 34-item battery of questions focused on the behavioural and metacognitive self-regulatory learning (SRL) strategies workers undertake to complete their tasks (e.g. planning, implementation and reflection) (Zimmerman, 2006; Litteljohn et al., 2016; Margaryan et al., 2013). The specific phrasing of the core questions of interest for this study is available in the Annex.

Participants were further asked in the survey to identify their main employment status, but also allowed to select all applicable options, to cater to the fact that individuals may hold a portfolio of different activities. Figure 1 illustrates the distribution of responses across the different options as well as the potential combinations of different statuses identified by the respondents[11].

[INSERT FIGURE 1 ABOUT HERE]

35.5% of the respondents reported that their main status is 'freelancer/self-employed'. This group of "main self-employed" people consists of individuals for whom their engagement in online platform work is either their main status or is performed in combination with some other self-employed activity. Another 31.5% of the sample comprises of individuals who combine their online platform work with another regular full-time or part-time job. 14.5% are students who combine their studies with the execution of online platform tasks, while another 6% consists of unemployed or inactive individuals who offer their labour services via online platforms. While all aforementioned groups, except the main self-employed, combine by definition their main status with some online platform activity, a residual 12,5% of the sample indicated themselves that they engage in a portfolio of

[9] e.g. the Self-Regulated Learning at Work Questionnaire, SRLWQ, (Fontana, et al., 2015), the Classification Structure for Knowledge-Intensive Processes (Margaryan et al., 2011) and the Work Design Questionnaire (Morgeson and Humphrey, 2006).

[10] To overcome the constraint that people are not always aware that they are learning, especially when learning informally as part of their everyway working life (Eraut, 2007), respondents were promoted to think about a concrete recent or ongoing crowdwork task or project for which they had to learn something new and develop skills and then ask them to articulate their responses in relation to that specific project or task.

[11] There is a distinction in the main labour market status of the two groups of crowdworkers underpinning the combined Crowdlearn sample, namely online freelancers and microworkers, with 6 in 10 respondents from the CrowdlearnOF sample claiming to be 'freelancers/self-employed' as opposed to only 24% of microworkers. A significantly greater share of microworkers are, by contrast, full-time employed in a regular job, students or outside of the labour market.

activities. For instance, 8,5% of the sample reported that they combine freelancing work, possibly referring to their online platform engagement, with other states.

Overall, it is clear that while about one-third of crowdworkers in our sample are fully engaged in self-employment (main self-employment), the remaining 65% consists of individuals who combine their platform work with other activities, in particular alternative regular jobs or studies, hereafter referred to generically as **"**hybrid digital self-employment". Filtering out the "part-time entrepreneurs" (namely, those combining platform work with a part-time job, studies, unemployment or inactivity), which accounts for about 39% of the sample, leaves about 26% of the full sample consisting of "hybrid entrepreneurs" (Folta et al., 2010), namely platform workers holding a full-time, regular job[12].

Table 1 and Figure 2 indicate that crowdworkers engaged in hybrid digital self-employment are, on average, less likely to engage daily on skill development and workplace learning activities, compared to the main self-employed, but they are more inclined to do so on a weekly basis or on a few occasions.

[INSERT FIGURE 2 ABOUT HERE]

The raw descriptive statistics also reveal though that the hybrids possess certain characteristics that are inversely associated with skill formation. Hybrid self-employed platform workers are more likely to be males and native workers. They are characterised by lower levels of human capital, since their education and work experience levels are significantly lower than the exclusively self-employed. Overall, hybrids are of younger age and inexperienced both in terms of years of overall labour market and platform work experience. Their platform work engagement is more limited, since it tends to involve, on average, fewer hours and completed tasks. For hybrid platform workers the execution of more routine / less complex tasks as part of their crowdwork should be a deterrent to their further skill development. Overall, their total income is less reliant on any proceeds made from platform work.

Fully self-employed and hybrid crowdworkers are also characterised by markedly different motivations for joining platform work; the latter generally do it more as a means of engaging in a fruitful or pleasurable activity (intrinsic satisfaction) but, crucially, they also face greater external constraints. For instance, they are more likely to do platform work to supplement their income or to gain extra technical skills. By contrast, the main self-employed have a clear drive to do platform work for reasons related to being their own boss and enjoying the relative flexibility that comes with working alone. Such motivations are also reflected in their higher stated propensity to work alone and belief that they are entrepreneurs.

4. Empirical methodology

For testing the hypothesis whether hybrid digital self-work may facilitate greater skill formation and enhance possibilities of engagement in full-time self-employment in the future, it is crucial to employ a multivariate regression analysis framework. Considering the endogenous nature of many of the variables of concern in the Crowdlearn cross-sectional sample, it is also important to account for the possible simultaneity between the different behavioural equations underpinning the decisions of individuals to, first, take-up hybrid work and subsequently invest in appropriate or targeted learning activities.

The main empirical analysis relies on three theoretically sequential steps that are believed to underlie the process by which crowdworkers may decide to make the transition from proto entrepreneurship

[12] We acknowledge some potential lack of clarify in the terminology used, however we have tried to remain faithful to prevailing definitions used in literature, particularly the terms solo self-employment, hybrid and part-time entrepreneurship.

to full (platform) self-employment. Given the self-selected sample of platform workers that comprises the dataset, we cannot model the original decision of individuals to participate in online platform work[13]. We model however the decision of existing crowdworkers to engage in hybrid digital self-employment, *h (where h=1* if *h*>0)*, compared to working completely as self-employed/freelancers, as follows:

$$Pr(h_i^* \,/\, PW) = f_i(m, d, hc, M, C) + u_i \qquad [1]$$

where the conditional latent probability of deciding to be hybrid digitally self-employed (that is, conditional on being already a platform worker, PW) is assumed to be a function of individual *i*'s underlying motivations to do platform work (*m*), along with a core set of background - demographic (*d*) and human capital (*hc*) - characteristics. The empirical specification also controls for potential sources of sample variability caused by differences in crowdworker/survey types (*M*), namely if individuals were sampled as part of the CrowdlearnOF or CrowdlearnMW waves. Country fixed effects (*C*) aim to account for any cultural and/or institutional cross-country differences affecting individual behaviour[14].

