

WELL-BEING EFFECTS OF THE DIGITAL PLATFORM ECONOMY: THE CASE OF TEMPORARY AND SELF-EMPLOYMENT

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Abstract. The surge in non-traditional employment, including self-employment and temporary jobs, driven by the digital platform economy (commonly known as the gig economy), has thrust this form of work into the centre of social and political discussions. Among the European Union countries, Spain stands out with the highest volume of digital platform work. To explore the well-being effects of various gig economy employment arrangements, this study utilizes microdata from the Spanish Living Conditions Survey for 2018 and Google Trends data related to platforms like Deliveroo, Airbnb, Just Eat, Uber, and Freelance as a proxy for digital platform economy demand. Employing an econometric approach based on instrumental variables, the study reveals that the most detrimental well-being effects are observed among self-employed workers. Specifically, in terms of self-reported health, self-employed individuals (own-account workers) exhibit 125.8% lower average health levels compared to permanent workers. These findings suggest that the heightened job insecurity and precariousness associated with self-employment outweigh the potential benefits arising from greater flexibility and autonomy in this type of work.

Keywords: digital platform economy, gig economy, digital platform work, self-employment, temporary jobs, well-being, self-reported health, happiness, life satisfaction.

JEL Classification: I31, J21, J81, J40.

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1. Introduction

The emergence of the digital platform economy, also known as the “gig economy”, has been one of the most important transformations in the new world in the past decade (International Labour Office [ILO], 2018). Although the number of gig workers is still relatively small (1–3% of the global workforce according to Schwellnus et al. (2019)), it is estimated that digital platform work will continue to grow in the future and expand across sectors¹.

This economic revolution is causing a transformative and potentially severe impact on employment relationships, as it disrupts the general concept of “normal jobs”. In the aftermath of the Great Recession (2008–2013), digital platforms have fundamentally reshaped the

¹ By country, the incidence varies from 9.4% in 2019 in United Kingdom, to 2.9 % in Germany or 0.8% in France or 0.5% to 1% of Norwegian working age adults (OECD/ILO/European Union, 2023, chapter 4).

relationship between workers and companies. This transformation has given rise to what is commonly known as the gig or platform economy. As a result, labour markets recently exhibit a growing prevalence of non-traditional work arrangements (temporary jobs and self-employment). While non-traditional work arrangements have been the focus of attention for both scholars and the popular media over several decades, the swift emergence of platforms that utilize digital technologies to facilitate labour on a task-by-task basis has reignited interest in understanding how these work arrangements impact workers' well-being. Recent studies by Bajwa et al. (2018), Gross et al. (2018), Banks (2019), Berger et al. (2019), Apouey et al. (2020), Bérastégui (2021), and Escudero et al. (2023) delve into this critical area of inquiry. Insofar as these platforms create significant job opportunities, increase the just-in-time workforce, and provide temporal flexibility (De Stefano, 2016; Wood et al., 2018), such forms of employment might increase the well-being of workers. In fact, the demand for greater flexibility and a better work-life balance constitutes some of the drivers behind the growth of platform work (European Commission, 2017; OECD, 2019). However, as stated by Drahokoupil and Fabo (2018) and Kässi and Lehdonvirta (2016), these work arrangements may erode labour protection, be prone to poorer working conditions, and sustain economic insecurity and the unpredictability of working life. In such a case, lower levels of well-being may be observed among workers employed in this type of work arrangements.

Therefore, it is essential to understand how workers fare in these types of work arrangements associated to the gig economy (particularly temporary jobs and self-employment), which are becoming a prominent feature of 21st-century labour markets. The main purpose of this paper is to analyse the well-being of these workers in the Spanish labour market. In our study, we investigate the impact of digital platform-related work on various aspects of individual well-being, including health, happiness, and different facets of satisfaction (such as general satisfaction, financial satisfaction, satisfaction with work, personal relationships, and leisure time). To that end, we exploit microdata for the year 2018 from a specific module of the Spanish Living Conditions Survey included in European Union Statistics on Income and Living Conditions (EU-SILC).

We focus on Spain because it stands out among the EU countries with the highest volume of work through digital platforms. In particular, around 2.6% of the working population in Spain relies on digital platform work as their main form of employment (Pesole et al., 2018). This new labour model has placed the focus on the high job temporality and use of the "false self-employed" formula. As regards self-employment, some studies have pointed out that in many cases these work arrangements have ceased to be a free choice for workers in Spain (Monereo, 2016). Many of the new self-employed (freelancers), especially after the 2008 crisis, have found jobs through digital platforms, as indicated in a report by GoVup and the Spanish Digital Economy Association (GOVUP & Adigital, 2017). Moreover, according to the International Labour Organization (ILO, 2016), to the extent that jobs linked to digital platforms consist of project or task-based contracts and are of fixed-term duration or seasonal, temporary employment has become increasingly related to the digital platform economy. Since the beginning of the economic recovery in 2014, temporary hiring has become widespread in Spain, as noted by Felgueroso et al. (2017).

Our results indicate that self-employed workers have lower levels of individual well-being than other types of workers, especially in terms of self-reported health. Specifically, their average levels of self-reported health are 125.8% lower than that of permanent workers. In

contrast to the enhanced flexibility and autonomy associated with these atypical jobs prevalent in the digital platform economy, our findings indicate that factors such as employment insecurity, uncertainty, and social isolation have a more pronounced impact on workers' individual well-being.

The paper is organized as follows. Following the introduction, Section 2 reviews the most recent literature on the effects of the digital platform economy on the labour market. Sections 3 and 4 describe the datasets and provide a descriptive analysis of the types of work arrangements associated to the gig economy in Spain and its relation to individual well-being. Section 5 describes the empirical model and Section 6 discusses the results. Section 7 concludes.

2. Background: the digital platform economy and the labour market

The digital platform economy, or gig economy, is based on non-standard forms of employment (NSE, hereinafter) that are closer to "gigs" than traditional kinds of jobs (ILO, 2016). Over the past few decades, there has been a marked shift towards NSE in both industrialized and developing countries. Indeed, NSE has become a contemporary feature of labour markets around the world, as the use of such work arrangements has become more widespread across economic sectors and occupations. In 2013, NSE accounted for around a third of total employment in OECD countries (OECD, 2015). As stated in ILO (2015), NSE relies heavily on temporary and part-time positions filled by independent contractors and freelancers rather than full-time and permanent employees². Thus, the evolution of the digital platform economy is closely associated with these atypical forms of employment.

There is no accepted definition of the gig economy, but the literature has related it to non-standard work arrangements associated with both self-employment and temporary employment. With respect to the former, Abraham et al. (2019) utilize the taxonomy established in Abraham et al. (2018) to delineate a gig worker as an individual who is not remunerated with a wage or salary, lacks an implicit or explicit contract for ongoing employment, and operates without a predictable work schedule or earnings when working. Applying this definition to various alternative work arrangements, the authors classify independent contractors, freelancers, day labourers, and on-demand or platform workers as gig (related) workers. Thus, under this definition, gig workers should be part of the unincorporated self-employed. With respect to temporary employment, Valletta et al. (2020) defined gig jobs as short-term work arrangements based on contracted agreements, with a specific emphasis on tasks facilitated through online platforms that connect suppliers with demanders of products and services. In a similar vein, Glavin and Schieman (2022) underscored that temporary and short-term employment compensated on a piece-rate basis are key characteristics of the "gig economy". Based on an online survey, they distinguished between platform work (ride-hail and delivery services, remote online work, etc.), including dependent platform workers (their main job is app-based or web-based) and secondary platform workers, and non-platform workers (those reporting no platform work including temporary or permanent wage workers and traditional

² The classification of non-standard employment was the subject of discussion at the February 2015 ILO Meeting of Experts on Non-standard Forms of Employment (ILO, 2015).

self-employed). Finally, OECD/ILO/European Union (2023) offers a review of current sources and metrics for measuring digital platform employment, focusing exclusively on online and location-based services facilitated by digital labour platforms.

Based on all this literature, in our study, we contemplate temporary employment and self-employed being conscious that these two forms of employment are not fully identified with gig work, although they share the main features. Temporary employment encompasses various arrangements where workers are engaged for a specific duration. This includes fixed-term, project- or task-based contracts, seasonal or casual work, or day labour. For decades, the Spanish labour market has been characterized by a high level of temporary employment, especially compared to the EU average. This phenomenon has resulted in the creation of a dual labour market, where workers are employed under either fixed-term, temporary contracts, or regular, open-ended contracts. Although temporary employment decreased slightly during the years of the economic crisis³ due to the widespread destruction of temporary jobs, following the economic recovery temporary employment increased again to account for 22.7% of all jobs in 2018. In 2021, this figure was even higher, with over 24% of the Spanish workforce employed on temporary work contracts; a much higher share relative to other OECD countries⁴.

Self-employment has also been considered NSE in several studies on industrialized countries (see, for example, OECD, 2015). In the Spanish labour market, self-employment also increased over the period 2012–2016 and has stabilized at 15–16%⁵ in recent years; a slightly higher figure than the European average.

In principle, NSE can have both positive and negative aspects and hence affect workers in terms of their well-being. On the one hand, work arrangements associated to NSE might be valued and preferred by some workers who opt for this type of employment to achieve a better work-family balance and/or greater autonomy and sense of control in the case of self-employment. Nevertheless, NSE may be linked to precariousness and poorer working conditions. Non-standard workers often lack the same levels of employment protection, safeguards, and fringe benefits enjoyed by their counterparts in standard working arrangements. Due to this precariousness, workers in NSE may suffer greater levels of job insecurity⁶ – the subjective perception of losing one's job in the near future. During recessions or economic downturns, individuals often worry about the stability of their jobs, but they also may experience job insecurity due to organizational changes, modifications of the labour market regulation, mergers and restructuring plans, technological changes such as digitalization, etc. Although job insecurity is a problem that affects all individuals, specific workers are more exposed to greater risks, and the type of contract is one of the drivers of employment instability. In the metanalysis of Keim et al. (2014), the authors found that lower levels of

³ See Eurostat data (2000–2018): Temporary employees.

⁴ Employment – Temporary employment – OECD Data.

⁵ Around 10–11% for own-account workers.

