

Pollio, Chiara; Landini, Fabio; Prodi, Elena; Arrighetti, Alessandro

Working Paper

Does Temporary Employment undermine the Quality of Permanent Jobs?

GLO Discussion Paper, No. 1273

Provided in Cooperation with:

Global Labor Organization (GLO)

Suggested Citation: Pollio, Chiara; Landini, Fabio; Prodi, Elena; Arrighetti, Alessandro (2023) : Does Temporary Employment undermine the Quality of Permanent Jobs?, GLO Discussion Paper, No. 1273, Global Labor Organization (GLO), Essen

This Version is available at:

<https://hdl.handle.net/10419/270902>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Does Temporary Employment undermine the Quality of Permanent Jobs?¹

Chiara Pollio^{a,b}, Fabio Landini^{c, d, e, b}, Elena Prodi^{b,f}, Alessandro Arrighetti^{c,b}

^a University of Ferrara, ^b CIMET – Italy’s National University Center for Applied Economic Studies, ^c University of Parma, ^d Rutgers School of Management and Industrial Relations, ^e Global Labour Organization (GLO), ^f University of Macerata

May, 2023

Abstract

Standard screening and core-periphery theories claim that temporary employment does not undermine the quality of permanent jobs. In contrast, organizational approaches suggest that firms use temporary contracts to pursue low-road employment strategies, which involve the creation of cheap and low quality jobs also for permanent employees. We test these predictions by matching administrative data at the occupation, worker and firm level from the Emilia Romagna region (Italy). Job quality is measured through non-wage occupation-specific factors capturing *self-realisation*, *recognition* and *social support*. Baseline and IV estimates show that a larger use of temporary employees is associated with permanent jobs of lower quality. Moreover, in firms using more temporary workers the jobs of permanent employees are more routinized and less complex. Also, in such firms, permanent workers hold occupations that receive less training and involve less teamwork. These results suggest that where temporary work is used, the low quality of permanent positions is driven by work arrangements that tend to economize on individual skills and competences, which is consistent with the low-road employment hypothesis. Related managerial and policy implications are discussed.

Key words: job quality; temporary employment; skills; labour market institutions

JEL Code: D22, J28, J41, L23

¹ **Acknowledgment:** We thank seminar and conference participants at SIEPI 2022 and IIPPE 2022.

1. Introduction

In recent years, there has been growing awareness among scholars and policy makers about the inability of advanced capitalist economies to produce a sufficient amount of good jobs (Acemoglu, 2001; Aiginger and Rodrik, 2020; Rodrik and Stantcheva, 2021). Stagnant wages and temporary forms of employment have been frequently identified as major sources of the problem, especially in the low-cost service sectors (Gash and McGinnity, 2006; Elia, 2010; Mishel, 2012; Levy and Kochan, 2012; David and Dorn, 2013; OECD, 2015; ILO, 2016; Dwyer and Wright, 2019). In manufacturing industries, the available evidence is somewhat more reassuring as workers tend to receive better pay and more stable contractual arrangements, but also in these sectors the trend is toward greater precarization of work (Nagaraj, 1994; Battisti and Vallanti, 2013; Addessi, 2014; Bellani and Bosio, 2021). This is particularly worrisome as precarious jobs have been shown to impact negatively on several dimensions of workers' well-being, such as stress, health, safety, and security (Bryson and Harvey, 2000; Clarke et al., 2007; Lewchuk, 2017; Moscone et al., 2016; Kalleberg, 2018; Aleksynska, 2018).

In this paper we contribute to this literature by investigating if and how the use of temporary workers affects the quality of permanent jobs, where by 'quality' we mean non-wage attributes of jobs contributing to worker welfare such as self-realization, social support and security. According to traditional screening and core-periphery theories, this effect should be weak and if anything positive. In fact, in such frameworks temporary contracts are used either to screen new hires before the access to a permanent position (Portugal and Varejão, 2010) or as a device to create a buffer of flexibility based on precarious, fixed-term or external employees (Kalleberg, 2001; ILO, 2016). In either of the cases, the theory predicts that the quality of permanent jobs should not decrease with a larger use of temporary contracts. In contrast, the approaches supporting the so-called low-road employment hypothesis suggest that when firms decide to pursue competitive strategies based on low labour costs and temporary employment, they have strong incentives to design jobs of relatively low quality for all types of employees, independently of their contract. By doing so, in fact, firms can economize on costly skills and exert effective discipline on permanent workers by virtue of their close substitutability with temporary ones (Osterman, 2018; Fukao et al., 2022; Basu et al., 2021). Thus, in such cases increases in the use of temporary work are expected to be associated with the creation of permanent positions of similar low quality, pointing towards a knock-on effect that negatively affects the quality of all jobs (Bellani and Bosio, 2021).

We test these contrasting predictions by combining different data at multiple levels of analysis, using the Emilia-Romagna region (Italy) as a case. In particular, we combine: a) data on the quality of jobs at the occupation level (5-digit ISCO) by the 2013 *Indagine Campionaria delle Professioni*

(ICP), an O*NET-type of dataset providing detailed information on tasks, organizational and procedural sequences of the activities done at the workplace; b) contract-level administrative information taken from the SILER-ARTER system, which includes, for each employment contract activated or terminated in Emilia-Romagna region between 2008 and 2017, information about the contractual arrangement and the occupational code of the employee; and c) firm-level accounting and financial information for the same period (i.e. 2008-2017) obtained from the AIDA-BVD database. We end up with an original dataset including more than 64.000 firm-level observations with detailed firm- and worker-level yearly information. To avoid issues related to the insufficient number of permanent employees, we limit our analysis to the manufacturing sector.

We obtain the following results. First, a higher incidence of temporary work correlates negatively with the average quality of permanent positions. This result holds also when we consider different indicators of job quality as dependent variable, as well as when we instrument temporary work with the unemployment rate in the local labour market area. Moreover, when we look more specifically at the task content of occupations, we find that in firms with more temporary workers, permanent employees perform jobs that are on average more routinized and less complex compared to the other firms. In such firms there is a lower number of permanent professions that are usually involved in activities characterized by training and team work. Intuitively, these results suggest that the low quality of permanent jobs is driven by work arrangements that tend to economize on worker skills and competences, which is fully consistent with the low-road employment hypothesis. This evidence has strong policy implications as it points towards the existence of a potentially excess demand of bad jobs that involve not only temporary workers (as usually assumed) but also permanent ones (Rodrik and Sable, 2020).