A second step of the empirical strategy analyses whether the take-up of hybrid digital self-employment may be associated with the augmentation of a crowdworker's skillset, both overall (*S*) and in terms of specific skill types (S_j):

$$\Pr\left(S_{ij}^*\right) = g_i(h, e, b, d, hc, t, r, M, C) + \vartheta_i \qquad [2]$$

where it is assumed that the extent to which a hybrid status may influence a person's skill formation is likely to be mediated by their desire to work for themselves one day (*b*) and/or be a full entrepreneur (*e*). It has also been well-reported that the extent to which one develops his/her skills at work and

[13] We acknowledge that our main results are hence likely to be biased (upwards) if particular characteristics of hybrid crowdworkers (e.g. risk aversion, job security aptitude) are more aligned to those of main self-employed persons, compared to the remaining (unobserved) part of the working age population that has not considered taking up online platform work.

[14] Other important variables considered for modelling the decision to accept hybrid digital self-employment include (i) the person's main or previous occupation/job title (ii) the homogeneity of skill profiles between one's main/previous occupation and the type of platform tasks/projects one accepts to do (iii) the prospective income to be made via engagement in platform work (Panos et al., 2015) (iv) the career prospects, salary and working conditions and "switching costs" (e.g. lost retirement and healthcare benefits or seniority, disrupted lifestyle) in one's main or previous job (Folta et al., 2010; Pouliakas, 2017) (v) wider family, social and household relations e.g. number of children, spousal income (Burke et al., 2008; Bögenhold and Fahinger, 2013) (vi) individuals' behavioural traits e.g. risk aversion (Petrova 2012). While the Crowdlearn dataset has information on people's current job title, there is no information on the previous occupation of unemployed/inactive workers or specific descriptions of the type of activity carried out by freelancers. Nevertheless, aggregating occupations of those with reported job titles according to the prominent in platform work iLabour taxonomy (Kässi and Lehdonvirta, 2018), reveals that those in mainly professional service occupations and software development and technology or sales and marketing support are most likely to be hybrid entrepreneurs, in contrast to those doing creative and multimedia and writing and translation jobs.
Crowdlearn also contains information on the type of platform task carried out. However, due to their specific nature, any dissimilarity analysis comparing one's main tasks in an occupation and his/her platform tasks is likely to be imperfect. Moreover, only the CrowdlearnOF sample collected information on crowdworker's pay rates, which could be used to estimate individual's predicted remuneration, given a set of crowdworker characteristics. Both Crowdlearn samples also did not collect any further information about people's main or previous jobs. We included in the specification a Crowdlearn proxy of risk aversion ("*how much do you agree or disagree with the following statement: there is not a lot of risk involved in working for yourself*"), but this variable was not found to have any statistical significance. Using only the CrowdlearnOF sample, there is some indication that the presence of dependent children in the household is positively associated with hybrid digital work.

engages in entrepreneurial learning is affected by the nature of job tasks (*t*) (Pouliakas and Russo, 2015; Lans et al., 2008). For robustness purposes, the specification further accounts for a measure of the adopted self-regulatory learning strategies (*r)* adopted by individual crowdworkers[15].

A final, third, stage of the estimation then considers if those engaged in hybrid digital self-employment may be inclined to continue doing such work in the future. The sustainability of one's engagement in online platform work is captured by the extent to which crowdworkers receive enjoyment from it, modelled as follows:

$$E_i = \varphi_i(h, d, hc, t, j, M, C) + \rho_i \quad [3]$$

where, in addition to the standard demographic, human capital and task features of one's platform work, as described above, the specification also considers relevant utility from work determinants (*j*) (Pouliakas and Theodossiou, 2010), namely the person's hours of work in the platform and the share of income received from it, as well as participation in any community membership related to one's online work (not a trade union).

Obtaining unbiased estimates of the coefficients of the above explanatory variables, following the estimation of linear regression models, depends, as is standard, on their conditional independence with any unobserved factors included within the error terms (*u, ϑ, ρ*). Given the discrete choice nature of the *h* dummy variable, we estimate equation (1) using a probit estimator. We also break down *h* according to whether it refers to hybrid or part-time entrepreneurship, in which case we estimate a multinomial probit equation. The ordinal nature of the dependent variables in equations (2) and (3) requires that we estimate them with an ordered probit estimator.

Given the endogeneity however between some of the variables across the system of equations, the independence assumption between the errors and the main explanatory variables is likely to be violated. We therefore also seek to estimate the system of three interlinked equations using a limited maximum likelihood estimator, where they are treated as part of a multi-equation (simultaneous) system in which the correlated errors share a multivariate normal distribution (Roodman, 2011). In all instances Hubert-White standard errors are estimated to allow for clustering of observations at country level.

5. Empirical findings

5.1. Determinants of hybrid self-employment

Table 2 displays the main empirical findings following the estimation of equations (1)-(3).

The estimation of equation (1) (column 1) reveals that hybrid digital workers are more likely to have less labour market experience than the main self-employed. There is a statistically significant U-shaped age effect, implying that younger and older-aged workers (especially over 54 years, which is the global minimum) are more likely to be in hybrid status, compared to the middle-aged. Hybrid

[15] Important variables of interest considered for modelling if hybrid self-employment contributes to greater skill development includes (i) the variability of skill needs across a range of different platform tasks/projects carried out (ii) the transferability of skills between one's main or previous employment and a secondary activity (Panos et al., 2015). Such information however could only be potentially extracted from the CrowdlearnOF sample (as respondents were asked to indicate the main job categories/tasks they carry out as part of their crowdwork), but any task correspondence analysis between individual's main occupation/job title and respective platform tasks is highly imperfect.

digital self-employment is also more prevalent among microworkers and those based in Finland, Romania and Germany, while less so in Spain, Italy and UK.

An important finding is that individuals are primarily motivated to take up hybrid platform work for reasons related to labour market constraints, for instance to supplement their income or to overcome both personal (e.g. health limitations, social obligations) and external barriers (no alternative "traditional" work). They further aim to gain extra technical skills, while retaining the stability and regular income of a traditional job. Nevertheless, the decision to accept hybrid self-employment is also motivated for many by intrinsic satisfaction reasons (e.g. because platform tasks are fun or a fruitful way to spend one's time) and not by a will to enjoy the benefits of working alone.