⁶ Job insecurity is a complex phenomenon (see Greenhalgh & Rosenblatt, 2010, for a review of different definitions and measures). According to Ashford et al. (1989), job insecurity encompasses insecurity about losing the whole job (becoming unemployed), insecurity about losing specific job features (undesirable replacement, unpleasant tasks, privileges curtailed, etc.), and powerlessness to prevent the loss. A remarkable aspect of job insecurity is that it is a subjective perception, implying that different employees might perceive the same situation differently.

job insecurity are associated, among other factors, with having a permanent work, and in a more recent paper based on data from the European Working Conditions Surveys 2010 and 2015, Eichhorst and Tobsch (2017) found that, overall, fixed-term workers experience much lower levels of job security than those in permanent employment⁷. For the Spanish case, the influence of the type of contract on job stability and, hence, on the global job component of job insecurity is especially remarkable due to the severe segmentation of its labour market (Spain has one of the highest rates of fixed-term contracts within the EU). During the Great Recession (2008–2013), more than 3.4 million workers in Spain lost their jobs, of whom 61% were fixed-term workers. Hence, these factors associated with NSE may negatively affect individuals' well-being. In this respect, a recent meta-analysis concluded that employees in non-standard employment experience lower global subjective well-being (Fabrín-Petersen, 2022).

As regards temporary employment, a large body of research has shown evidence of the negative impact of this type of work arrangement on subjective well-being (Klein Hesselink & van Vuuren, 1999; Blanchard & Landier, 2002; Quesnel-Vallee et al., 2010; Robone et al., 2011; Carrieri et al., 2012; Dawson et al., 2017; Inanc, 2018; Karabchuk & Soboleva, 2020; Wu, 2023)⁸ and happiness (Scherer, 2009; Ponzo, 2011; Schumann & Kuchinke, 2020). However, some studies have reported a weak or non-negative impact of these work arrangements on workers' well-being (Sverke et al., 2000; Rodríguez, 2002; Bardasi & Francesconi, 2004; Silla et al., 2005; Cottini & Lucifora, 2013; Helbling & Kanji, 2018; Bartoll et al., 2019).

Research has also found that, overall, people who are self-employed exhibit consistently higher levels of subjective well-being measured either in terms of happiness or job satisfaction than those who are not self-employed (Blanchflower & Oswald, 1998; Blanchflower, 2000; Alesina et al., 2004; Andersson, 2008; Kawaguchi, 2008; Benz & Frey, 2008; Binder & Coad, 2013; Millan et al., 2013; Kara & Pretescu, 2018; Binder & Blankenberg, 2021). Binder and Blankenberg (2021) highlighted that while self-employed workers tend to report higher job satisfaction, this does not always translate into increased overall life satisfaction. This phenomenon is attributed to the diversity among self-employment arrangements, along with work characteristics, motivational factors, and institutional frameworks that differ across countries. In recent years, however, self-employed workers have become more heterogeneous. Although some individuals may experience satisfactory work quality and secure continuity of employment, for others, this particular work arrangement has become more commonly linked with terms such as "involuntary", "dependent", and "precarious" self-employment (Stone, 2006; Schulze et al., 2009; Kautonen et al., 2010; Westerveld, 2012; Eurofound, 2017).

Studies focusing specifically on gig workers and well-being outcomes are scarcer due

⁷ On the contrary, there is evidence suggesting that job insecurity plays a moderating rather than a mediating role between contract type and well-being. Several authors have observed that the association between job insecurity and psychological outcomes is more negative among permanent workers compared to temporary workers (De Cuyper & De Witte, 2006, 2007; Virtanen et al., 2002; Sverke et al., 2000). However, other authors have not found significant differences between temporary and permanent workers. For example, De Witte and Näswall (2003) regarding job satisfaction, or Dawson et al. (2015) and Russo and Terraneo (2020) regarding mental health.

⁸ For the Spanish case, Escudero et al. (2023) examined the relationship between precarious employment and psychological well-being (mental health). They concluded that, in comparison to short-term temporary contracts, self-employment, and atypical arrangements, the stability offered by permanent employment contracts contributes to greater well-being. However, this effect is observed only among workers who attain certain specific levels of job satisfaction beforehand.

mainly to the availability of accurate data to measure gig work (OECD/ILO/European Union, 2023). Among the few existing ones, Bajwa et al. (2018) emphasized that the health and well-being of gig workers are influenced by the design and operation of platform businesses. This includes several factors, such as worker classification, control over pricing and workflow, social isolation, and work-related stress arising from monitoring. In the same line, Gross et al. (2018) indicated that gig workers' mental well-being could be affected by precarity of finances, status, certainty and sociability. Bérastégui (2021) showed that gig work generates challenges for workers in terms of physical and social isolation, with the well-documented consequence of a lack of workplace social support, which directly affects workers' health and well-being. Apouey et al. (2020) studied the financial precarity and well-being outcomes of gig economy workers (especially drivers and bikers food delivery) in France before and during the mandatory lockdown of the COVID-19 crisis. They found that, although gig workers were more impacted by the crisis in terms of financial and physical health outcomes, drivers did not report higher levels of stress and anxiety compared to other precarious workers. Interestingly, bikers actually reported lower levels of stress and anxiety. In the framework of organizational theory, Keith et al. (2020) proposed a working model and highlighted that the gig economy could have both negative and positive effects on well-being, depending on the motivations for entering the gig economy and one's experience in the gig economy is likely to rely on the nature of the gig work – particularly how well the job resources balance out the demands. In this line, Berger et al. (2019) utilized administrative data from Uber along with a representative survey of London drivers. They discovered that drivers who prioritize flexibility as a key motivation for joining Uber tend to report elevated levels of subjective well-being. This underscores the significance of non-monetary factors in influencing the welfare of workers within the gig economy.

This paper attempts to contribute to this literature by providing recent empirical evidence on the subjective well-being effects of temporary and self-employment; two non-standard forms of employment that have been closely associated with the emergence of the digital platform or gig economy in recent years.

3. Data

To achieve the objectives of the paper, we exploit data from several sources that include information on self-employment and temporary employment. In a first stage, we provide an overview of the incidence and evolution of temporary and self-employment for Spain and the EU-15 for the period 2000–2018 using aggregated data from the European Union Labour Force Survey (EU-LFS). Specifically, we analyse the incidence of self-employment and temporary work on total employment, attending to several individual and labour characteristics such as gender, educational level, age, and occupation.

The analysis of the relationship between self-employment, temporary employment, and the individual well-being of workers is based on cross-sectional microdata from the 2018 wave of the Spanish Living Conditions Survey (ECV-2018); the Spanish sample of the EU-SILC.

The ECV-2018⁹ is well suited to achieve the purposes of this study as it includes a special module with self-reported information on various dimensions of subjective well-being: self-reported health, happiness, life satisfaction, satisfaction with financial situation, job satisfaction, satisfaction with personal relationships, and satisfaction with leisure time. To complement the ECV-2018 microdata and following the proposal of Apouey and Stabile (2019), we use Google search data on the amount of search activity related to the gig economy. In particular, we use Google trends data at the regional level (autonomous communities)¹⁰ on Deliveroo, Airbnb, Just Eat, Uber, and Freelance as a proxy of the digital platform economy demand to estimate the likelihood that an individual will be employed in a gig-type job (employee with a temporary contract or self-employed).

4. Descriptive analysis

4.1. Jobs related to the gig economy in Spain and in the EU-15

Our analysis starts with an overview of the occurrence and progression of self-employment and temporary employment in EU-15 during the period 2000–2018. We base our examination on aggregated data sourced from the European Union Labour Force Survey (EU-LFS). In general terms, the analysis reveals that self-employment and temporary employment rates are higher in Spain than the rest of the EU-15 countries, especially in terms of temporality. In particular, the percentage of self-employed persons in Spain was 14.9% in 2018, while the figure for the rest of the EU-15 was 13%,¹¹ while the temporary employment rate (measured over total employment) was 22.7% in Spain and 12.6% in the EU-15. As regards individual characteristics, self-employment tends to be more prevalent among men, whereas temporary employment is more common among women. Interestingly, the gap between women in Spain and the rest of Europe regarding temporary employment is widening¹². There is also an inverse relationship with educational level, although this is more evident in the case of temporary jobs. Additionally, older workers tend to engage in self-employment more frequently, whereas temporary employment is predominantly concentrated among young people. As regards self-employment, Figure 1 shows that the incidence of this type of work is lower among workers with tertiary education in Spain than the European average, especially among women. This finding indicates that tasks and occupations linked to these jobs in other European countries tend to require a higher level of qualification (such as liberal professions). Additionally, the data suggest that European women with higher education often choose more flexible work arrangements that prioritize work-family balance more than their Spanish counterparts. Both in Spain and in Europe, the low frequency of self-employment among young people is noteworthy.

⁹ The ECV is conducted on a sample of around 13,000 households and involves approximately 35,000 individuals. Its objective is to collect comparable data on income, poverty, social exclusion, and living conditions across time. Around 90% of the collected data comprises annual variables. The rest are either modules that are collected every three or six years or modules conducted ad-hoc to respond to policy needs.

¹⁰ NUTS-2.

¹¹ In terms of self-employed persons without employees (own-account workers) these figures were 10.4% for Spain and 9.1% for the rest of the EU-15.

¹² See Figures A1 and A2 in the Appendix.