Our paper contributes to extend the literature on temporary work and job quality. In particular, the latter has developed along two main lines. The first one has looked at the drivers of temporary employment among firms, placing particular attention on their role as devices to screen individual competences (Baranowska et al., 2011; Faccini, 2014; Portugal and Varejão, 2010) and to cope with market volatility and shocks (Atkinson, 1984, 1987; Kalleberg, 2001). Other works have also stressed the role that temporary work plays in supporting strategies of cost reduction and downsizing among firms and put it in contrast with management practices of opposite sign, oriented towards the valorisation of internal human resources and quality productions (Kleinknecht et al., 2006; Osterman, 2018; Arrighetti et al., 2021). Our paper adds to these different views by testing their explanatory power concerning the consequences for job quality ensuing from the mixing between temporary and permanent jobs. In particular, we show that the approaches linking the use of temporary contracts

with strategies of cost reductions tend to provide predictions concerning the quality of permanent jobs that are the most consistent with the data.

The second line of research that is relevant for us concerns the consequences of temporary contracts for the well-being of employees (De Witte and Näswall, 2003; Carrieri et al., 2012; Lewchuk, 2017; Kalleberg, 2018). Initially, this literature focused primarily on the quality of temporary jobs, studying a variety of psychological and material factors (De Cuyper et al., 2008; Green et al., 2010; Dixon, 2011; Kauhanen and Nätti, 2015; Chadi and Hetschko, 2016). A number of studies have also investigated the interplay of temporary and permanent employees within the same workforce and the related implications for job performance and quality (Broschak and Davis-Blake, 2006; De Cuyper et al., 2010; Von Hippel and Kalokerinos, 2012). In particular, issues related to the motivation and organizational engagement of permanent workers have received some attention (Davis-Blake et al., 2003; George, 2003; De Cuyper and De Witte, 2006). In this paper we contribute to this literature by investigating structural channels (i.e. firm-level mixing of occupations) through which temporary employment can undermine the quality of permanent jobs. By doing so we highlight hidden consequences for the quality of work that have been widely overlooked by previous research.

The remaining parts of the study are organized as follows. Section 2 presents the main competing views on the drivers behind firms' decisions to use temporary employment and their predictions on job quality. Section 3 describes the dataset, presents descriptive evidence, and discusses the empirical strategy employed in the estimation. Section 4 presents and discusses the results and the robustness checks. Finally, section 5 concludes by identifying managerial and policy implications.

2. Background literature

2.1 Temporary contracts as screening devices

The recent expansion in temporary employment has led many scholars and policy makers to investigate the reasons behind its large use. One of the main theories that has been put forward is that that fixed-term contracts provide firms with two main advantages: first they allow greater flexibility in the use of production inputs (in particular labour); second, they enable employers to screen new hires for a prolonged period of time before shifting into a permanent position (Baranowska et al., 2011; Faccini, 2014; Portugal and Varejão, 2010). In presence of uncertainty surrounding the real productivity of employees (because for instance traditional indicators such as educational credentials and employment history are compromised), such contracts can be used by employers to obtain more complete information about the activity of the workers and eventually discard those employees that do not meet minimum productivity standards.

When applied to issues related to the mixing of permanent and temporary workers, this theory conceives the quality of permanent positions as being essentially unrelated to the use of temporary contracts. The latter are viewed as entry positions that, depending on idiosyncratic characteristics of the workers, may eventually lead to more permanent jobs, whose quality can vary. In firms that make large use of highly qualified and well remunerated workers, the quality of permanent jobs can be high, and often associated with welfare improving non-wage attributes such as greater decisional autonomy and social support (Esser and Olsen, 2012; Arranz et al., 2018). On the contrary, in firms that are intensive in the use of low skilled labour, the average quality of permanent positions will tend to be low. Whether a firm belongs to the first or second group depends mainly on context-specific factors (e.g. sector of activity), but it is essentially unrelated to the more or less intensive use of temporary contracts. The latter are just screening devices that firms use to deal with information asymmetries and their adoption does not affect the composition of permanent jobs inside firms.

Although highly successful, especially among policy makers, the empirical evidence supporting the screening hypothesis is at best inconclusive. Some works do find results that are consistent with the use of fixed-term contracts as tools to learn about the quality of the matching between employers and employees (Faccini, 2014; Berton et al., 2011; Gerfin et al., 2005; Heinrich, 2005; Ichino et al., 2005; Lane et al., 2003; de Graaf-Zijl et al., 2011). At the same time, however, a number of studies report opposite results. Biegert and Kühhirt (2018), for instance, using data from the German Socio-Economics Panel show that individually laid off workers, whose productivity tends to be relatively uncertain, are not more likely to enter a fixed-term contract in their subsequent job applications compared to other types of job seekers. Similarly, Barbieri and Scherer (2009) and Autor and Houseman (2010) document that in Italy and the U.S. episodes of temporary employment do not improve but rather undermine future career chances of workers, with particularly negative effects on earnings and hiring contracts. These results, as well as those reported in other studies (Fuller and Stecy-Hildebrandt, 2015; D'Addio and Rosholm, 2005; Yu, 2012; Gash and McGinnity, 2007; Giesecke, 2009; Scherer, 2004; Amuedo-Dorantes, 2000; Arranz et al., 2010; Gagliarducci, 2005), cast doubt on the explanatory power of the screening hypothesis. As a result, we also expect the latter to be a relatively weak predictor of the quality implications of temporary and permanent job mixing.

2.2 The core-periphery perspective

Another theory that has attracted wide attention in scholarly research is the one that advances the so-called core-periphery hypothesis (Atkinson, 1984, 1987). According to the latter, firm decisions concerning labour utilization are driven primarily by the need to deal with the high volatility of market demand, which requires flexibility in production. Firms can achieve the latter in two ways: on the one

hand, they can rely on internal (or functional) flexibility, i.e. strengthening the ability of permanent employees to perform a variety of tasks within the organization in response to market fluctuations; on the other, they can exploit external (or numerical) flexibility, i.e. hiring temporary employees through on-demand jobs that are by definition flexible and volatile (Kalleberg, 2001). Oftentimes, these different solutions can co-exist within organizations, leading to an internal segmentation of the workforce (Doeringer and Piore, 1971). In these cases, permanent employees are conceived as the “core” of the organization, consisting of highly trained, skilled, and committed workers that are also the repository of firm-specific competences and knowledge. Temporary employees, on the contrary, operate as a buffer of numerical flexibility, encompassing low qualified and poorly committed workers that are involved in routinized and standardized activities through transactional contracts (Atkinson, 1984, 1987; Atkinson and Meager, 1986).

If used to make inference about job quality, the prediction of the core-periphery theory is straightforward. As long as the higher skill profile of specific jobs is associated with better wage and non-wage attributes of work (e.g. greater autonomy in the management of time, higher variety in tasks, higher relevance of intellectual over physical work), such theory predicts the quality of core permanent occupations to be positively associated with the incidence of peripheral temporary jobs, through two main mechanisms. First, increases in the share of temporary workers induce firms to expand the internal segmentation of the workforce and keep in the core only the most qualified and valuable workers. As a consequence, the mean quality of permanent positions should increase. Second, in presence of a large stock of temporary jobs, the bargaining power of permanent workers rises, as the former protect the latter against the risk of job termination (Dolado et al., 2002; Gebel and Giesecke, 2011). This creates incentives to include into permanent positions only those workers whose potential for rent extraction is less detrimental to the firm, such as those performing high skill and firm-specific tasks. As a result, thanks to this second mechanism, the average quality of permanent jobs should increase even further with the share of temporary work.