It is notable that the characteristics of those who undertake platform work simultaneously to a regular, full-time, job – the so-called hybrid entrepreneurs - differ from those who engage in part-time self-employment (see Table A1 in Annex). Hybrid entrepreneurs are more likely to be males, natives and higher educated workers, in contrast to females and less experienced workers who are more likely to engage in part-time entrepreneurship. While younger and older aged workers are less likely to engage in combined dependent and digital self-employment, the reverse is true for the part-timers. The latter are also more likely to do online platform work for necessity-driven reasons, such as being unable to do or find work in the traditional labour market[16].

[INSERT TABLE 2 ABOUT HERE]

5.2. Determinants of skill development

Considering the skill development equation (2), hybrid status has a statistically significant positive relation with skill formation but only for hybrid entrepreneurs as well as for all hybrids when the specification controls for individuals' entrepreneurial and self-employment aptitude. The latter measures capturing the respondents' inclination towards working fully as self-employed or as entrepreneurs, strongly influence the development of skills in a positive direction and are inversely related with hybridity. This highlights that part of the reason why individuals in hybrid digital self-employment do not engage, on average, in more skill development than those in full self-employment is because of their lower underlying entrepreneurial propensity. Self-employment and entrepreneurial drive are hence found to be important confounding factors that mediate the relationship between hybrid digital work and skills formation.

Column (3) further demonstrates the estimated regression coefficients of a variable that interacts a crowdworker's hybrid employment position with his/her stated entrepreneurial status. There is a positive reinforcing effect of entrepreneurship on the relationship between hybrid digital self-employment and skill development, other things equal.

In addition, we test whether the skills-enhancing effect of hybrid digital work differs between the hybrid and part-time entrepreneurs. Column (4) shows that that the positive coefficient of hybrid digital work is underlined by those combining platform work with a full-time, regular job. We further confirm that the estimate remains statistically significant when we completely exclude from the sample the part-time entrepreneurs.

In terms of other explanatory variables, the results indicate that females are more likely to develop their skills than males via the execution of platform work. Individuals with longer general labour

[16] Bögenhold and Klinglmair (2017) also find that age is negatively associated with self-employed persons engaging in additional dependent employment and confirm a positive tertiary education effect. They show that in most cases additional dependent employment is not necessity driven.

market experience also have lower probability of skill formation. Crowdlearn data corroborate that the nature of work tasks is a significant determinant of skills formation, given that there is a statistically significantly positive association of the latter with the undertaking of complex and innovative job tasks. All other things equal, microworkers are also found to experience lower skill development compared to online freelancers.

Table 3 displays the estimated regression coefficients for the hybrid digital self-employment dummy, also broken down according to if it captures combinations of platform work with full-time, dependent employment. These are obtained from separate ordered probit regressions where the dependent variable is the specific skill type, *j*, and the control set remains the same as in the main skills development equation. The results indicate that, once one controls for crowdworkers' self-employment/entrepreneurial attitude, hybrid digital self-employment is positively associated with the augmentation of computer literacy, technical skills and skills in obtaining platform work - e.g., self-promotion, how to price one's work, how to use the platform. There is also a positive impact on learning and foreign language skills and the build-up of personal dispositions (e.g. confidence, creativity, resilience, independence, flexibility) (although these are significant at the 10% level of statistical significance). Strong skill development effects are found mainly for the hybrid entrepreneurs, in contrast to the part-time hybrids who only see some positive gains in their foreign language and technical skills.

[INSERT TABLE 3 ABOUT HERE]

5.3. Determinants of platform work satisfaction

To be a sustainable work arrangement and to commit to online platform work for the long haul, individuals must receive enjoyment from the execution of their platform work. Especially those who have decided to retain a hybrid arrangement should receive a higher level of utility from providing their surplus labour services online, to consider the possibility of becoming fully self-employed.

Column (4) in Table 2 confirms that crowdworkers with a hybrid status are characterised by higher levels of satisfaction with their platform work, compared to the full self-employed. This holds after controlling for a set of demographic, human capital and relevant job utility characteristics. It particularly accounts for the fact that the hybrids can only participate in platform activities for fewer hours and to subsequently earn less income than the full self-employed, both of which would lower their work satisfaction. As with the skill formation equation, the satisfaction premium is underpinned however by those in a hybrid, and not part-time, entrepreneurship state.

The remaining explanatory variables are in accordance with the job satisfaction literature (Clarke, 1998). For instance, females are found to have higher levels of work utility than males, while the results also confirm the well-reported education paradox (Pouliakas and Theodossiou, 2010), whereby those with lower levels of education are more likely to be content with their work. Satisfaction is also found to be inversely related to the degree of task routinisation in one's platform work, while it increases with more task complexity. Other things equal, microworkers are found to receive significantly less satisfaction from their platform work.

5.4. Robustness analysis

As discussed above, the empirical output obtained via separate regressions of equations (1)-(3) is agnostic to the fact that the presence of unobserved factors may result in correlation among the errors of the multi-equation system. We hence estimate a multi-equation, mixed methods (probit and ordered probit) model to account for such system endogeneity and recursivity.

The multi-equation model shown in Annex Table A2 fails to reject the null hypothesis that the errors of equations (1) and (2) are uncorrelated. This confirms that some unobserved factors affecting individuals' decision to take up hybrid self-employment are also likely to influence the frequency of skill development activities at work. Nevertheless, the model confirms the robustness of the estimates described before, specifically the positive influence of hybrid digital self-employment on skill formation and platform work satisfaction.

Other robustness tests that have been performed include the addition in equation (2) of crowdworkers' intensity of engagement in self-regulatory learning strategies, a highly significant determinant of their overall engagement in workplace learning and skill development. It is confirmed that the statistical significance of the effect of hybrid digital work on skills remain unaffected.

The robustness of the coefficient is furthermore confirmed when we exclude from the sample individuals for whom crowdwork constitutes a main source of income, ensuring that any skill gains are made exclusively via the execution of platform work that constitutes a secondary activity[17].

6. Conclusions

Ongoing socioeconomic changes and crises are having a marked effect on the changing landscape of employment in modern societies. Labour markets are increasingly in a state of flux with more people switching between different forms of dependent or independent employment over time. The advent of digitalisation, which has facilitated the proliferation of platform or gig work, has particularly stimulated the take-up of solo forms of self-employment, the latter constituting the majority of self-employed activities in Europe (Bögenhold and Klinglmair, 2017). Crowdworking, which is often at the margin of dependent employment, seems particularly prone to providing individuals with the option of engaging in own work in combination with other activities. About 1 in 4 online platform workers are found in the Crowdlearn sample to combine a self-employed activity with a full-time, regular job. While 4 in 10 couple their platform work with a part-time job, studies, unemployment or inactivity.