Figure 2 presents data on temporary employment. Notably, Spain exhibits a higher prevalence of temporary employment compared to the other EU-15 countries across all demographic groups. Furthermore, women experience a significantly higher incidence of temporary work. A distinctive feature in Spain is that, unlike men, primary and secondary educated women demonstrate similar rates of temporary employment. These figures are only lower

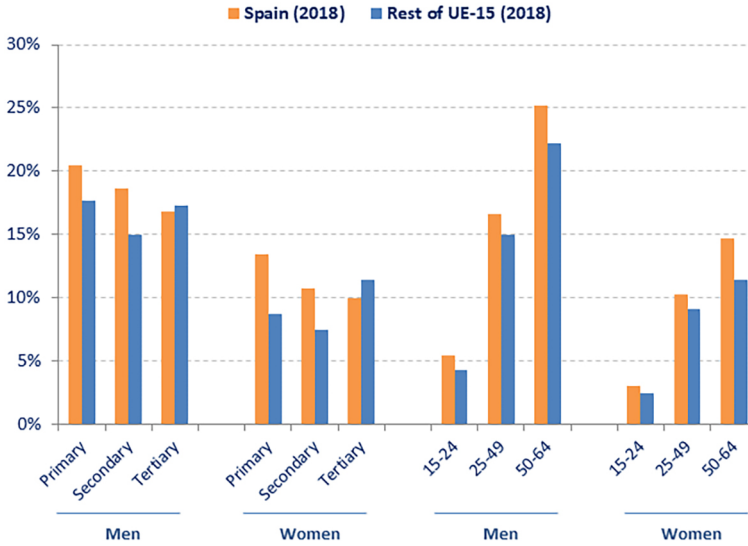


Figure 1. Self-employment in 2018 by gender, educational level, and age (% over total employment) (source: own elaboration based on data from the EU Labour Force Survey (Eurostat, 2018))

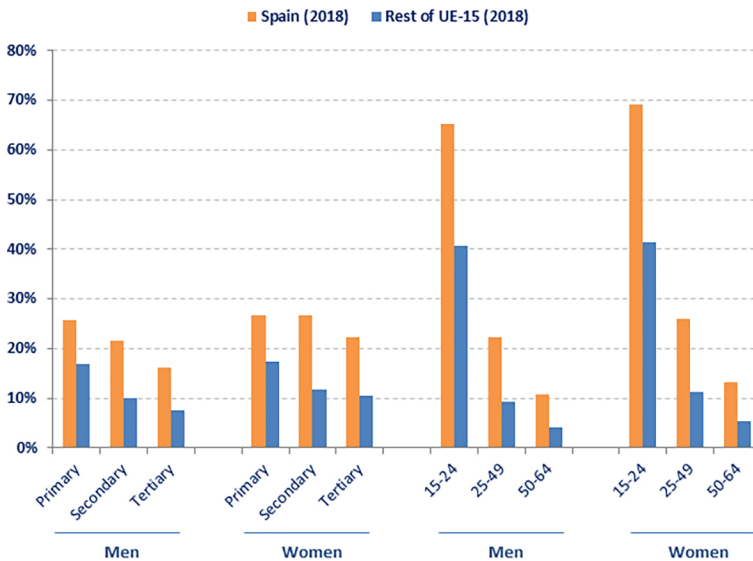


Figure 2. Temporary employment by gender, educational level, and age in 2018 (% over total employment) (source: own elaboration based on data from the EU Labour Force Survey (Eurostat, 2018))

for women with tertiary education. In contrast, the association between job temporality and education is consistent for both men and women across the rest of Europe. These findings suggest that, unlike the broader EU-15 context, Spanish women require more years of education than men do to attain more stable employment. Lastly, there is a significant disparity between Spain and the rest of the EU-15 (26 percentage points) concerning the incidence of temporary work among the youngest workers.

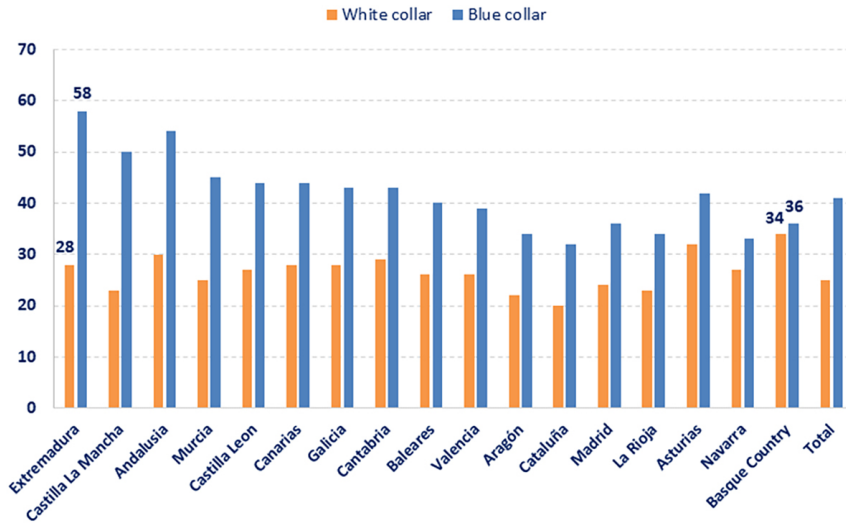
4.2. Employment status and individual subjective well-being

Our analysis of the effects of the digital platform economy or gig economy on individual subjective well-being is based on two subsamples of individuals aged 16–64 years drawn from the ECV-2018 microdata. The first subsample includes 11,377 employed individuals (employees with permanent contracts, employees with temporary contracts, and the self-employed).¹³ The second subsample also considers unemployed and inactive individuals, amounting to a total of 16,527 individuals. Using the first sample we will compare self-employed and temporary workers in terms of well-being, specifically contrasting them with permanent workers. The second sample will enable us to conduct a comparative analysis not only with respect to self-employed and temporary workers but also concerning unemployed and inactive workers. By examining these distinct groups, we aim to gain insights into the well-being implications of different employment arrangements. According to ILO definition, self-employment comprises both self-employed with employees and own-account workers. Self-employed with employees constitute employers as they are people whose primary activity is self-employment and who employ others (and have the authority to decide about how to run the business). They usually represent entrepreneurs and are not considered as atypical forms of employment. In contrast, own-account workers are self-employed working on their own, such as contractors and freelancers, more associated with the type of non-standard employment common in the gig or digital platform economy. Hence, it should be remarked that, similarly to other studies (OECD, 2015; Abraham et al., 2019; Valletta et al., 2020; Bérastégui, 2021), self-employment in the empirical analysis refers exclusively to own-account workers, excluding self-employed persons with employees (employers).

Across the entire sample, we observe that 45.8% of individuals fall into the category of permanent workers, 15.5% are unemployed, and 15.7% of individuals report to be inactive. Approximately 23% of the sample is engaged in one of the typical forms of gig economy work, which includes self-employment (7.7%) and temporary employment (15.3%)¹⁴. These gig economy forms of employment constitute 33.5% of employed individuals in the sample, with temporary employees accounting for 22.2% and the self-employed comprising 11.2%. Figure 3 provides insights into self-employment and temporary employment across Spanish regions (autonomous communities) and distinguishes between white-collar (managerial, professional, technical, or administrative positions) and blue-collar (skilled workers in service, manufacturing, or construction sectors, operators, and workers in elementary occupations). Incidence of gig economy jobs is much lower in white-collar occupations across all regions,

¹³ See Table A1 in Appendix A for a detailed description of the different employment status in the ECV.

¹⁴ Table A2 in the Appendix displays the sample characteristics of both samples.



Notes: White-collar occupations (Directors and managers, Scientific technicians and professionals, Support technicians, Accountants and administrative staff). Blue-collar occupations (Service workers and salespersons, Skilled agricultural workers, Skilled artisans and skilled industrial and construction workers, Operators and assemblers, Elementary occupations). Armed forces occupations have not been included. Self-employed refers to own-account workers.

Figure 3. Self-employment and temporary employment across regions by type of occupation (%) (source: own elaboration (ECV-2018))

being more prevalent in blue-collar occupations. Notably, Extremadura exhibits a 58% incidence of self-employment and temporary employment in blue-collar occupations. Similar patterns are observed in Castilla-La Mancha, Andalusia, and Murcia. In contrast, the Basque Country shows the smallest differences between blue-collar (36%) and white-collar (34%) occupations.

Table 1 delves into the interplay between gig economy jobs and individual well-being. It offers a descriptive analysis of various dimensions of subjective well-being, based on individuals' employment status. For all dimensions, this is self-reported information. Here are the specifics. In the case of satisfaction variables, responses are recorded on a scale of 1 to 11, where value 1 signifies "not at all satisfied," and value 11 represents "completely satisfied." In the case of self-reported health and happiness, the variables use a scale ranging from 1 (very bad) to 5 (very good). This self-reported information sheds light on how different employment arrangements impact well-being¹⁵. Numerous studies have demonstrated that subjective well-being measures possess strong predictive power for relevant phenomena. These measures are correlated with a variety of observable indicators, including physical health and longevity (Danner et al., 2001), suicide rates, macroeconomic fluctuations (Di Tella et al., 2003), and unemployment (Clark et al., 2008), among other factors. These self-reported measures also show reasonable consistency, as they correlate well with each other and with

¹⁵ See Table A3 in Appendix A for a detailed description of the well-being variables.

Table 1. Main descriptives of well-being variables

	Permanent contracts		Temporary contracts		Self-employed (own-account workers)		Unemployed		Inactive	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Self-reported Health	4.12	0.65	4.15	0.68	4.04	0.68	3.88	0.81	3.60	0.99
Happiness	4.02	0.86	3.97	0.89	3.91	0.87	3.65	1.01	3.81	0.98
Life satisfaction	8.80	1.38	8.43	1.62	8.59	1.50	7.48	2.06	8.16	1.95
Financial satisfaction	7.91	1.74	7.22	1.99	7.60	1.77	5.72	2.43	7.18	2.19
Personal relationship satisfaction	9.32	1.38	9.28	1.39	9.29	1.33	9.08	1.61	9.18	1.59
Job satisfaction	8.41	1.72	8.05	1.93	8.26	1.85	–	–	–	–
Leisure satisfaction	7.42	2.18	7.41	2.18	6.88	2.50	8.02	2.17	8.33	2.08
N	7,570		2,528		1,279		2,560		2,590	

Note: Almost all pairwise mean differences across economic status are statistically different from zero. Test results are available upon request.

alternative measures based on information provided by family and friends and a wide range of psychological and psychosocial indicators (Cacioppo & Patrick, 2008).

As Table 1 shows, employed workers report higher levels of individual well-being than unemployed or inactive individuals except in leisure satisfaction. In general terms, well-being seems to be higher for employed workers with permanent contracts, especially in the dimension of financial satisfaction. Employed workers with a permanent contract report a mean score of 7.91 in financial satisfaction, which is 10% higher than the score reported by fixed-term employees and 4% higher than self-employed workers. To a lesser extent, permanent employees report a mean value of job satisfaction and life satisfaction that is 4% and 2% higher than fixed-term employees and self-employed workers, respectively. In contrast, no significant differences were found between self-employed and temporary workers in the mean values of the different well-being indicators, with the only exception being leisure satisfaction. Both permanent and fixed-term workers report much higher levels of satisfaction with leisure time than self-employed workers (around 8% higher).

These data suggest that the type of contract exerts an effect on individual well-being. In the next section we aim to shed more light on the impact of these atypical working arrangements on individual well-being.