Likewise, the screening theory, also for the core-periphery perspective the empirical evidence is at present mixed. Although some studies show that in certain contexts patterns of internalization and externalization do co-exist within the same organization, other contributions question the idea that firms can use functional and numerical flexibility simultaneously (Kalleberg, 2001). Osterman (2000), for instance, using establishment-level US data documents that firms relying on functional flexibility for core occupations are significantly less likely to make use of temporary employment compared to other firms. Similarly, Fukao et al., (2022) find that in Japan a growing presence of temporary workers weakens the ability of permanent employees to appropriate rents, which contrasts with the idea that core employees feel somewhat “protected” thanks to the presence of peripheral

workers. Analogous evidence contrasting the core-periphery view has been reported by other studies using data from various countries (e.g. Davis-Blake and Uzzi, 1993; Cappelli, 1995). Moreover, recent contributions show that even when an internal segmentation between permanent and temporary workers is present, its drivers tends to be different from those put forward by the core-periphery approach (which basically boil down to the volatility of market demand). In particular, Arrighetti et al., (2022) document that firms-specific managerial resources play a key role in determining the firm's propensity to use functional vs. numerical flexibility, thus influencing the relative degree of internal segmentation. Overall, based on the available evidence, we thus expect also this theory to provide only limited insights on our research question.

2.3 An alternative view: the low-road employment hypothesis

The seemingly inconsistent evidence that characterizes the two theories discussed above lead us to advance an alternative view to frame the relationship between temporary work and the quality of permanent jobs. To do so, we rely on earlier works supporting the so-called high/low-road employment hypothesis. At the core of the latter is the idea that, within the same industry and product market segment, firms enjoy several degrees of freedom to set their preferred work arrangements, which are often functional to the pursuing of specific competitive advantages (Osterman, 2018; Arrighetti et al., 2021). Based on a long tradition of institutional research, this view conceives employers as agents whose choices often deviate from pure optimizing decisions and rather reflect political processes aimed at recomposing conflicting interests among social groups (Osterman, 2011). In some cases, the outcome of such political processes can be the adoption of employment practices characterized by good working conditions, relatively high wages and wide contractual safeguards, including an extended use of permanent contracts (i.e. the high-road). In others, the result can be the opposite with low wages that are combined with poor working conditions and little (if any) contractual protection, as exemplified by the large use of temporary work (i.e. the low road). The emergence of high- vs. low-road to employment is possible in traditional as well as in advanced industries and it ultimately depends on the complex interactions between firm idiosyncratic factors and contextual (both structural and institutional) constraints (Landini et al., 2020).

Within this perspective the use of temporary work is primarily associated with the aim of reducing labour costs, via the conversion of fixed wage bills into variable costs. Obviously, this weakens the firm's ability to attract skilful and competent employees.² However, such choice can be fully consistent with a low-road employment strategy that considers costs, and thus price, as the main

² Except for a minority (especially in manufacturing) of skilled consultants hired on-demand through non-standard contracts.

source of competitive advantage. In terms of job quality, such strategy has a twofold implication. First, being costs the main source of competitive advantage, it creates an incentive to minimize wage expenditure across all types of jobs, including those foreseeing a permanent contract. Thus, for such positions low-road firms will tend to hire professions characterized by sufficiently low market salary, which often implies that other non-wage attributes of jobs contributing to quality (e.g. self-realization, social recognition) will be low too. Second, in presence of asymmetric information and incomplete contracts, low-road firms have an incentive to maintain temporary and permanent jobs as substitutable as possible, as this strengthens their bargaining power vis-à-vis the latter (Fukao et al., 2022; Basu et al., 2021). In our setting this argument, which reminds the traditional radical position supporting the use of contractual forms as disciplinary device (Marglin, 1974; Braverman, 1974; Gintis, 1976, Bowles, 1985), implies that the tasks and quality of permanent occupations will tend to match quite closely those of the temporary ones, with the possibility of a negative knock-on effect on the quality of all jobs. This line of reasoning is further reinforced by the finding that extensive use of low-quality temporary work inevitably generates a demand for equally low-quality permanent work. The need to strengthen the internal cohesion of the working team, to give continuity to operational roles and to define continuous links with the organization as a whole call for the signing of permanent employment contracts for workers who do not have superior skills compared to the temporary ones but that it can be useful to keep in stable positions over time.

In terms of available empirical evidence, previous works provide some support for the high/low-road employment hypothesis in general, and the existence of knock-on effects between temporary and permanent jobs in particular. With respect to the variety of employment strategies, a considerable body of research document the existence of large and persistent within-industry wage differentials among firms that cannot be explained by labour market rigidities alone (Montgomery, 1991; Groshen, 1991; Lane et al., 2007). Rather, they seem to match quite closely divergent high vs. low-road approaches to work organization across firms (Holzer et al., 2004; Zeynep, 2014; Card et al., 2016; Osterman, 2018). Moreover, with specific reference to knock-on effects, there is some evidence that the latter are present at least for wages. In particular, a recent work by Bellani and Bosio (2021) using European occupation-level data shows that temporary contracts indeed exert a negative impact on the average wage of permanent employees and this effect seems particularly strong for occupations that make little use of technical skills, i.e., those for which the substitutability between temporary and permanent employees is the easiest. Similar results provide support for the existence of a negative wage externality effect that derives from the mixing between temporary and permanent jobs, which have the potential to undermine the welfare of all the employees. To investigate whether such effects hold also for non-wage attributes of jobs is the main aim of the next sections.

3. Data and methodology

3.1 Building the database

Our empirical analysis focuses on manufacturing firms active in the Emilia-Romagna region (Italy) along the time span 2008-2017. The choice of focusing on manufacturing lies in the relevance of such sector for the Italian economy, as well as on its role for stimulating economic growth at large (Kaldor, 1967; more recently Szirmai, 2013; Andreoni and Chang, 2016, and many more). Moreover, likewise other countries, the Italian manufacturing sector is still characterized by a relatively larger share of permanent workers compared to services, which makes our analysis of greater interest.

Among Italian regions Emilia-Romagna emerges as one of the leaders in manufacturing production: it ranks third in terms of value added and employees. In particular, the manufacturing industry employs about 34% of workers, and deploys about 35% of total value added. Moreover, an additional advantage of restricting the analysis to Emilia-Romagna lies in the structure of the regional labour market, which is not highly affected by informal employment – a widespread phenomenon in Italy (Di Caro and Nicotra, 2016). This means that, overall informal employment does not represent a viable alternative to temporary employment for firms in the region, strengthening the robustness of our results.