The findings of our paper reveal that hybrid digital self-employed persons, and especially part-time entrepreneurs, are enticed by online platform work for necessity-driven reasons. However, many choose to be hybrid for intrinsic satisfaction motives as well. Platform work is an alluring avenue of alternative work for some population groups facing difficulties in conventional labour markets, for instance females, the elderly, immigrants and inexperienced younger workers. By contrast, individuals combining platform work with an additional dependent job tend to be middle-aged, higher-educated, males. As noted in relevant literature, such hybrid entrepreneurs may be inclined to adopt a low-risk, staged entry to entrepreneurship, exploiting the fact that they may have adequate time, resources, and stability to develop relevant business acumen and a varied skillset that is a critical determinant of entrepreneurial entry (Lazear, 2009). In addition, they may benefit from the ability to foster skills transfer and knowledge spillovers between their primary and secondary jobs.

Our analysis confirms that a platform work experience for otherwise employed individuals may contribute towards the strengthening of both subject-specific knowledge and skills related to the area of specialty. It may also elevate their digital and self-employment/entrepreneurial skillset. By contrast, there is more limited skill formation for the part-time hybrids. As the latter face greater external constraints, it is plausible that they face higher opportunity costs inhibiting their opportunities for human capital investments. In general, it is also found that those combining platform work with other activities are more inclined to develop their skills provided they are driven by an entrepreneurial

[17] About 9% of the hybrids in our sample claimed to be motivated to do platform work because it is their main source of income.

mindset. This highlights the critical role of early entrepreneurial education bestowing to individuals a sense of personal initiative and entrepreneurial attitude, when only 28% of Europeans agree that their school education made them interested in becoming an entrepreneur (European Commission, 2012).

Our paper provides additional evidence to recent literature highlighting the need for policymakers to take fuller into account the marked diversity of different forms of (solo)self-employment and the hybridity between dependent and own employment characterising modern labour markets. It showcases that for some individuals the option of online platform work may be sustainable in the future, contributing significantly to their continuing learning and yielding high satisfaction dividends. Nevertheless, it cautions that this is not the case for those who engage in hybrid digital self-employment out of necessity, so their journey from proto entrepreneurship to full entrepreneurship is less likely to materialise.

Future research should aim to address several deficiencies of our dataset and empirical approach. Acknowledging the endogeneity between the decision to accepting hybrid self-employment and becoming a "die hard" entrepreneur (Burke et al., 2005; Folta et al., 2010), it is necessary to model individuals' solo self-employment entry by understanding factors preventing others from doing so. Our data have also not permitted a fuller investigation of the underlying channels via which hybrid entrepreneurship leads to more skill accumulation. Other studies should also focus on the linkage between workers' original occupational status and any skill transfers between one's primary and gig employments. In-depth understanding of the factors dictating crowdworkers' actual transitions from proto- to full-entrepreneurship would also require longitudinal data and a life course perspective (Conen et al., 2016; Margaryan, 2019b, 2021).

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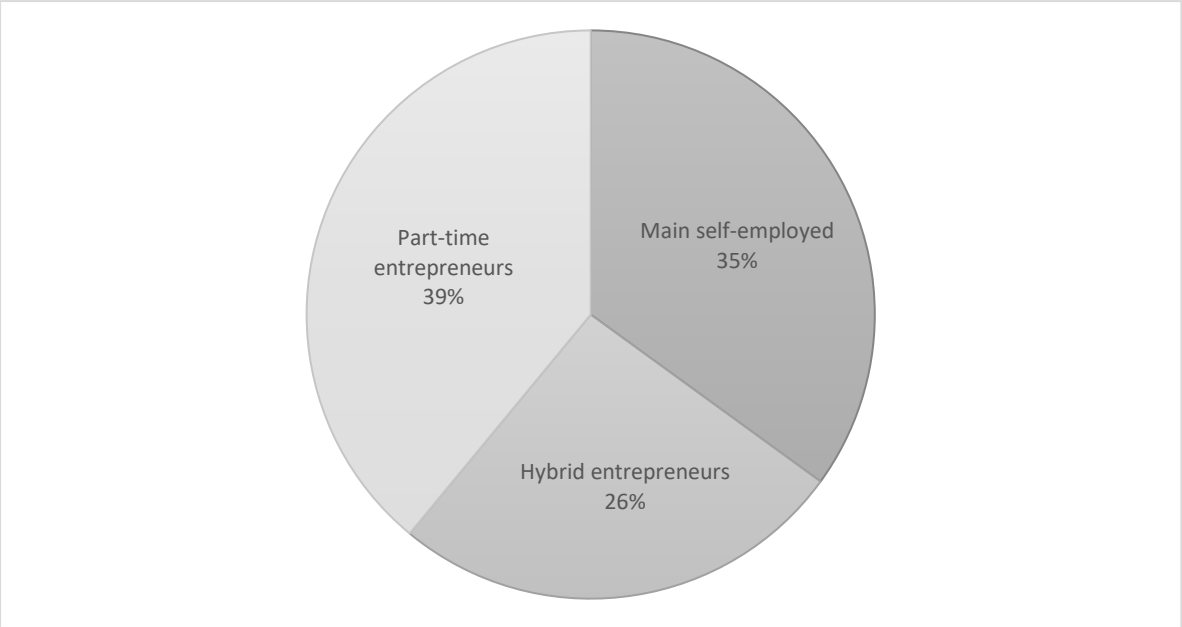
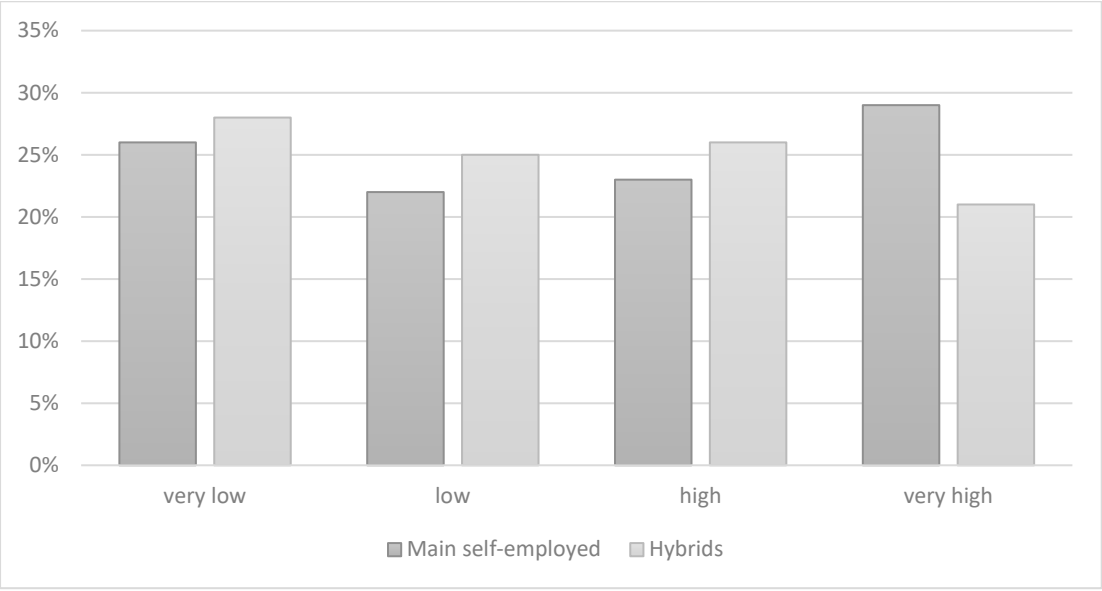
Figure 1 Main employment status of crowdworkers