5. Empirical model and econometric strategy

To examine how self-employment and temporary work affect individual well-being, we utilize the following specification:

$$SWB_{ij} = \alpha + \beta LMS_{ij} + \gamma X_{ij} + \delta Y_j + \epsilon_{ij}, \quad (1)$$

where SWB_{ij} represents the subjective well-being of individual i who lives in region j . As mentioned, we consider seven dimensions of well-being: self-reported health, happiness, life

satisfaction, satisfaction with financial situation, job satisfaction, satisfaction with personal relationships, and satisfaction with leisure time. For the estimation of Equation (1), the different SWB measures are considered to encompass a cardinality-type classification. While the assumption of cardinality rather than ordinality is not relevant for the results (Ferrer-i-Carbonell & Frijters, 2004), it has the advantage of producing coefficients that can be directly interpreted as marginal effects.

LMS_{ij} is a vector that includes several dummy variables related to the employment situation of individual i in region j . Specifically, for the analysis of the subsample of employed persons, the vector LMS_{ij} includes the dummy variable GIG_Emp (which takes the value of 1 if the person is self-employed or is on a temporary contract). In addition, for the analysis of the total sample of individuals (employed, unemployed, and inactive) the vector LMS_{ij} includes the dummy variables $Unemployed$ and $Inactive$, which take the value of 1 if the individual is unemployed or inactive, respectively. For both samples, the reference category in the estimations is *Permanent* (being employed with a permanent contract). Moreover, to explore in greater depth which types of contractual arrangements closely linked to the gig economy may lead to lower levels of well-being, we consider the self-employed (*Self-Employed*) and temporary employees (*Temporary_Employed*) separately.

Vector X_{ij} includes several socio-demographic characteristics at the individual and household levels. The individual characteristics include gender, age, marital status, and level of education, and the household characteristics are total household size, number of children, household income, and an indicator of whether the household has difficulties in making ends meet. This vector also includes a dummy variable that distinguishes between blue-collar¹⁶ and white-collar occupations. Finally, vector Y_j includes the average income and unemployment rate at regional level.

Our empirical strategy starts with the estimation of equation (1) by ordinary least squares (OLS) for both subsamples (employed individuals and total sample). In the first model (OLS-1) we have jointly considered self-employed and temporary workers under the category GIG_Emp , while the second model (OLS-2) considers both types of employment arrangements separately in the estimations (*Self_employed* and *Temporary_Emp*).

An inherent problem in determining the sign of the causal effect that the type of work most closely related to the digital platform economy may have on individual well-being is the possibility of a reverse causality and selection problem. In other words, levels of individual well-being might affect the probability that an individual is self-employed or a temporary employee. Moreover, other unobservable factors may affect both the likelihood of being employed in a gig-economy-related job and individual well-being. To address these problems, and in line with previous work (Apouey & Stabile, 2019; Berger et al., 2019), Equation (1) is also estimated using an instrumental variables methodology (IV).

Following Apouey and Stabile (2019), we use Google Trends data at the regional level (autonomous communities)¹⁷ for the year 2018 corresponding to the number of Google

¹⁶ Based on major groups 5 to 9 of the ISCO-2008 (Service workers and salespersons, Skilled agricultural workers, Skilled artisans and skilled industrial and construction workers, Operators and assemblers, Elementary occupations). Armed forces are excluded from the analysis.

¹⁷ Autonomous communities (NUTS-2) is the highest level of regional disaggregation provided by Google trends data for Spain.

searches for different digital platforms related to the gig economy (Deliveroo, Airbnb, Just Eat, Uber, and Freelance). We use these Google trends data as a proxy variable for the gig economy demand and hence as an instrument to estimate the probability that an individual is employed in one of the two contractual arrangements most closely related to the gig economy (self-employment or temporary job). These web search data are increasingly being used as measures of economic activity or indicators of the demand in this type of digital platform economy, which also make it possible to obtain predictions on the evolution of unemployment among other macroeconomic variables (see, e.g., D'Amuri & Marcucci, 2017).

More precisely, using a sample of searches, Google Trends provides the percentage of a region's searches for a given word divided by the percentage of searches on a given word in that region with the highest share of searches for that same word multiplied by 100. The resulting data is therefore relative to the region with the highest share of searches at time t equal to 100.

Specifically, for region j at time t the score for the word "W" is defined as follows:

$$\text{Search}_W_{j,t} = \frac{\left[\frac{\text{Google searches that include the word "W"}}{\text{Total Google searches}} \right]_{j,t}}{\left[\frac{\text{Google searches that include the word "W"}}{\text{Total Google searches}} \right]_{j_{\max,t}}} \times 100.$$

Notice that our identification strategy relies on the assumption that Google searches for different digital platforms do not exert a direct impact on individual well-being, except through the employment situation. Nonetheless, these Google searches might also be a proxy for the total economic activity of the region, which may be correlated with individual levels of well-being. To address this issue, we have included in vector Y_j of equation (1) the average income and unemployment rate at the regional level.

6. Results

Table 2 and Table 3 display the results from the OLS and IV regressions for the sample of employed individuals and the full sample, respectively. Since we find evidence of endogeneity in all the estimates¹⁸, not controlling for the reverse causality problem (OLS-1 and OLS-2) would result in misleading conclusions. Hence, our comments will be based on models IV-1 and IV-2 where we control for possible sources of endogeneity and self-selection.

Starting with the sample of employed individuals (Table 2), the results indicate that jointly considering the types of jobs most closely linked to the digital platform economy affects negatively and significantly almost all the dimensions of individual well-being (Table 2, Model IV-1). The largest and most highly significant effect appears in the dimension of life satisfaction (the coefficient is -2.994), followed by self-reported health. The lowest effect occurs in the leisure dimension. Additionally, when considering self-employment and temporary employment separately (Table 2, Model IV-2), we find that the negative impact on well-being is mostly caused by self-employment. This is an interesting issue, since when we do not

¹⁸ The endogeneity test of endogenous regressors is significant at the 1% level in all estimates.

Table 2. Effects of the work-related with the digital platform economy on individual well-being (employed workers). Main results

	Self-reported health				Happiness			
	OLS-1(a)	OLS-2(b)	IV-1(a)	IV-2 (b)	OLS-1(a)	OLS-2(b)	IV-1(a)	IV-2 (b)
GIG_Emp	-0.036*		-2.326***	-	-0.074***	-	-2.011***	-
	[0.017]		[0.506]		[0.018]		[0.483]	
Self_employed	-	-0.027	-	-5.182***	-	-0.075**	-	-2.899**
		[0.024]		[1.337]		[0.027]		[0.941]
Temporary_Emp	-	-0.041*	-	-0.621	-	-0.074***	-	-0.059
		[0.020]		[0.679]		[0.022]		[0.478]
Life satisfaction				Financial satisfaction				
GIG_Emp	-0.113***	-	-2.994***	-	-0.101***	-	-1.798***	-
	[0.019]		[0.608]		[0.017]		[0.426]	
Self_employed	-	-0.038	-	-6.870***	-	-0.023	-	-5.042***
		[0.027]		[1.773]		[0.024]		[1.408]
Temporary_Emp	-	-0.157***	-	0.278	-	-0.147***	-	0.859
		[0.022]		[0.901]		[0.020]		[0.715]
Personal relationships satisfaction				Leisure satisfaction				
GIG_Emp	-0.031	-	-1.376**	-	-0.060**	-	-1.353**	-
	[0.020]		[0.436]		[0.020]		[0.434]	
Self_employed	-	0.005	-	-4.448**	-	-0.166***	-	-3.035**
		[0.028]		[1.441]		[0.031]		[0.982]
Temporary_Emp	-	-0.052*	-	1.671*	-	0.003	-	-0.858+
		[0.023]		[0.732]		[0.023]		[0.499]
Job satisfaction								
GIG_Emp	-0.079***	-	-1.396**	-				
	[0.020]		[0.441]					
Self_employed	-	0.006	-	-3.787**				
		[0.030]		[1.155]				
Temporary_Emp	-	-0.129***	-	-0.065				
		[0.024]		[0.587]				
N	11,377	11,377	11,377	11,377	11,377	11,377	11,377	11,377

Standard errors in brackets. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

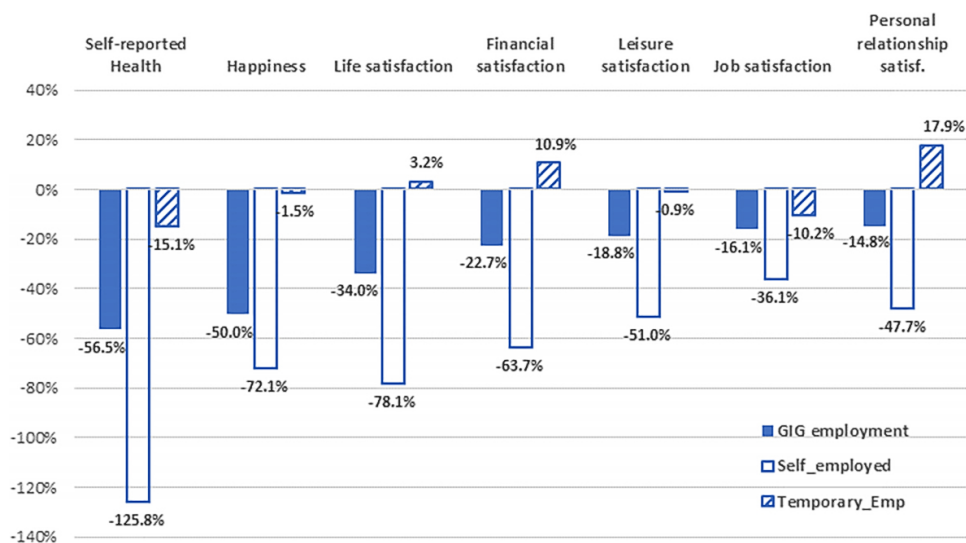
(a) Variable *Gig* considers jointly self-employment and temporary employment; (b) Self-employment and temporary employment appear separately. Self-employed refers to own-account workers.

Controls: gender, age, educational level, marital status, number of children, household size, household income, household with difficulties to make ends meet, white/blue collar, regional unemployment rate, regional mean income.