Given this context, we build the measures of our focus variables by combining different data sources. Information about *employment contracts* are retrieved from administrative data available in the SILER-ARTER system – a linked employer-employee database on the Emilia-Romagna labour market that is provided by ARTER (Attractiveness Research Territory – Emilia-Romagna Joint Stock Consortium). This database includes all mandatory communications that firms with production units located in Emilia-Romagna have to submit to regional offices in cases of major employment events (e.g. hiring, firing, contract transformation) occurred between January 2008 and December 2017. For each event, data includes information about the contractual arrangement (type of contract, start and end date, effective days worked during the day), the occupational code of the employee (6 digit ISCO code), some individual information about the worker (sex, nationality, educational attainment) as well as the identifier of the employer.³

For all the firms available within the SILER-ARTER system, i.e., those that have experienced at least one employment event between 2008 and 2017, we complement the available information in two ways. First, we build an occupation-specific index of *job quality* by means of the ICP survey – *Indagine Campionaria delle Professioni*, which is conducted by the National Institute for Public

³ For more information about the SILER-ARTER system see Arrighetti et al., (2021).

Policy and Analysis (INAPP) in collaboration with the Italian National Statistical Institute (ISTAT). The content of this survey replicates quite closely the American O*Net framework (Cetrulo et al., 2020). In particular, on the basis of 16,000 face-to-face interviews with workers, it provides detailed information on tasks, skills, work contexts, and organizational characteristics at the 5-digits ISCO occupational code. Currently, the ICP database is available in two waves, one carried out in 2007 and the other in 2012. For our purposes we make use of the 2012 wave and we focus on the 21 questions contained in section “E. Work Values of the Profession”, which refers to those aspects of work that concerns specific needs considered to be important for a person's satisfaction. Through a Principal Component Analysis (see Appendix B for the methodological details),⁴ we extract three factors that capture the quality of jobs performed in each profession in terms of self-realisation, recognition, and social support. These factors are normalized within the 1-digit professional macro classes⁵ and collapsed into a single index of job quality through their arithmetic mean – with equal weights across factors. We then exploit the 5-digits ISCO occupational code to merge this index with the information available in the SILER-ARTER system and obtain a firm-level measure of job quality available in three versions: one for temporary workers, one for permanent workers, and one for all the employees, with a homogeneous theoretical range of variation between 0 (minimum quality) and 1 (maximum quality).

Finally, we merge the data of the SILER-ARTER system with information concerning the economic and financial performance of the firms. The latter are retrieved from the AIDA-BVD archive, which includes all balance sheets of the Italian firms recorded within the chambers of commerce registries over the time span 2008-2017. After this final merge, we remain with a unique and original firm-level dataset consisting of 64,380 observations for the years 2008-2017. To check the representativeness of the obtained sample, we compare it with census data retrieved from Istat's *Archivio Statistico delle Imprese Attive* (ASIA). In particular, we match the distribution of firms across different industries considering 2011 as reference year. Overall, the firms included in our sample represent roughly one-tenth of the manufacturing firms active in the Emilia-Romagna region.

⁴ O*Net-type surveys have been widely used to build synthetic indexes through factor analysis (e.g., Consoli and Rentocchini, 2015; Consoli et al., 2016). In particular, Cetrulo et al., (2020) run a comprehensive study that relies on a factor analysis on ICP data to create occupation-specific measures of work organization and task content for the majority of the Italian professions. In our analysis we adopt a similar approach, except that we restrict our attention to the section of the survey that most directly tackles issues related to job quality.

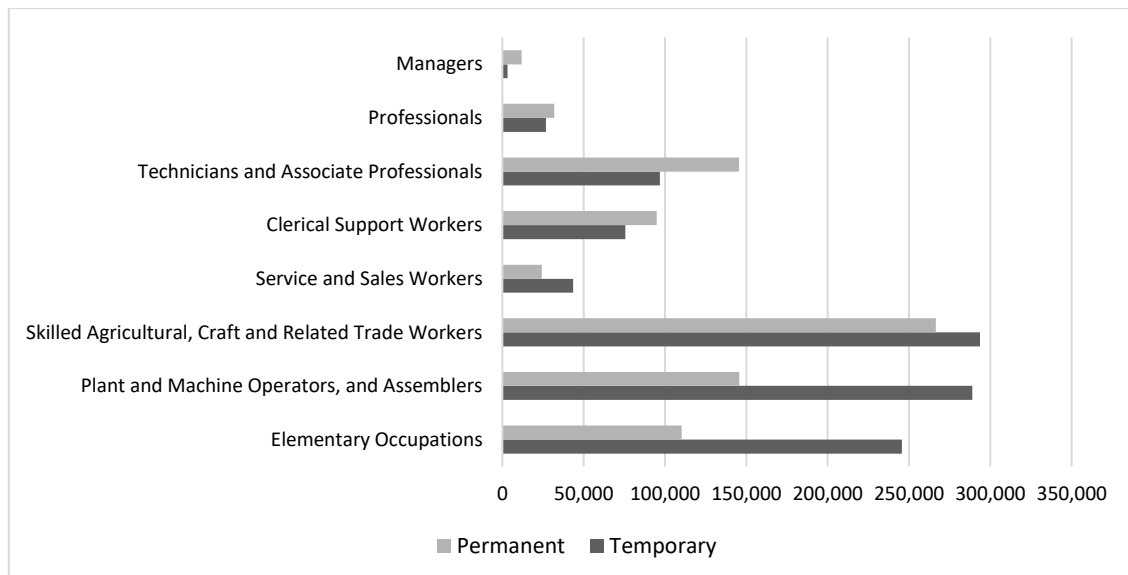
⁵ The ISCO classification reports 8 macro-classes: 1. Lawmakers, managers and entrepreneurs; 2. Professionals; 3. Technical and associate professionals; 4. Clerical support workers; 5. Service and sales workers; 6. Skilled agricultural, craft and related trade workers; 7. Plant and machine operators, and assemblers; 8. Elementary occupations. To improve the comparability of occupation-specific quality measures and prevent potential mismeasurements due to the employment status of the professions (e.g. higher vs. lower incidence of self-employment) we normalized the occupation-specific scores within each macro-class. In particular, since the PCA returns factors with negative as well as positive scores, we employ a standard min-max normalization, with the resulting scores ranging in the [0,1] interval.

The sample representativeness in terms of industry of activity is preserved (see Table A1 in the Appendix).