Notes: Main self-employed are online platform workers reporting that their main employment status is 'freelancer/self-employed'. Hybrid entrepreneurs are online platform workers whose main employment status is a 'full-time, regular job next to their platform work' (including those selecting combinations of freelancer/self-employed with full-time, regular job and other). Part-time entrepreneurs are online platform workers whose main employment status is 'part-time, regular job next to platform work', 'student', 'retired', 'disabled', 'homemaker', 'unemployed' (including combinations of freelancer/self-employed with part-time job and other states).
Source: Cedefop Crowdlearn dataset

Figure 2 Skill development by hybrid self-employment status



Source: Cedefop Crowdlearn dataset

Table 1 Descriptive statistics, main self-employed and hybrid crowdworkers

	Main self-employed		Hybrids	
	Mean	*Std.Dev*	*Mean*	*Std.Dev*
Female (0-1 dummy)	0.45	0.50	0.35	0.48
Age	36.88	10.41	30.70	9.61
Immigrant (0-1 dummy)	0.35	0.48	0.31	0.46
Low education (below upper secondary, non-tertiary) (0-1 dummy)	0.33	0.47	0.41	0.49
General labour market experience				
<1 year	0.06	0.23	0.22	0.41
1-3 years	0.14	0.35	0.25	0.43
3-10 years	0.29	0.46	0.26	0.44
>10 years	0.51	0.50	0.28	0.45
Nature of platform tasks				
Routine tasks (Cronbach a = 0.51)	0.21	0.24	0.30	0.26
High skill / complex tasks (Cronbach a = 0.76)	0.37	0.27	0.25	0.23
Platform work hours (weekly)				
<4 hours	0.23	0.42	0.31	0.46
4-8 hours	0.19	0.39	0.24	0.42
2 work days	0.13	0.33	0.11	0.31
3 work days	0.09	0.29	0.04	0.20
4 work days	0.09	0.28	0.03	0.17
> 5 work days	0.04	0.20	0.01	0.12
Share of monthly income coming from [Platform]				
0 - 20%	0.56	0.50	0.78	0.41
21 - 40%	0.12	0.33	0.09	0.28
41 - 60%	0.11	0.32	0.04	0.20
61 - 80%	0.08	0.27	0.06	0.24
81 - 100%	0.13	0.33	0.03	0.17
Number of projects/HITS completed on [Platform]				
1-20	0.44	0.50	0.60	0.49
21-40	0.14	0.35	0.12	0.33
41-60	0.08	0.28	0.06	0.23
61-80	0.06	0.24	0.04	0.19
>80	0.27	0.44	0.19	0.39
Motives to accept platform work				
Fruitful activity	0.32	0.46	0.57	0.49
Secondary income	0.37	0.48	0.45	0.50
Kill-time	0.11	0.31	0.34	0.47
Primary income	0.24	0.43	0.09	0.29
Fun	0.19	0.39	0.38	0.49
More choice over projects	0.43	0.49	0.27	0.44
Unable to work (e.g. health condition)	0.09	0.29	0.11	0.31
No commute/work from anywhere	0.48	0.50	0.31	0.46
Control over schedule	0.51	0.50	0.34	0.47
More income on [Platform] than traditional work	0.11	0.32	0.08	0.26
Unable to find traditional work	0.09	0.29	0.07	0.26
Social obligations (e.g., caring for children or elderly family members)	0.22	0.41	0.20	0.26

Following passion	0.30	0.46	0.17	0.37
Being own boss	0.52	0.50	0.29	0.45
Extra technical skills in my hobby area while maintaining stability and regular income of traditional job	0.15	0.35	0.26	0.43
No office dress code	0.24	0.43	0.17	0.38
Self-employment / entrepreneurial attitude				
Wantself (Cronbach alpha = 0.77)	4.36	0.61	3.75	0.80
Entrepreneur (0-1 dummy)	0.65	0.48	0.30	0.46
Member of community, forum, or group related to online work or [Platform]	0.22	0.42	0.13	0.34
Workplace learning intensity - composite index normalised as low/moderate/high [1-2-3]	1.99	0.79	1.96	0.79
Self-regulatory learning intensity - composite index normalised as low/moderate/high [1-2-3]	2.03	0.78	2.01	0.79
Skill development				
Learning	2.54	0.92	2.52	0.90
Computer literacy	2.23	1.00	2.35	0.96
Analytical	2.48	0.92	2.49	0.92
Technical	2.50	0.92	2.37	0.90
Personal dispositions	2.75	0.91	2.47	0.93
Communication	2.76	0.96	2.28	0.99
Organisational	2.81	0.93	2.61	0.93
Freelancer/online worker	2.71	0.97	2.65	0.93
Obtaining platform work	2.76	0.89	2.69	0.93
Foreign language	2.03	1.11	2.14	1.09
Overall skill development (Cronbach a = 0.85)	2.56	0.64	2.46	0.61

Notes: See Annex A3 for derivation of scales.