Instruments: We use data on Just Eat, Uber, and Airbnb (Google trends) for Model IV-1. Just Eat, Uber, Airbnb, and population size for IV-2. Alternative estimates were made with different combinations including the number of Deliveroo and Freelance searches and finally the number of Just Eat, Uber, and Airbnb searches was chosen as the best instruments. Results not included but available upon request.

control for the reverse causality problem (OLS-2), we obtain the false result that temporary jobs are associated with the lowest levels of well-being, while the self-employed show only slightly lower levels of well-being than permanent employees. However, a completely different picture emerges when a methodological approach that allows controlling for the reverse causality problem is applied. In this case, we find that self-employed workers display the worst results in practically all the well-being dimensions analysed (Model IV-2), while temporary workers do not exhibit significantly lower levels of well-being than their counterparts in permanent jobs. However, it is worth noticing that being employed in a temporary job implies a higher individual well-being in the dimension of satisfaction with personal relationships¹⁹.

As regards the size of the effect, in Figure 4, we plot the differences (in %) in all dimensions of well-being between types of employment related to the gig economy and the corresponding levels among permanent workers (reference category). We sort the dimensions of well-being from the smallest to the largest effect. We find that gig-economy-related workers display average levels of self-reported health that are 56.5% lower than permanent workers.



Notes: The difference in well-being is computed by dividing the corresponding coefficients for gig-related employment, self-employed and temporary employees from the estimations of models IV-1 and IV-2 (Table 2, sample of employed workers) by the mean value of each well-being indicator for permanent employees (reference category; see column 2 in Table 1). For instance, the -56.5% is the result of dividing the coefficient of gig related employment in the self-reported health dimension (Model IV-1) by the mean value of self-reported health among permanent employees (-2.326/4.12). Coefficients of temporary employment are only statistically significant for the dimension of personal relationships (see Table 2, Model IV-2). Self-employed refers to own-account workers.

Figure 4. Differences in well-being for self-employed and temporary workers vs. permanent employees (%) (source: own elaboration (ECV-2018 and Just Eat, Uber, and Airbnb data from Google trends))

¹⁹ We have performed some robustness checks. Following a referee's comment, we have compared IV estimates distinguishing by full-time and part-time employment. We have also considered a more restricted definition of self and temporary workers excluding those who declare not having access to an internet connection at home, and a second restricted definition only considering self and temporary workers in the service sector (and have an internet connection). The main results hold. See Appendix B (Tables B1-B2) for a detailed explanation of the robustness analysis.

This percentage is 125.8% in the case of the self-employed. Regarding other dimensions of well-being, the adverse impact of non-standard work arrangements commonly linked to the gig economy is less pronounced. However, even in the dimension with the lowest negative effect (job satisfaction), self-employees exhibit significantly lower levels of well-being (36.1% lower) than individuals in permanent jobs. Therefore, our results provide evidence that the negative impact of non-standard work arrangements most commonly associated with the gig economy on individual well-being is mainly driven by self-employment. This is a novel result since most of the literature has found that greater flexibility and autonomy in self-employment usually has a positive effect on well-being (Wang et al., 2022; Vučković et al., 2023).

The negative relationship between the non-standard work arrangements most related with the gig economy and individual levels of well-being still holds. Furthermore, this effect is slightly amplified when the analysis includes unemployed and inactive individuals (Table 3). The most detrimental well-being effects are observed again in the dimensions of life satisfaction, followed by happiness and self-reported health (coefficients in Model IV-1). When we consider different types of labour market status, we find that self-employed workers again suffer the largest negative effect with respect to permanent employees, followed by unemployed and inactive individuals (Model IV-2 in Table 3). In contrast, temporary employment does not have a significant negative effect on individual well-being, and its positive influence on the dimension of satisfaction with personal relationships remains.

The negative impact of self-employment on well-being can partly be attributed to the circumstances during the Great Recession (starting in 2008). Many workers compelled to opt for this form of non-standard employment as the sole means to avoid unemployment, even though it might not have been their preferred choice. Consequently, the heightened insecurity and precariousness associated with necessary self-employment outweighed the potential benefits arising from the greater flexibility and autonomy inherent in this type of work²⁰. Interestingly, related research has also found a positive effect of self-employment on individual well-being, primarily driven by midsize and large employers. This underscores the nuanced impact of different employment arrangements on our overall sense of well-being.

This type of self-employee usually displays specific characteristics, such as high levels of motivation or more ability to recognize opportunities among others, which used to be positively related to individual well-being. In contrast, farmers, dependent freelancers, and own account workers generally have fewer of these features and tend to have lower levels of mental well-being (Gevaert et al., 2018). In a similar vein, Figure 5 shows the differences in dimensions of well-being for the self-employed, temporary workers, the unemployed, and inactive individuals with respect to permanent employees (reference category). The smallest difference is observed in the dimension of leisure satisfaction. In this well-being dimension, being self-employed leads to a 64.8% lower average satisfaction levels. In contrast, the largest difference appears in self-reported health, where the well-being of self-employed workers is, on average, 166.3% lower than that of permanent employees. The detrimental effects of being unemployed or inactive on well-being range from 1% (personal relationships) to 30.4%

²⁰ Binder and Blankenber (2021) emphasized that individuals who are self-employed out of necessity often exhibit lower levels of autonomy in their respective occupations, display diminished intrinsic motivation, and may also lack the personality traits typically associated with an entrepreneurial personality.

Table 3. Effects of the work-related with the digital platform economy on individual well-being (Total sample). Main results

	Self-reported health				Happiness			
	OLS-1(a)	OLS-2(b)	IV-1(a)	IV-2 (b)	OLS-1(a)	OLS-2(b)	IV-1(a)	IV-2 (b)
GIG_Emp	-0.051** [0.016]	-	-3.439*** [0.814]	-	-0.070*** [0.018]	-	-3.624*** [0.862]	-
Self_employed	-	-0.021 [0.024]	-	-6.850*** [1.837]	-	-0.076** [0.026]	-	-5.492*** [1.577]
Temporary_Emp	-	-0.067*** [0.019]	-	-0.785 [0.962]	-	-0.067** [0.021]	-	-0.262 [0.826]
Unemployed	-0.171*** [0.021]	-0.172*** [0.021]	-1.608*** [0.347]	-1.251*** [0.360]	-0.232*** [0.023]	-0.232*** [0.023]	-1.740*** [0.368]	-0.976** [0.309]
Inactive	-0.415*** [0.023]	-0.415*** [0.023]	-1.701*** [0.311]	-1.446*** [0.327]	-0.108*** [0.023]	-0.108*** [0.023]	-1.457*** [0.329]	-0.829** [0.281]
Life satisfaction				Financial satisfaction				
GIG_Emp	-0.117*** [0.018]	-	-5.167*** [1.130]	-	-0.110*** [0.016]	-	-2.786*** [0.688]	-
Self_employed	-	-0.041 [0.026]	-	-11.116*** [2.940]	-	-0.041+ [0.023]	-	-6.819*** [1.921]
Temporary_Emp	-	-0.159*** [0.022]	-	0.752 [1.539]	-	-0.149*** [0.019]	-	0.861 [1.006]
Unemployed	-0.459*** [0.024]	-0.462*** [0.024]	-2.602*** [0.482]	-1.594** [0.576]	-0.496*** [0.021]	-0.499*** [0.021]	-1.631*** [0.293]	-1.057** [0.377]
Inactive	-0.178*** [0.024]	-0.179*** [0.024]	-2.095*** [0.432]	-1.320* [0.524]	-0.103*** [0.020]	-0.105*** [0.020]	-1.119*** [0.263]	-0.687* [0.342]
Personal relationships satisfaction				Leisure satisfaction				
GIG_Emp	-0.027 [0.019]	-	-2.345*** [0.690]	-	-0.058** [0.020]	-	-1.958** [0.634]	-
Self_employed	-	0.011 [0.028]	-	-6.647** [2.193]	-	-0.181*** [0.031]	-	-4.810*** [1.438]
Temporary_Emp	-	-0.048* [0.022]	-	2.693* [1.148]	-	0.01 [0.022]	-	-0.655 [0.753]
Unemployed	-0.064** [0.024]	-0.065** [0.024]	-1.048*** [0.294]	-0.093 [0.430]	0.394*** [0.024]	0.399*** [0.024]	-0.412 [0.270]	-0.385 [0.282]
Inactive	-0.028 [0.024]	-0.029 [0.024]	-0.908*** [0.264]	-0.154 [0.391]	0.449*** [0.024]	0.451*** [0.024]	-0.272 [0.242]	-0.293 [0.256]
N	16,527	16,527	16,527	16,527	16,527	16,527	16,527	16,527

Note: Standard errors in brackets. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

(a) Variable *Gig* considers jointly self-employment and temporary employment; (b) Self-employment and temporary employment appear separately. Self-employed refers to own-account workers.

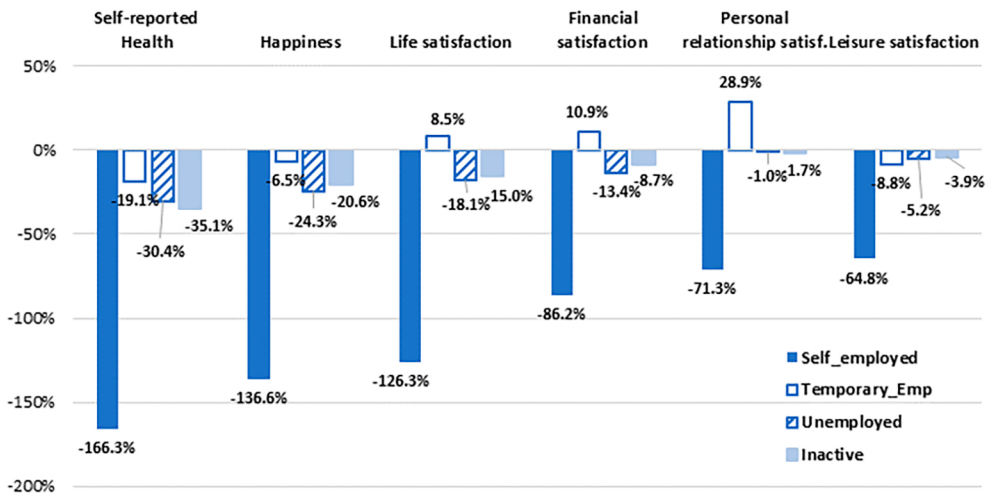
Controls: gender, age, educational level, marital status, number of children, household size, household income, household with difficulties to make ends meet, white/blue collar, regional unemployment rate, regional mean income.