3.2. Descriptive evidence

Figure 1 shows the distribution of professions by employment contract across the whole 2008-2017 period. Some workers hired with temporary contract are present in all the professions, but their number is clearly the largest for professions that are usually associated with low skill jobs. In particular, while permanent contracts are the most common form of employment among managers, professionals and the so-called “white collars”, temporary employment is by far the prevalent form among plant and machine operators, and assemblers, as well as elementary occupations. This evidence confirms the general intuition according to which temporary contracts are not well suited to recruit highly skilled employees. Moreover, the fact that the incidence of temporary contract is inversely related to the skills of the professions is in line with the idea that such contracts tend to be used more as tools to economize on specific types of jobs, than as devices to screen competences in the labour market. Otherwise, one should observe a relatively homogeneous incidence of temporary contracts across all the professions.

Figure 1 – Distribution of professions by type of contract

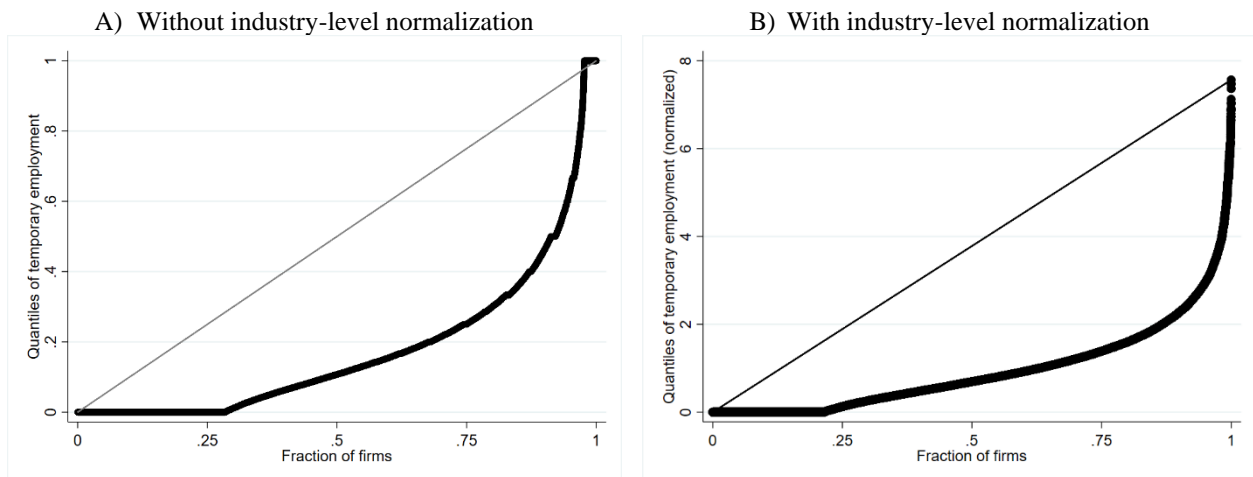


Source: authors' own elaboration on SILER data

Another aspect that is interesting to investigate is whether the drivers of temporary employment are to be located mainly at the firm or the industry level. As argued above, this is one of the key difference that characterize the low-road employment hypothesis as opposed to the competing theories. Along these lines we report in Figure 2 the quantile distribution of the firm-level share of

temporary contracts both with (panel B) and without (panel A) industry-level normalization. In line with previous evidence (e.g. Arrighetti et al., 2022), we document wide heterogeneity in the use of temporary workers. In particular, about one third of the firms make virtually no use of such type of workers and up to 75% of the sample has activated less than 1 temporary contract out of 4. At the same time, however, in the last decile of the distribution there are firms that heavily rely on this kind of contracts, with their incidence on the total number of activated contracts being higher than 46%. Moreover, the shape of the distribution remains virtually unchanged after normalizing by the industry mean (panel B), with the top decile of firms relying on temporary employment from 2.5 to 7.8 times more than their industry average. Such within-industry heterogeneity points towards firm-specific factors, more than sectorial competitive conditions, as being potentially important drivers behind the use of temporary contacts.

Figure 2. Quantile distribution of temporary employment across firms

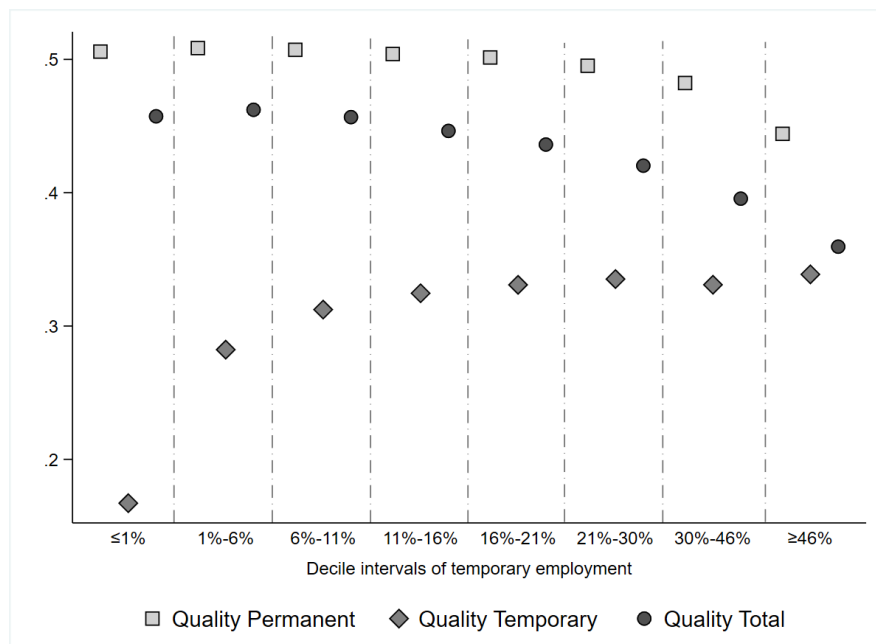


Source: authors' own elaboration on SILER and AIDA data

To check whether the propensity to use temporary employment correlates with the quality of the hired positions, we report in Figure 3 the mean scores of our quality index for different types of employment contracts as well as different deciles of temporary employment. We notice that for firms that make relatively little use of temporary employment the quality of temporary professions is particularly low and distant from the one of permanent occupations. This suggests that, at least for this portion of firms, an internal segmentation of the workforce that is consistent with the core-periphery theory seems to exist. However, as the share of temporary contracts rises, two additional patterns emerge. First, the quality of temporary occupations initially increases and then (from the fifth decile on) stabilizes around the value 0.3. This trend is consistent with the gradual extension of temporary contracts to professions, such as skilled craft workers, that are on average characterized by

a higher level of job quality.⁶ Second, and more relevant for our analysis, the quality of permanent occupations gradually reduces, with a clear knock-on effects on the overall quality of jobs that is particularly strong for firms making relatively large use of temporary contracts (i.e. the last three deciles). Such changes contradict the existence of internal segmentation patterns in which the quality of core professions is kept at increasing distance from the one of peripheral occupations. Rather, and in line the with low-road employment hypothesis, they suggest that an increasing use of temporary work has the potential to drag down the quality of all the professions, including those performed by permanent workers. Additional evidence in support of this interpretation comes from Figures A.1 and A.2 in the Appendix, which show that the knock-on effect on job quality is stronger for the firms that in principle have greater interest in pursuing a low-road employment strategy, such as those that are relatively small and less productive.