Source: Cedefop Crowdlearn dataset

Table 2 Determinants of hybrid digital self-employment, skills development and work satisfaction of online platform workers

	(1) Hybrid digital self-employment	(2) Skills development	(3) Skills development (entrepreneurship interaction)	(4) Skills development (type of hybrid work)	(5) Platform work satisfaction
hybrid digital self-employment		0.18**			0.09**
		(0.091)			(0.041)
hybrid x entrepreneurship [yes]			0.30***		
			(0.100)		
hybrid x entrepreneurship [no]			0.02		
(base: no hybrid)			(0.093)		
hybrid entrepreneurship				0.30***	
				(0.062)	
part-time entrepreneurship				0.09	
				(0.106)	
entrepreneur		0.25***	-	0.26***	
		(0.035)		(0.032)	
wantself		0.19***	0.20***	0.20***	
		(0.042)	(0.038)	(0.042)	
female	0.07	0.21***	0.21***	0.23***	0.25***
	(0.054)	(0.054)	(0.055)	(0.055)	(0.048)
age	-0.09***	0.01	0.01	0.00	-0.01
	(0.015)	(0.013)	(0.013)	(0.015)	(0.017)
agesq	0.00***	-0.00	-0.00	-0.00	0.00
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
immigrant	-0.06	0.13	0.13	0.14	0.07
	(0.051)	(0.083)	(0.081)	(0.087)	(0.057)
community member	-0.28***	0.09	0.10	0.09	0.01
	(0.074)	(0.064)	(0.063)	(0.066)	(0.041)
low educated	-0.05	0.01	0.01	0.03	0.06
	(0.097)	(0.064)	(0.063)	(0.062)	(0.052)
LM experience: 1-3 years	-0.24**	0.00	-0.00	-0.03	0.18***
	(0.114)	(0.108)	(0.108)	(0.104)	(0.052)
LM experience: 3-10 years	-0.38***	-0.04	-0.04	-0.09**	0.12
	(0.068)	(0.041)	(0.045)	(0.044)	(0.072)
LM experience: >10 years	-0.39***	-0.25*	-0.25*	-0.30**	0.02
(base: <1 year)	(0.057)	(0.137)	(0.136)	(0.130)	(0.062)
routine tasks		-0.00	-0.00	0.01	-0.19**
		(0.103)	(0.107)	(0.106)	(0.093)
high skill tasks		1.13***	1.15***	1.15***	0.44***
		(0.122)	(0.121)	(0.121)	(0.098)
boss	-0.98***				
	(0.097)				
fun	0.85***				
	(0.077)				
primary income	-0.59***				
	(0.114)				
necessity	1.07***				
	(0.317)				
platform hours: < 4					0.20**
					(0.082)
platform hours: 4-8					0.36***
					(0.095)
platform hours: 2 days					0.31***
					(0.049)
platform hours: 3 days					0.45***

					(0.109)
platform hours: 4 days					0.44**
					(0.174)
platform hours: >5 days					0.46
(base: No work)					(0.305)
income share: 21-40%					0.12*
					(0.061)
income share: 41-60%					0.26***
					(0.080)
income share: 61-80%					0.18
					(0.109)
income share: >80%					0.31***
(base: 0-20%)					(0.088)
micro-worker	0.64***	-0.25***	-0.25***	-0.27***	-0.02
	(0.109)	(0.034)	(0.037)	(0.032)	(0.123)
Finland	0.54***	-0.08**	-0.07**	-0.05	0.06
	(0.048)	(0.031)	(0.034)	(0.035)	(0.036)
France	0.19***	0.22***	0.24***	0.22***	-0.15*
	(0.069)	(0.028)	(0.026)	(0.027)	(0.086)
Germany	0.32***	0.08***	0.09***	0.10***	-0.08**
	(0.026)	(0.028)	(0.028)	(0.032)	(0.039)
Italy	0.02	0.49***	0.49***	0.51***	0.14***
	(0.023)	(0.033)	(0.032)	(0.039)	(0.034)
Romania	0.40***	0.67***	0.67***	0.66***	0.51***
	(0.052)	(0.048)	(0.049)	(0.047)	(0.050)
Spain	0.13***	0.38***	0.38***	0.40***	0.09*
(base: UK)	(0.041)	(0.025)	(0.028)	(0.027)	(0.047)
/cut1		0.79***	0.70***	0.70**	-1.54***
		(0.262)	(0.258)	(0.274)	(0.445)
/cut2		1.51***	1.42***	1.42***	-0.01
		(0.268)	(0.264)	(0.279)	(0.438)
/cut3		2.27***	2.19***	2.19***	1.46***
		(0.258)	(0.252)	(0.268)	(0.431)
Constant	2.24***				
	(0.312)				
Observations	1,997	1,997	1,997	1,997	1,997

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Col (1) estimated with probit; Col (2-5) estimated with ordered probit.
Source: Cedefop Crowldearn dataset

Table 3 Skill formation and hybrid digital self-employment

Skill j	*Hybrid digital self-employed*	*Hybrid entrepreneurs*	*Part-time entrepreneurs*
Learning	0.18* (0.105)	0.25*** (0.087)	0.12 (0.123)
Computer literacy	0.15** (0.078)	0.25*** (0.051)	0.08 (0.095)
Analytical	0.09 (0.097)	0.22*** (0.063)	-0.01 (0.114)
Technical	0.19** (0.081)	0.26*** (0.076)	0.15* (0.082)
Personal dispositions	0.144* (0.076)	0.24*** (0.062)	0.08 (0.085)
Communication	0.01 (0.063)	0.06 (0.055)	-0.02 (0.075)
Organisational	0.12 (0.096)	0.021*** (0.078)	0.057 (0.11)
Freelancing / online worker	0.058 (0.085)	0.128 (0.094)	0.007 (0.098)
Obtaining platform work	0.104** (0.052)	0.19*** (0.064)	0.04 (0.054)
Foreign language	0.11* (0.059)	0.09 (0.071)	0.12** (0.055)

Notes: Ordered probit regression coefficients obtained from estimation of specification equation (2) using skill *j* as dependent variable.