Instruments: We use data on Just Eat, Uber, and Airbnb (Google trends) for Model IV-1. Just Eat, Uber, Airbnb, and population size for Model IV-2. Alternative estimates were made with different combinations including the number of Deliveroo and Freelance searches and finally the number of Just Eat, Uber, and Airbnb searches was chosen as the best instruments. Results not included but available upon request.

(self-reported health) in the case of unemployed workers, and from 1.7% (personal relationships) to 35.1% (self-reported health) in the case of inactive individuals. Although not significantly different from zero in almost all the well-being dimensions, temporary employees seem to experience higher levels of well-being in the dimension of personal relationships by 28.9% with respect to permanent workers.

Overall, our results highlight the importance of correcting for the endogeneity of self-employment and temporary employment when analysing the influence of these types of jobs on individual well-being. To check the validity of the instruments, Table 4 displays the underidentification and overidentification tests, Anderson canon correlation LM statistic, and Sargan statistic using as instruments the number of Google searches for “Just Eat”, “Uber” and “Airbnb” (for Model IV-1) plus the regional²¹ population size for Model IV-2. In almost all estimates, both tests lead us to reject the hypothesis of weak instruments, hence confirming the validity of the Google Trends data linked to the digital platform economy as instruments.

In sum, our results seem to indicate that the greater job insecurity and precariousness experienced by self-employees (own-account workers) exceed the potential favourable effects related to the greater flexibility and autonomy of these types of workers. Thus, our findings align with prior research in the literature, which indicates that the experience of job loss and the stress associated with factors such as low support (Syrett, 2016) or high workloads and



Notes: The differences in well-being is computed by dividing the corresponding coefficients for self-employed, temporary employment, unemployment, and inactivity from estimations for Model IV-2 (Table 3, total sample) by the mean value of each well-being indicator for permanent employees (reference category; see second column in Table 1). Coefficients of temporary employment are only statistically significant in the personal relationships dimension (Table 3, Model IV-2). Self-employed refers to own-account workers.

Figure 5. Differences in well-being for self-employed, temporary workers, unemployed and inactive vs. permanent employees (%)

(source: own elaboration (ECV-2018 and Just Eat, Uber, and Airbnb data from Google trends))

²¹ Spanish Autonomous Communities (NUTS2). Figures referred to 2018.

long working hours (Hyytinen & Ruuskanen, 2007; Nordenmark et al., 2012) in gig economy roles lead to overall unfavourable outcomes (De Witte, 1999, 2005; Sverke et al., 2002; Cheng & Chan, 2008; Probst, 2008). This effect is particularly pronounced for the group of self-employed individuals we analysed in this study – specifically, freelancers or independent professionals. Empirical evidence suggests that this group faces the poorest working conditions and mental well-being. Several factors may contribute to this situation: over-commitment tendencies (Syrett, 2016); low autonomy, economic dependence, and financial hardship (Böheim & Mühlberger, 2009); or the phenomenon of Effort-Reward Imbalance (Ertel et al., 2005). These combined factors underscore the unique challenges faced by self-employed individuals in terms of their well-being.

Table 4. Underidentification test and overidentification test of all instruments in Instrumental variables estimates

	Employed workers				Total sample			
	Sargan statistic (overidentification test of all instruments):							
	IV-1 (a)		IV-2 (b)		IV-1 (a)		IV-2 (b)	
Self-reported health	13.864	***	1.622		6.764	*	0.284	
Happiness	8.072	*	22.828	***	4.295		12.605	**
Life satisfaction	16.694	***	4.975	+	18.515	***	7.037	*
Financial satisfaction	10.832	**	0.506		10.217	**	0.806	
Job satisfaction	19.279	***	4.769	+	–		–	
Personal relationships satisf.	7.692	*	4.094		6.764	*	6.641	*
Leisure satisfaction	11.892	**	5.1	+	12.3	**	1.87	
	Underidentification test (Anderson canon. corr. LM statistic)							
	IV-1 (a)		IV-2 (b)		IV-1 (a)		IV-2 (b)	
	32.583	***	16.453	***	24.453	***	15.432	**

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

7. Conclusions

In this study, we examined the impact of being employed in job types closely associated with the digital platform or gig economy on various dimensions of individual well-being in Spain for the year 2018. Spain is among the EU countries with the highest volume of digital platform work. The findings indeed validate a greater prevalence of self-employment and, particularly, temporary employment in Spain when compared to the other EU-15 countries over the period spanning from 2000 to 2018. According to our data, the self-employed have lower levels of individual well-being than the rest of workers, with the greatest negative impact on self-reported health (125.8% lower than permanent workers). Our results also underline the relevance of correcting for the endogeneity of self-employment and temporary employment. Once we control for the reverse causality problem using Google trends data as instruments of digital platform economy demand, temporary workers do not exhibit significantly lower

levels of well-being than their counterparts in permanent jobs. Thus, we can conclude that the negative impact on well-being is mostly caused by self-employment (own-account workers).

Our estimates indicate that the adverse impact on well-being, stemming from factors like job insecurity and precariousness associated with self-employment, outweighs the potential positive impact arising from the greater flexibility and autonomy inherent in this type of work. However, in our estimations we do not find evidence that temporary employment produces negative effects on individual well-being. These findings indicate that the profile of self-employed workers has changed since the Great Recession of 2008–2013, as nowadays self-employment is no longer a voluntary decision between being an employee or self-employed but rather the result of the only opportunity for employment in a strongly deteriorated labour market.

Some limitations should be mentioned. To date, there is no standard measure that allows determining the true incidence of the digital platform economy in society because existing data sources have problems capturing workers engaged in “gig jobs”. In this sense, the only relevant progress is the Online Labour Index²² which measures the use of digital platforms in real time for all countries and occupations.

Furthermore, it is important to note that while self-employment and temporary employment are closely associated with the digital platform economy, they do not provide a fully accurate representation of gig jobs. Consequently, the findings of this study should be interpreted with caution. To gain a more precise understanding of the impact of the digital platform economy on society, it would be essential to collect higher quality data specifically focused on professionals working within and for digital platforms. This could be achieved, for example, by means of a register kept by the platforms themselves that would make it possible to obtain a census with detailed information on these workers. In addition, it would be very useful to be able to monitor workers in this type of non-standard jobs (e.g., through longitudinal databases) in order to correct the usual potential biases arising from both the self-selection of individuals in these jobs and the existence of unobservable factors that may simultaneously affect employment decisions and other types of individual decisions or situations; topics of study that could be of interest to researchers.

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Author contributions

These authors contributed equally to this work.

²² See Kässi and Lehtonvirta (2018).

Disclosure statement

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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APPENDIX

Appendix A. Main definitions and data characteristics

Table A1. Description of dependent variables: Self-defined current (main) economic status

Main job	<p>Respondents declare their main current activity status on the basis of how most time is spent. Persons who work simultaneously in their own professional practice and for a public or private employer should be classified according to the status where they work the longer number of hours.</p> <p>If the person combines different part-time jobs as an employee that result in the equivalent hours of a full-time job, the person should consider herself as an employee working full-time. The same holds if the person has a main job as an employee and an additional "small" (in terms of hours) second job as a self-employed person, both jobs being remunerated in what would be considered, together, as the remuneration for a full-time equivalent role.</p>
Self-employed	<p>In the ECV the self-employed are defined as persons who work in their own business, professional practice or farm for the purpose of earning a profit. Among the self-employed, those who employ paid employees are defined as "employers", while those without paid employees are defined as "own-account workers".</p> <p>Self-employment is becoming more prevalent in the EU, and it is becoming more heterogeneous in its nature. The types of occupation in which the self-employed are engaged have diversified. Many new self-employed are involved in the service sector, but the skill level of these jobs varies widely from low-paid jobs on temporary contracts to high-paid and specialised jobs in banking and financial services and information technology. The traditional self-employed person running a business, perhaps with a few employees, is joined by people in casual work or involved with sub-contracting.</p>
Self-employed without employees (Own-account workers)	<p>Own-account workers are defined as persons who work in their own business, professional practice or farm for the purpose of earning a profit and who do not employ any other person.</p> <p>A freelancer should be classified as self-employed, although a person who has been regularly retained by a single employer for some time may also be regarded as an employee.</p>
Temporary employees	<p>Temporary employees are defined as workers who work for a public or private employer receiving compensation in the form of wages, salaries, fees, etc. but both the employer and the employee understand that the termination of the job is determined by objective conditions such as reaching a certain date, completion of an assignment or return of another employee who has been temporarily replaced. The condition for its termination is generally mentioned in the contract.</p>

Table A2. Sample characteristics (source: own elaboration (ECV-2018))

	Employed individuals (N = 11,377)				Total sample (N = 16,527)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Permanent workers	0.665	0.472	0	1	0.458	0.498	0	1
Temporary workers	0.222	0.416	0	1	0.153	0.360	0	1
Self-employed (own-account workers)	0.112	0.316	0	1	0.077	0.267	0	1
Unemployed	–	–	0	0	0.155	0.362	0	1
Inactive	–	–	0	0	0.157	0.364	0	1
Number of children	0.632	0.861	0	5	0.563	0.840	0	5
Ln (Household size)	1.385	0.306	0.693	2.485	1.374	0.310	0.693	2.639
Ln (Household income)	9.718	0.650	0.693	11.893	9.564	0.926	0.336	12.007
Household with difficulties to make ends meet	0.483	0.500	0	1	0.542	0.498	0	1
Female	0.472	0.499	0	1	0.504	0.500	0	1
Married	0.596	0.491	0	1	0.579	0.494	0	1
Divorced	0.076	0.264	0	1	0.078	0.269	0	1
Widowed	0.011	0.105	0	1	0.018	0.132	0	1
16–24 years	0.038	0.192	0	1	0.056	0.230	0	1
25–34	0.158	0.364	0	1	0.147	0.354	0	1
35–44	0.286	0.452	0	1	0.244	0.430	0	1
45–54	0.308	0.462	0	1	0.283	0.450	0	1
55–64	0.210	0.407	0	1	0.270	0.444	0	1
Primary education	0.063	0.243	0	1	0.102	0.303	0	1
Lower secondary	0.248	0.432	0	1	0.279	0.448	0	1
Upper secondary	0.243	0.429	0	1	0.244	0.430	0	1
Tertiary	0.447	0.497	0	1	0.375	0.484	0	1
Ln (Unemployment rate)	2.603	0.263	2.300	3.163	2.628	0.276	2.300	3.163
Ln (Regional income)	10.268	0.144	9.953	10.465	10.256	0.147	9.953	10.465
Blue collar occupation	0.535	0.499	0	1	0.597	0.490	0	1