Figure 3. Quality of occupations across levels of temporary employment



Source: authors' own elaboration on INAPP, SILER and AIDA data. The figure reports deciles of temporary employment starting from the third decile, since for 20% of the population the share of temporary workers is equal to zero.

Overall, this preliminary evidence is broadly consistent with the low-road employment hypothesis as being a useful framework to interpret the impact of temporary employment on the quality of permanent jobs. On the contrary, predictions based on the screening and core-periphery

⁶ In our data, the average quality for the eight 1-digit macro-classes of professions is as follows: 1. Lawmakers, managers and entrepreneurs: 0.554; 2. Professionals: 0.253; 3. Technical and associate professionals: 0.255; 4. Clerical support workers: - 0.124; 5. Service and sales workers: - 0.046; 6. Skilled agricultural, craft and related trade workers: 0.160; 7. Plant and machine operators, and assemblers: - 0.135; 8. Elementary occupations: - 0.855.

theories find only limited support. However, a rigorous test of these competing approaches requires a more elaborated multivariate analysis. The design of the latter is the topic of the next section.

3.3 Methodology

We begin by considering the following baseline model:

$$\text{Quality of perm jobs}_{i,t} = \beta_0 + \beta_1 \text{Share temp workers}_{i,t-1} + \mathbf{bX}_{i,t-1} + \mathbf{cZ}_{i,t} + u_{i,t} \quad (1)$$

where subscripts i and t denote the firm and year, respectively; the dependent variable is the mean of our quality index measured for occupations that are hired with a permanent contract; *Share of temp workers* captures the incidence of temporary employment at the firm level in the previous year; $\mathbf{X}_{i,t-1}$ is the vector of firm-level controls; $\mathbf{Z}_{i,t}$ is the vector of worker-level controls; and $u_{i,t}$ are the residuals. To avoid issues related to simultaneity, all firm-level controls are included considering a one-year lag with respect to the dependent variable.

Among firm-level controls, we include a vector of characteristics related to the internal organization of work, which include: the log of the number of employees; the log of labour productivity (measured as the value added per employee); and the per-employee labour cost. Moreover, we control for the firm's economic conditions through a vector of variables derived from the balance sheet, such as: the return on equity index and the log of per-employee capital stock (considering both tangible and intangible assets). As per worker level controls, we consider a vector of information about the characteristics of the hired permanent workers, including: their average education measured as the ISCED grade as well as the share of foreign and female workers. Finally, we also include year, sector and province fixed effects. Table 1 reports summary statistics of all the variables included in the model.

Since our focus variables are relatively stable over time⁷, in our baseline specification we estimate equation 1 above through a pooled ordinary least squared (OLS). This allows us to estimate the coefficients by exploiting the cross-sectional variability that is present in our data. At the same time, however, we are worried that time-invariant unobservable components that are correlated with both the quality of permanent occupations and the use of temporary contracts could bias our estimates. For this reason, we run also a set of regression where we leverage on the time dimension of our data through panel models with either random or fixed effects.

⁷ Table A2 in the Appendix reports the decomposition of our focus variables into their within and between components. To a large extent the variation of the average quality of permanent jobs and the use of temporary workers – represented by their standard deviation – is explained by the between (i.e. variation across firms) rather than by the within (i.e. variation across time) component. In this view, both variables can be regarded as a relatively steady feature of the firms in our dataset.

Table 1 – Summary statistics

Variable	Mean	Stand. Dev.	Min	Max
Quality of perm jobs	0.493	0.096	0.001	0.772
Share of temp workers	0.168	0.192	0.000	1.000
log(Employees)	2.518	1.236	0.000	7.878
log(Labour productivity)	10.764	0.631	2.303	13.116
Average labour costs	36186.830	14133.130	0.000	99850.000
ROE	0.029	6.104	-1131.379	246.503
log(Per-employee capital stock)	3.274	1.325	0.000	9.472
Education of perm workers	1.524	0.873	0.000	7.502
Share of foreign perm workers	13.120	19.737	0.000	100.000
Share of female perm workers	29.852	26.639	0.000	100.000

Source: authors' own elaboration on INAPP, SILER and AIDA data

4. Empirical results

4.1 Baseline

Table 2 shows the results of our baseline model. The first four columns report the outcomes of a set of stepwise pooled OLS. In column (1) we consider a very parsimonious specification where we include only the share of temporary workers among regressors plus a full set of year, industry and province dummies. The use of temporary employment is negatively associated with the quality of permanent occupations. In columns (2)-(4) we sequentially add more control variables to test the robustness of the results. In particular, we add: those related to internal organization of work (column 2), those capturing the firm's economics conditions (column 3), and finally those associated with the features of permanent workers (column 4). In all the specifications, the coefficient associated with the share of temporary workers remains negative and highly significant. More specifically, in the most complete model, we obtain that one-standard-deviation increase from the mean value of the share of temporary workers is associated with a decrease in the quality of permanent positions of about 1.2%. In absolute value, the magnitude of this effect is similar to the effect associated with the same type of variation in the log of employees and in labour productivity. Finally, in columns (5) and (6) we test the robustness of our estimates in the most complete specification by estimating a panel model with fixed and random effects, respectively. The main result for our focus variable remains valid.⁸

⁸ We have also tested whether our hypothesis is robust against alternative specifications of the dependent variable. In particular, we have run additional models using the differential between firm-level average quality of permanent and temporary workers, as well as the individual factors (i.e. self-realisation, recognition, and support) that we have summed up to compute the quality index. Results are shown in table A3 in Appendix A, and confirm the main ones. In particular,

Table 2 – Temporary employment and quality of permanent jobs: baseline results

	Pooled OLS				FE	RE
	(1)	(2)	(3)	(4)	(5)	(6)
Share of temp workers	-0.0773*** (0.005)	-0.0673*** (0.004)	-0.0676*** (0.004)	-0.0623*** (0.004)	-0.0472*** (0.004)	-0.0569*** (0.004)
log(Employees)		0.0113*** (0.001)	0.0114*** (0.001)	0.0109*** (0.001)	0.0274*** (0.002)	0.0200*** (0.001)
log(Labour productivity)		0.0186*** (0.001)	0.0197*** (0.001)	0.0197*** (0.001)	0.0111*** (0.001)	0.0139*** (0.001)
Average labour costs		0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)	0.0000** (0.000)	0.0000*** (0.000)
ROE			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
log(Per-employee capital stock)			-0.0018*** (0.001)	-0.0019*** (0.001)	0.0015* (0.001)	0.000 (0.001)
Education of perm workers				-0.0064*** (0.001)	0.0050** (0.002)	-0.0013 (0.001)
Share of foreign perm workers				-0.0003*** (0.000)	-0.0001 (0.000)	-0.0003*** (0.000)
Share of female perm workers				-0.0004*** (0.000)	-0.0006*** (0.000)	-0.0005*** (0.000)
Constant	0.5037*** (0.003)	0.2445*** (0.015)	0.2389*** (0.015)	0.2758*** (0.015)	0.3229*** (0.016)	0.3096*** (0.013)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	No	Yes
Province fixed effects	Yes	Yes	Yes	Yes	No	Yes
Firm fixed effects	No	No	No	No	Yes	No
N. Observations	64380	64380	64380	64380	64380	64380
Log-Likelihood	61020.17	63270.09	63288.07	63772.15	94856.54	
BIC	-121597	-126064	-126078	-127013	-189525	
AIC	-121960	-126454	-126486	-127448	-189679	
RSS	566.2615	528.0343	527.7394	519.8626	197.9295	
R2_adjusted	0.0496	0.1137	0.1142	0.1274	0.0398	
R2_within					0.0401	0.0369
R2_overall					0.1225	0.1724