Source: Cedefop Crowdlearn dataset

Annex

Annex A1. Details of the Crowdlearn sampling methodology

The two Crowdlearn datasets were collected by an international team led by researchers at the University of Oxford Internet Institute and the Copenhagen Business School. They were collected as part of a Cedefop research project that took place between 2017-2020 and used both qualitative and quantitative methods to obtain novel insights on the skill development and skills matching practices of online platform work. Building on the findings from the initial qualitative project phase, which facilitated the compilation of a unique taxonomy of skills typically developed in online platform work, the project subsequently developed a prototype survey instrument. This aimed at collecting representative information on the patterns of skill development and the nature of working conditions of a sample of European crowdworkers.

Given significant difficulties in surveying online platform workers, including the absence of a population sampling frame, low survey responsiveness and marked biases in survey participation *inter alia*, the Crowdlearn sampling methodology deployed a mix of three sampling methods: platform-assisted probability sampling, equal quota sampling (with quotas on country and age for the CrowdlearnOF sample and only country for CrowdlearnMW) and snowballing[18]. Roughly half of the sample was collected using snowballing and equal quota sampling. The other half was collected with assistance from two platforms. In this case, the platforms supported the research team by distributing a project description and an anonymous survey link to a randomly drawn sample of crowdworkers (while keeping country quotas constant in one of the two platforms). Response rates for the equal quota sampling were about 17%. For the snowballing approach, which asked crowdworkers who supported the research team in the qualitative research phase to participate and share the survey amongst their colleagues, they were 29%.

To be considered an eligible respondent for the Crowdlearn surveys, a person had to work from one of the European target countries, be a natural person of at least 18 years old and have earned income through an online platform (Kässi and Lehdonvirta, 2016). The survey instrument used was almost identical across all platforms targeted as part of the study, although it was tailored to consider platform-specific terminologies (e.g. platform-specific names, jargon and context). Notably, the CrowdlearnOF survey is longer than CrowdlearnMW, as it includes additional sections focused on crowdworkers' interactions with fellow workers, platforms and governments. The list of main tasks performed was also adjusted according to whether the survey was addressed to online freelancers or microworkers (Gadiraju et al., 2014).

Both surveys aimed to secure the quality and reliability of information by filtering out unreliable or non-applicable responses (e.g. including attention check questions, restricting participation to 'regular' as opposed to occasional crowdworkers). Appropriate monetary compensation, in alignment with standard platform work rates, was offered to respondents in both survey waves, while all ethical safeguards and data protection clauses were adhered to. Respondent recruitment took place by either posting the survey as a task/project on each platform and paying respondents to participate, or by an arduous manual process of filtering potential participants who fulfilled the selection criteria from the platform's search features, algorithmically randomising them and subsequently extending a personal

[18] Further information about the Crowdlearn sampling methodology is available at the project's data quality report, available from the authors upon request; also see https://www.cedefop.europa.eu/en/projects/digitalisation-and-future-work/crowdlearn-online-platform-work-and-skills-2

invitation. All necessary efforts were made to mitigate potential self-selection biases associated with attracting crowdworkers prone to completing survey-type tasks and contributing to scientific research (Betlehem, 2010) or those induced by extrinsic incentives (Head, 2008). For instance, the research team worked closely with platforms to help draw sufficiently diverse samples from each platform or widened the pool of potential participants via manual searching of crowdworkers' platform profiles and snowballing. Respondents were properly informed about the nature of the project to entice their interest and alleviate any data protection concerns, hence mitigating non-response. They were also reminded that they were not evaluated as workers participating in a monetary exchange, but that they were participating only for research purposes. The compensation provided was equivalent to the standard platform fee that a crowdworker would have obtained for the time devoted to the survey.

Overall, the sampling strategy ensured sufficient sample variation to allow for comparisons of sub-groups that are interesting from a public policy perspective.

Annex A2. Main Crowdlearn survey variables

Entrepreneurial attitude (entrepreneur): *Do you consider yourself an entrepreneur?* [Yes/No]	*Definition: 'Entrepreneur' means a person who organises and manages their own business exercising considerable personal initiative and taking on financial risk. Entrepreneurs include people who are self-employed, those who are a sole owner, partner or a majority shareholder of a small, medium, or large company.*
Self-employment attitude (wantself): *How do you feel about the potential to work for yourself?* [Strongly Disagree / Disagree / Neither Agree nor Disagree / Agree / Strongly Agree]	I want to be my own boss I consider working for myself to be a better option than formal employment with a company I would be proud to tell my friends and family that I am an entrepreneur There is not a lot of risk involved in working for yourself I see myself as a freelancer.
Main employment status: *What is your main employment status? Select all that apply*	Freelancer/self-employed Employed full-time in a regular job next to my work on [platform] Employed part-time in a regular job next to my work on [platform] Student Retired Disabled/Not able to work Homemaker Unemployed Other (please specify)
Workplace Learning for Crowdwork (WLCQ) *Within the last 3 months, how frequently have you undertaken the following learning activities as part of your work on [platform]* [Never (I have not undertaken this learning activity) / Rarely (I have undertaken this learning activity on a few occasions) / Frequently (I have undertaken this learning activity weekly) / Very frequently (I have undertaken this learning activity daily)]	Acquiring new information to complete my [Platform Name] projects Collaborating with others to complete my [Platform Name] projects Following new developments in my field Performing tasks that are new to me Asking others for advice Attending a training course/ workshop to acquire knowledge/ skills for [Platform Name]

	Taking free online courses or webinars (e.g., Coursera, edX) to acquire knowledge/ skills for [Platform Name] Using paid online tutorials (e.g., Lynda) to acquire knowledge/ skills for [Platform Name] Reading articles/ books to acquire knowledge/ skills for [Platform Name] Observing/ replicating other people's strategies Finding a better way to do a task by trial and error Thinking deeply about my work (e.g., what I could do better next time) Receiving feedback on my [Platform Name] projects (e.g., from my client, colleagues) Learning from online community forums (e.g., StackOverflow, platform community forums) Working alone to complete my [Platform Name] projects
Skill formation: *Thinking about your projects on [Platform Name] over the last three months, to what extent have you developed the skill categories listed below through your work on the platform? Please keep a broad definition of learning in mind. You can develop a skill category through various learning activities ranging from on-the-job learning to formal educational courses.* [Never (I have not developed this skill category) / Rarely (I have developed this skill category on a few occasions) / Frequently (I have developed this skill category weekly) / Very frequently (I have developed this skill category daily)]	technical skills / core skills in my area of specialty foreign language skills skills in obtaining platform work (e.g., self-promotion, how to price my work, how to use the platform) learning skills skills in being a freelancer / online worker communication skills (e.g., handling customers, handling cultural differences, presentation skills, email etiquette, etc.) personal dispositions (e.g., confidence, creativity, resilience, independence, flexibility, etc.) organisational skills (e.g., time management, project management, discipline) analytical skills computer literacy