Table A3. Well-being variables

Variable	Question	Original scale	Transformation
Self-perceived general health	How is your health in general? (The respondent should take into account the different dimensions of health, i.e. physical, social and emotional functioning and biomedical signs and symptoms).	1 Very good 2 Good 3 Fair 4 Bad 5 Very bad	5 Very good 4 Good 3 Fair 2 Bad 1 Very bad
Overall life satisfaction	Overall, how satisfied are you with your current life? (The respondent should take into account that the term "life" is intended as all areas of a person's life at the time of the survey).	From 0 (Not at all satisfied) to 10 (Completely satisfied)	From 1 (Not at all satisfied) to 11 (Completely satisfied)
Satisfaction with financial situation	Overall, how satisfied are you with the financial situation of your household? (The respondent should take into account income adequacy, level of savings, capacity to pay back debt and money owed, the ability to meet large emergency expenses, level of assets for the entire household).	From 0 (Not at all satisfied) to 10 (Completely satisfied)	From 1 (Not at all satisfied) to 11 (Completely satisfied)
Satisfaction with personal relationships	Overall, how satisfied are you with people you often spend time with? (The respondent should take into consideration his/her relationships with family, friends, colleagues, neighbors, etc.).	From 0 (Not at all satisfied) to 10 (Completely satisfied)	From 1 (Not at all satisfied) to 11 (Completely satisfied)
Satisfaction with time use (amount of leisure time)	Overall, how satisfied are you with the amount of time you have to do things that you like? (The respondent should take into consideration time for hobbies, leisure, time off work)	From 0 (Not at all satisfied) to 10 (Completely satisfied)	From 1 (Not at all satisfied) to 11 (Completely satisfied)
Satisfaction with job	Overall, how satisfied are you with your current job? (The respondent should take into consideration tasks performed, workplace atmosphere, pay, hours, etc.)	From 0 (Not at all satisfied) to 10 (Completely satisfied)	From 1 (Not at all satisfied) to 11 (Completely satisfied)
Being happy	During the last four weeks how often have you been happy?	1 All of the time 2 Most of the time 3 Some of the time 4 A little of the time 5 None of the time	5 All of the time 4 Most of the time 3 Some of the time 2 A little of the time 1 None of the time

Note: For the estimation of Equation (1), the different well-being measures are considered to encompass a cardinality-type classification. The assumption of cardinality has the advantage of producing coefficients that can be directly interpreted as marginal effects (Ferrer-i-Carbonell & Frijters, 2004).

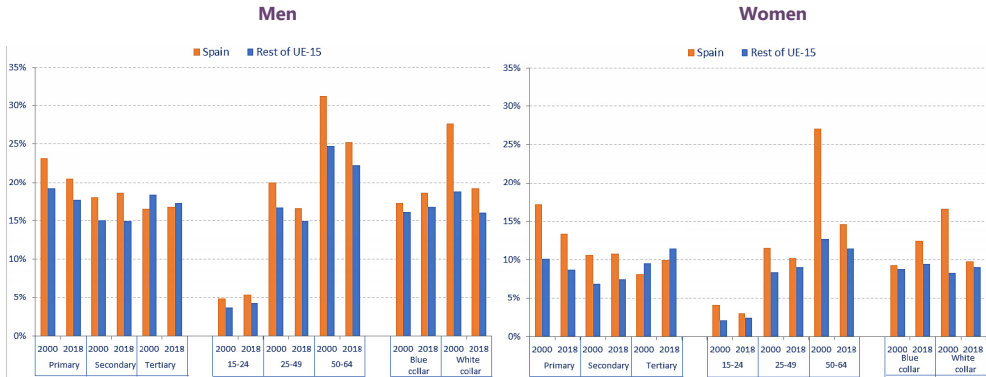


Figure A1. Self-employment by personal characteristics (% over total employment): 2000–2018 (source: own elaboration (European Labour Force Survey, Eurostat, Population aged 15–64 years))

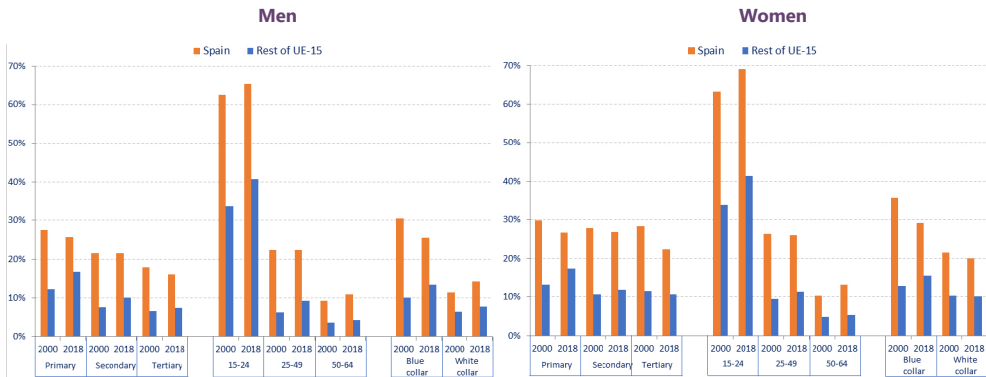


Figure A2. Temporary employment by personal characteristics (% over total employment): 2000–2018 (source: own elaboration (European Labour Force Survey, Eurostat, Population aged 15–64 years))

Appendix B. Robustness checks

To check our results robustness, we have performed some extra analysis. First, we distinguish between full-time and part-time workers. In the ECV, full-time workers are defined as those working more than 30 weekly hours in their main job. In our sample, 5.8% (74 individuals) and 25.4% (642 individuals) of self-employed and temporary employees, respectively, are part-time workers. As the sample of part-time self-employed workers is too small (only 74 individuals), we have replicated the estimates considering the difference between “gig-related” full-time vs. “gig-related” part-time in the first set of estimations and between “self”, “full-time temporary employee”, “part-time temporary employee” in the second.

The results are shown in Table B1 and B2 for employed people and the entire sample, respectively. The general results remain: the negative effect of the work arrangements most common in the gig economy on individuals’ well-being only comes from self-employment. Note that when we consider the broader category “gig-related employment” the main effect

is mainly driven by full-time workers. We cannot be sure if this is because of the intrinsic characteristics of this type of (full-time) workers or due to a composition effect, as the negative effect is driven by self-employment and in our sample the part-time self-employed workers are under-represented (5.8%).

Finally, we have replicated the above estimates for two additional restricted subsamples. As having an internet connection is essential to participate in the digital platform economy, we have considered a first restricted subsample of workers excluding those self-employed and temporary employees who declare not having an internet connection for personal use at home (the internet access can be via Smartphone, other wireless handheld device such as tablet or others, video games console, laptop, desktop computer, TV, etc.). Among the internet activities for personal use, the ECV includes buying/selling goods or services, as well as others (social networking, sending/receiving emails, using services related to travel and accommodation, creating web pages, blogs, Internet banking, reading or downloading online music, video, news, looking for information, telephoning or making video calls, taking part in online consultations or voting on civic or political issues). This restricted subsample corresponds to 95.4% and 93.9% of the original sample of self-employed and temporary employees, respectively (Tables B1 and B2 "Restricted definition 1: Internet").

As the type of activities related to the digital platform economy is mainly developed in the service sector, we have considered a second set of estimates with only self and temporary workers employed in the service sector (and having an internet connection at home). This restricted definition corresponds to 64.3% and 67.3% of the original sample of self-employed and temporary employees, respectively (a dummy for the remaining self-employed and temporary workers is included among control variables to keep permanent employees as the reference category). Results are shown in Tables B1 and B2 ("Restricted definition 2: Service sector + Internet"). As can be seen, the main results hold, although the significance level is lower when the definition of gig economy related work is restricted to the service sector.

Table B1. Effects of the digital platform work related on individual well-being by workhour (Employed persons)

	Self-reported health						Happiness					
	Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet		Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet	
	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)
GIG_Emp_full	-2.514***	-	-2.492***	-	-5.409+	-	-2.088***	-	-2.273***	-	-5.287*	-
	[0.644]		[0.754]		[2.833]		[0.483]		[0.569]		[2.178]	
GIG_Emp_part	2.819	-	3.334	-	7.306	-	0.083	-	-0.311	-	2.139	-
	[2.147]		[2.580]		[5.156]		[1.709]		[2.059]		[4.103]	
Self_employed	-	-4.357**	-	-4.208*	-	-8.734+	-	-2.584**	-	-2.710*	-	-5.661*
		[1.486]		[1.634]		[4.990]		[0.995]		[1.102]		[2.792]
Temporary_Emp_full	-	-1.065	-	-1.143	-	-1.584	-	-0.229	-	-0.138	-	0.323
		[0.766]		[0.779]		[2.205]		[0.534]		[0.542]		[1.281]