Source: authors' own elaboration on INAPP, SILER and AIDA data. For Pooled OLS robust clustered standard errors in brackets. For Panel Fixed effects and Random Effects robust standard errors in brackets. Dependent variable: average quality of permanent occupations. Significance levels: * 10%, ** 5%, *** 1%.

with a high rate of temporary workers the difference in quality between temporary and permanent workers tends to shrink, and a negative effect on quality is found also when looking at the individual factors as dependent variables.

With respect to the control variables, the estimated coefficients are broadly consistent with the previous evidence. In particular, we find that larger and more productive firms rely on permanent occupations that are on average of higher quality. Labour costs, which can be considered a proxy for individual skills, are also positively associated with the quality of permanent positions. As for economic indicators, instead, we obtain a set of mixed results: while profitability exerts no statistically significant effect on the quality of jobs, the coefficient associated with the per-employee capital stock is negative and significant in the OLS estimates and nearly not significant in the panel regressions. Finally, by taking into consideration the features of the workers, we find that in most estimated models a larger share of foreign and female permanent workers is associated with a reduction in the quality of their jobs. This result points towards the existence of potential job quality gaps along gender and nationality lines that could be interesting to explore in future research. Moreover, the level of education of permanent workers turns out to exhibit a negative and statistically significant coefficient in the OLS estimates⁹ and a positive coefficient in the panel model with fixed effects.

4.2 Robustness

To strengthen the causal interpretation of the relation between the use of temporary employment and the quality of permanent jobs we resort to an instrumental variable (IV) approach. The main benefit of IV is that it can potentially deal with both time-invariant and time-variant omitted variables as well as simultaneity. The major challenge, however, is to find suitable instruments for our variable of interest. Ideally, we would instrument the share of temp workers with an external variable that correlates with the use of temporary contracts but not with the error term (i.e., it affects the quality of permanent occupations only through the share of temp workers). This is not a simple task and requires the imposition of some exclusion restrictions.

All this considered, we select an instrument that is related to the local labour market in which the firm operates, namely the one-year lagged employment rate sourced from ISTAT¹⁰. Our reasoning is quite straightforward: in areas where the level of employment rises, the bargaining power of the workers *vis-à-vis* firms tends to rise too, which implies that for employers it becomes more difficult to hire employees by offering temporary contracts. Rather, firms will be pushed to offer better

⁹ This somewhat counterintuitive result could be related to the fact that, as it is well known, the share of graduate employees is relatively small in the Italian manufacturing sectors and it usually consists of young workers, who usually find their first job in occupations that score poorly in terms of quality.

¹⁰ Labour market areas (LMAs, “local labour systems – SLL” in Italy) are sub-regional geographical areas where the bulk of the labour force lives and works, and where establishments can find the main part of the labour force necessary to occupy the offered jobs. They respond to the need for meaningfully comparable sub-regional labour market areas for the reporting and analysis of statistics. Source: <https://www.istat.it/en/labour-market-areas>.

contractual conditions, which are likely to translate into a lower rate of temporary contracts. On the other hand, there is no reason to expect that such a change in a quantitative feature of the local labour market can also directly affect the choice made by firms about the *competence mix* of their already existing permanent occupations. Under this assumption the model is thus identified and our focus coefficient can be correctly estimated.

Table 3 – Robustness check: IV regressions, panel with fixed effects.

	First stage	Second stage
	(1)	(2)
Employment rate within the local labour market	-0.002*** (0.001)	
Share of temp workers		-0.641** (0.311)
log(Employees)	0.014** (0.003)	0.036*** (0.004)
log(Labour productivity)	0.004*** (0.002)	0.014*** (0.002)
Average labour costs	0.000 (0.000)	0.000 (0.000)
ROE	0.000 (0.001)	0.002* (0.001)
log(Per-employee capital stock)	4.51e-07** (1.10e-07)	4.19e-07** (1.67e-07)
Education of perm workers	0.001 (0.003)	0.006** (0.002)
Share of foreign perm workers	0.000 (0.001)	0.000 (0.000)
Share of female perm workers	-0.001*** (0.000)	-0.001*** (0.000)
Year fixed effects	Yes	Yes
Firm fixed effects	Yes	Yes
N. Observations	63255	63255
F-test	7.30**	41.73***
Anderson-Rubin Wald Test F	8.20**	
Anderson-Rubin Wald Test Chi2	8.20**	
Stock-Wright LM S	8.24**	
Kleibergen-Paap rk LM statistic (second step)	7.30***	
Cragg-Donald Wald F	8	
Hansen J statistic	0	

Source: authors' own elaboration on INAPP, SILER and AIDA data. For Pooled OLS robust clustered standard errors in brackets. For Panel Fixed effects and Random Effects robust standard errors in brackets. Dependent variable: average quality of permanent occupations. Significance levels: * 10%, ** 5%, *** 1%.

The results of the two steps IV estimation of the panel model with fixed effects are presented in Table 3. Column (1) reports the first stage result. As expected, an increase of the employment rate in the local labour market tends to exert a negative impact on the firm's use of temporary contracts. This finding is consistent with the idea that when the labour market is tight the bargaining position of workers is strengthened, and this may induce firms to offer better contractual conditions. Column (2) shows the second-stage results. When instrumented, the share of temporary workers affects negatively the quality of permanent jobs. The magnitude of the coefficient is larger than the one obtained in the baseline estimates, pointing towards the existence of a potential downward bias in our non-IV regressions. This could be due to measurement errors in our indicator of temporary employment. Moreover, non-IV estimates could be downward biased if an omitted determinant of the quality of permanent jobs is negatively correlated with use of temporary employment. For example, employers with idiosyncratic preferences for pursuing a high-road employment strategy may favour the introduction of occupations characterized by higher wage as well as better quality, while at the same time oppose the use of temporary contracts to prevent work demotivation. Finally, there could be reverse causality: it may be less convenient to resort to temporary employment in firms with a large incidence of occupations with high job quality (especially if in the latter workers are supposed to make firm-specific knowledge investments).