Motives: *Why do you work on [platform]*?	Upwork is my primary source of income Upwork is my secondary source of income I am unable to find traditional work I am unable to perform traditional work (e.g., because of a health condition) To kill time Upwork tasks are fun Upwork is a fruitful way to spend time and earn money Being my own boss Following my passion No commute/can work from anywhere Control over my schedule More choice over the projects I can do No office dress code I can earn money while fulfilling social obligations my family expects of me (e.g., caring for children or elderly family members) I can earn more income on Upwork than I could in traditional work I can gain extra technical skills in my hobby area while maintaining the stability and regular income of my traditional job Other

Source: Cedefop Crowdlearn survey

Annex A3. Derivation of scales used in empirical analysis

Routine tasks	My [Platform Name] tasks are mostly routine (i.e. ordinary pieces of work that follow a regular, unvarying, habitual, unimaginative, or rote pattern) ; My [Platform Name] tasks are highly reliant on formal processes (e.g., clear definition of input and output, structured interactions with clients, etc.) ; My [Platform Name] tasks don't give me freedom to decide what should be done in any particular situation; My [Platform Name] tasks are mostly systematically repeatable ; My [Platform Name] tasks are highly reliant on formal standards (e.g., standards of minimum quality, technical standards).
High skill/cognitively complex tasks	My [Platform Name] tasks rely on the combination of knowledge from different fields of expertise or disciplines; My [Platform Name] tasks are improvisational/creative; My [Platform Name] tasks are highly reliant on my deep and specific expertise/personal judgement ; My [Platform Name] tasks are dependent on collaborating with others ; My [Platform Name] tasks are highly reliant on my general expertise/individual experiences; My [Platform Name] tasks involve solving problems that have no obvious correct answer; My [Platform Name] tasks involve dealing with problems I have not met before; My [Platform Name] tasks require unique ideas/solutions to problems; My [Platform Name] tasks require me to use a variety of skills to complete

	the work; My [Platform Name] tasks require me to use a number of complex, high-level skills .
Boss	Being my own boss; No commute/can work from anywhere; Control over my schedule; More choice over the projects I can do; No office dress code
Fun	To kill time; Upwork tasks are fun; Upwork is a fruitful way to spend time and earn money
Necessity (dual jobholding)	Upwork is my secondary source of income I am unable to find traditional work I am unable to perform traditional work (e.g., because of a health condition) I can earn money while fulfilling social obligations my family expects of me (e.g., caring for children or elderly family members) I can earn more income on Upwork than I could in traditional work I can gain extra technical skills in my hobby area while maintaining the stability and regular income of my traditional job
Want self	I want to be my own boss; I consider working for myself to be a better option than formal employment with a company; I would be proud to tell my friends and family that I am an entrepreneur; There is not a lot of risk involved in working for yourself (excluded); I see myself as a freelancer.
Overall skill development	Cronbach alpha of all skill types *j*

Notes: Scales derived either as Cronbach alpha's or as principal components. The clustering of variables per scale is done based on principal component analysis.

Annex Table A1 Determinants of hybrid and part-time entrepreneurship, multinomial probit

	(1) Hybrid entrepreneurship	(2) Part-time entrepreneurship
Motives		
Fruitful activity	0.56***	0.56***
	(0.175)	(0.147)
Secondary income	0.60***	0.16
	(0.098)	(0.146)
Kill time	0.42***	0.04
	(0.132)	(0.109)
Primary income	-1.37***	-0.56***
	(0.210)	(0.189)
Fun	0.27*	0.19**
	(0.140)	(0.088)
More choice	-0.31***	-0.12
	(0.080)	(0.147)
Unable to work	-1.72***	0.35**
	(0.232)	(0.158)
No commute	-0.37**	-0.12
	(0.165)	(0.111)
Control over schedule	-0.26	-0.21**
	(0.169)	(0.090)
More income	0.35**	0.01
	(0.177)	(0.132)
Unable to find work	-0.20	0.39**
	(0.138)	(0.193)
Social obligations	0.02	0.27*
	(0.150)	(0.148)
Passion	-0.11	-0.01
	(0.111)	(0.078)
Own boss	-0.57***	-0.53***
	(0.145)	(0.137)
Extra technical skills	0.76***	0.34**
	(0.229)	(0.171)
No dress code	-0.21	0.04
	(0.166)	(0.139)
female	-0.11	0.30***
	(0.119)	(0.101)
age	0.07***	-0.18***
	(0.022)	(0.032)
agesq	-0.00***	0.00***
	(0.000)	(0.000)
immigrant	-0.24***	0.02
	(0.068)	(0.109)
community member	-0.38***	-0.35***
	(0.093)	(0.105)
low education	-0.34*	0.14
	(0.173)	(0.141)
LM experience: 1-3 years	0.09	-0.57***
	(0.144)	(0.126)
LM experience: 3-10 years	0.13	-0.93***
	(0.122)	(0.071)
LM experience: >10 years	0.12	-1.03***
(base: <1 year)	(0.137)	(0.075)
micro-worker	0.95***	0.79***
	(0.151)	(0.154)
Country dummies	x	x

Constant	-1.43***	3.59***
	(0.529)	(0.579)
Observations	1,997	1,997

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Multinomial probit with base category: main self-employed
Source: Cedefop Crowdlearn dataset

Annex Table A2 Mixed methods, multiple equation estimation

	(1) Hybrid digital self-employment	(2) Skill development	(3) Platform work satisfaction
Hybrid digital self-employment		0.45**	0.89***
		(0.210)	(0.23)
Hybrid entrepreneurship		0.34***	0.78***
		(0.110)	(0.132)
Control variables (as in Table 2)	x	x	x
Country dummies	x	x	x
Constant	-3.15***		
	(0.255)		
Observations	1,997	1,997	1,997
rho 1-2		-0.20 (0.11)	
rho 1-3		-0.53** (0.13)	
rho 2-3		0.35*** (0.018)	

Notes: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Based on estimation of simultaneous, multi-equation, mixed methods model (Col 1 probit; columns 2-3 ordered probit)
Source: Cedefop Crowdlearn dataset