	Self-reported health						Happiness					
	Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet		Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet	
	IV-1 ^(a)	IV-2 ^(b)	IV-1 ^(a)	IV-2 ^(b)	IV-1 ^(a)	IV-2 ^(b)	IV-1 ^(a)	IV-2 ^(b)	IV-1 ^(a)	IV-2 ^(b)	IV-1 ^(a)	IV-2 ^(b)
Temporary_Emp_part	-	2.884	-	3.505	-	8.453	-	1.278	-	1.267	-	2.387
		[3.016]		[3.594]		[6.866]		[2.120]		[2.552]		[4.060]
	Life satisfaction						Financial satisfaction					
GIG_Emp_full	-2.916***	-	-3.004***	-5.316**	-	-5.316**	-1.879***	-	-1.757***	-	-3.629*	-
	[0.684]		[0.799]	[2.017]		[2.017]	[0.438]		[0.499]		[1.746]	
GIG_Emp_part	-5.102*	-	-5.270+	-2.41	-	-2.41	0.403	-	0.894	-	3.252	-
	[2.314]		[2.768]	[3.746]		[3.746]	[1.495]		[1.732]		[3.214]	
Self_employed	-	-8.831**	-	-	-15.920*	-	-	-5.364***	-	-4.868**	-	-9.146*
		[2.887]			[6.872]			[1.611]		[1.618]		[4.196]
Temporary_Emp_full	-	1.335	-	-	2.586	-	-	1.032	-	0.962	-	2.023
		[1.459]			[3.121]			[0.838]		[0.773]		[1.927]
Temporary_Emp_part	-	-8.049	-	-	-4.574	-	-	-0.509	-	0.213	-	2.789
		[5.899]			[9.768]			[3.396]		[3.664]		[5.968]
	Personal relationships satisfaction						Leisure satisfaction					
GIG_Emp_full	-1.357**	-	-1.397**	-2.386+	-	-2.386+	-1.492**	-	-1.328*	-	-2.954	-
	[0.441]		[0.525]	[1.218]		[1.218]	[0.520]		[0.592]		[1.913]	
GIG_Emp_part	-1.891	-	-2.299	-0.482	-	-0.482	2.436	-	2.76	-	5.414	-
	[1.489]		[1.793]	[2.194]		[2.194]	[1.719]		[1.998]		[3.442]	
Self_employed	-	-5.654**	-	-	-9.044+	-	-	-2.259*	-	-1.954	-	-4.615
		[2.042]			[4.717]			[1.143]		[1.222]		[3.463]
Temporary_Emp_full	-	2.320*	-	-	4.206*	-	-	-1.276*	-	-1.390*	-	-2.099
		[1.040]			[2.126]			[0.602]		[0.601]		[1.554]
Temporary_Emp_part	-	-3.446	-	-	-2.120	-	-	2.436	-	2.671	-	6.530
		[4.189]			[6.536]			[2.224]		[2.591]		[4.704]
	Job satisfaction											
GIG_Emp_full	-1.397**	-	-1.226*	-	-2.230+	-						
	[0.436]		[0.481]		[1.247]							
GIG_Emp_part	-1.365	-	-0.999	-	0.737	-						
	[1.507]		[1.689]		[2.325]							
Self_employed	-	-4.634**	-	-4.310**	-	-7.940*						
		[1.587]		[1.628]		[3.556]						
Temporary_Emp_full	-	0.376	-	0.236	-	0.600						
		[0.828]		[0.781]		[1.684]						
Temporary_Emp_part	-	-3.404	-	-3.254	-	-0.300						
		[3.286]		[3.626]		[5.065]						
N	11,377	11,377	11,163	11,163	11,377	11,377	11,377	11,377	11,163	11,163	11,377	11,377

Standard errors in brackets. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference category: Permanent workers.

^(a) Self-employment and temporary employment are jointly considered in the variable *Gig*; ^(b) Self-employment and temporary employment appear separately. Self-employed refers to own-account workers.

Restricted definition 1: Self-employed and temporary employees are defined as self-employed (own-account workers) and temporary employees who have an internet connection at home for several internet activities, including buying/selling goods and services. *Restricted definition 2:* Self-employed and temporary employees are defined as self-employed (own-account workers) and temporary employees in the service sector who have an internet connection.

Controls: gender, age, educational level, marital status, number of children, household size, household income, household with difficulties to make ends meet, white/blue collar, regional unemployment rate, regional mean income. A dummy of the remaining self and temporary workers is included among control variables for estimates based on the second restricted definition. *Instruments:* Google trends data on Just Eat, Uber, and Airbnb for Model IV-1. Just Eat, Uber, Airbnb, and population size for IV-2.

Table B2. Effects of the work-related with the digital platform economy on individual well-being by workhour (Total sample)

	Self-reported health						Happiness					
	Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet		Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet	
	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)
GIG_Emp_full	-3.416***	-	-3.577***	-	-7.848+	-	-3.603***	-	-4.007***	-	-9.558*	-
	[0.837]	-	[1.047]	-	[4.223]	-	[0.849]	-	[1.092]	-	[4.678]	-
GIG_Emp_part	1.383	-	1.657	-	6.032	-	0.764	-	0.313	-	4.037	-
	[2.611]	-	[3.201]	-	[6.079]	-	[2.718]	-	[3.415]	-	[6.848]	-
Self_employed	-	-6.341**	-	-6.593**	-	-13.211+	-	-4.629**	-	-4.799*	-	-9.385+
	-	[2.028]	-	[2.411]	-	[7.170]	-	[1.714]	-	[2.049]	-	[5.481]
Temporary_Emp_full	-	-0.971	-	-1.089	-	-1.022	-	-0.577	-	-0.491	-	0.228
	-	[1.016]	-	[1.047]	-	[2.809]	-	[0.869]	-	[0.900]	-	[2.152]
Temporary_Emp_part	-	0.907	-	1.104	-	5.942	-	2.611	-	3.081	-	5.549
	-	[3.968]	-	[4.930]	-	[8.342]	-	[3.384]	-	[4.239]	-	[6.482]
Unemployed	-1.166**	-1.088*	-1.156*	-1.095+	-1.402	-1.033	-1.338**	-0.699	-1.464**	-0.656	-2.020	-0.605
	[0.422]	[0.514]	[0.525]	[0.643]	[1.131]	[1.120]	[0.433]	[0.434]	[0.554]	[0.548]	[1.259]	[0.861]
Inactive	-1.279***	-1.282**	-1.269**	-1.284*	-1.481	-1.213	-1.073**	-0.552	-1.189*	-0.513	-1.681	-0.458
	[0.385]	[0.491]	[0.479]	[0.612]	[1.027]	[1.057]	[0.396]	[0.414]	[0.506]	[0.521]	[1.144]	[0.812]
	Life satisfaction						Financial satisfaction					
GIG_Emp_full	-5.189***	-	-5.677**	-	-10.277*	-	-2.774***	-	-2.708***	-	-5.664+	-
	[1.371]	-	[1.760]	-	[4.652]	-	[0.660]	-	[0.801]	-	[2.996]	-
GIG_Emp_part	-9.707*	-	-10.142+	-	-5.040	-	-0.336	-	0.280	-	3.427	-
	[4.202]	-	[5.295]	-	[6.753]	-	[2.080]	-	[2.459]	-	[4.348]	-
Self_employed	-	-15.940**	-	-17.202*	-	-31.294+	-	-7.668**	-	-7.414**	-	-14.031+
	-	[5.663]	-	[6.894]	-	[16.023]	-	[2.428]	-	[2.688]	-	[7.198]
Temporary_Emp_full	-	2.515	-	2.098	-	4.874	-	1.171	-	1.051	-	2.489
	-	[2.792]	-	[2.976]	-	[6.312]	-	[1.218]	-	[1.166]	-	[2.866]
Temporary_Emp_part	-	-15.300	-	-17.048	-	-11.712	-	-1.963	-	-1.382	-	1.651
	-	[10.871]	-	[13.916]	-	[18.776]	-	[4.820]	-	[5.550]	-	[8.503]
Unemployed	-3.018***	-3.145*	-3.098***	-3.426+	-3.170*	-3.523	-1.407***	-1.330*	-1.303**	-1.259+	-1.445+	-1.265
	[0.687]	[1.409]	[0.879]	[1.815]	[1.250]	[2.510]	[0.334]	[0.619]	[0.402]	[0.721]	[0.804]	[1.136]
Inactive	-2.491***	-2.868*	-2.563**	-3.107+	-2.622*	-3.135	-0.905**	-0.960	-0.810*	-0.879	-0.931	-0.858
	[0.626]	[1.345]	[0.801]	[1.726]	[1.136]	[2.368]	[0.305]	[0.592]	[0.367]	[0.686]	[0.730]	[1.072]

	Self-reported health						Happiness					
	Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet		Original sample		Restricted definition 1: Internet		Restricted definition 2: Service sector + Internet	
	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)	IV-1(a)	IV-2 (b)
	Personal relationships satisfaction						Leisure satisfaction					
GIG_Emp_full	-2.356** [0.779]	-	-2.584* [1.007]	-	-4.361+ [2.344]	-	-1.941** [0.661]	-	-1.753* [0.802]	-	-3.674 [2.638]	-
GIG_Emp_part	-4.529+ [2.387]	-	-5.043+ [3.009]	-	-2.214 [3.348]	-	1.733 [2.046]	-	2.240 [2.415]	-	5.201 [3.750]	-
Self_employed	-	-9.727** [3.757]	-	-10.065* [4.394]	-	-16.678+ [9.875]	-	-4.449** [1.571]	-	-4.335* [1.784]	-	-8.981+ [5.069]
Temporary_Emp_full	-	3.819* [1.851]	-	3.622+ [1.895]	-	6.880+ [3.860]	-	-0.786 [0.803]	-	-0.968 [0.792]	-	-1.140 [2.028]
Temporary_Emp_part	-	-7.558 [7.219]	-	-8.446 [8.840]	-	-6.356 [11.347]	-	0.544 [3.051]	-	0.519 [3.607]	-	4.622 [5.933]
Unemployed	-1.248** [0.394]	-1.084 [0.934]	-1.310** [0.504]	-1.205 [1.152]	-1.234+ [0.633]	-1.123 [1.515]	-0.074 [0.333]	-0.269 [0.394]	0.042 [0.400]	-0.274 [0.470]	0.023 [0.709]	-0.209 [0.795]
Inactive	-1.099** [0.359]	-1.143 [0.892]	-1.157* [0.459]	-1.237 [1.096]	-1.084+ [0.576]	-1.111 [1.429]	0.050 [0.304]	-0.177 [0.376]	0.152 [0.365]	-0.177 [0.448]	0.146 [0.644]	-0.104 [0.750]
N	16,527	16,527	16,313	16,313	16,527	16,527	16,527	16,313	16,313	16,527	16,527	

Standard errors in brackets. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Reference category: Permanent workers.

(a) Self-employment and temporary employment are jointly considered in the variable *Gig*; (b) Self-employment and temporary employment appear separately. Self-employed refers to own-account workers. *Restricted definition 1*: Self-employed and temporary employees are defined as self-employed (own-account workers) and temporary employees who have an internet connection at home for several internet activities, including buying/selling goods and services. *Restricted definition 2*: Self-employed and temporary employees are defined as self-employed (own-account workers) and temporary employees in the service sector who have an internet connection.

Controls: gender, age, educational level, marital status, number of children, household size, household income, household with difficulties to make ends meet, white/blue collar, regional unemployment rate, regional mean income. A dummy of the remaining self and temporary workers is included among control variables for estimates based on the second restricted definition. *Instruments*: Google trends data on Just Eat, Uber, and Airbnb for Model IV-1. Just Eat, Uber, Airbnb, and population size for IV-2.