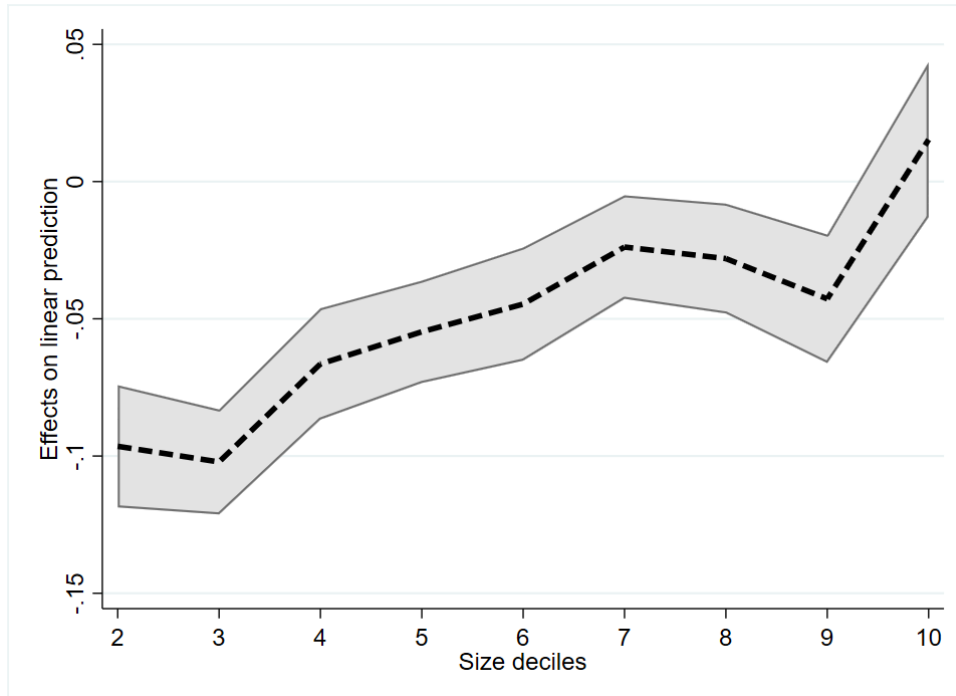
4.3 Mechanisms driving knock-on effects

Having documented the existence of a negative correlation between temporary employment and the quality of permanent jobs, we now run some additional regressions to explore the main mechanisms behind such result. As discussed above, the low-road employment hypothesis is the only theoretical framework predicting the quality of permanent jobs to decrease with the use of temporary employment. Moreover, following this theory, we should also expect that: a) such negative association tends to be stronger in firms that have more incentives to pursue competitive strategies based on cost reductions, such as small and relatively inefficient firms; b) in firms that make larger use of temporary employment, permanent employees should also have skills of lower quality, which tend to be more similar to the ones of temporary workers. Such similarity can indeed ensure a sufficient degree of substitutability among workers, thus reinforcing the bargaining position of the firm *vis-à-vis* its employees.

To check whether this is indeed the case, in this section we carry out two types of analysis. First, we investigate whether the negative relationship between temporary employment and the quality of permanent jobs is heterogeneous across firms. In particular, we run a set of regressions where we

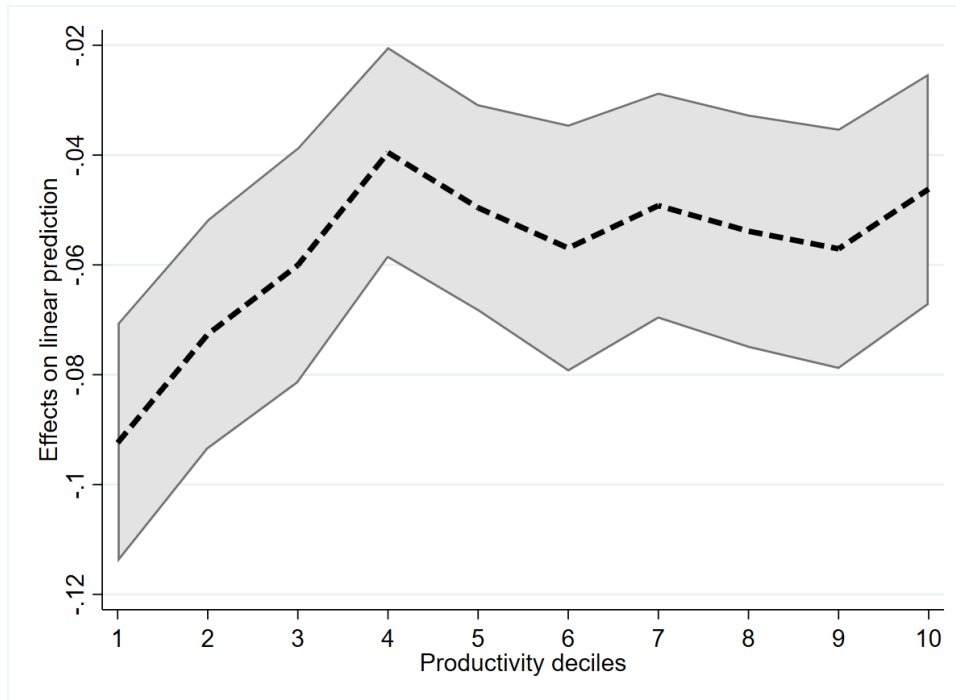
interact the share of temporary workers with dummy variables selecting distinct deciles of the firm size and labour productivity distributions. In all the regressions we include the full set of control variables. The results of this exercise are shown in Figures 4 and 5. Graphical inspection reveals that for firms that are relatively small and less productive, the negative association between temporary employment and quality of permanent jobs is stronger. This result is confirmatory that for firms who find it difficult to sustain profitability with drivers other than cost reductions, the use of temporary work is often associated with the presence of permanent jobs of significantly low quality. In the logic of the low-road hypothesis, such employment strategies can indeed ensure large cost declines, which helps to sustain profitability. Interestingly, we observe that for firms located in higher deciles of the firm size and productivity distributions, the association between temporary employment and quality of permanent jobs remains negative but it becomes smaller in absolute value. Eventually, for the firms with the largest size in the sample (i.e. 10th decile) such association becomes not statistically different from zero. If anything, this suggests that alternative interpretations for the use of temporary work that predict the lack of association between the latter and the quality of permanent jobs, such as the screening theory, find empirical support that is limited only to the largest firms in the sample.

Figure 4 – Marginal effects of temporary employment by deciles of firm size



Source: authors' own elaboration on INAPP, SILER and AIDA data. Conditional marginal effects of temporary employment on the quality of permanent jobs are obtained by estimating our Pooled OLS baseline model, as specified in column (4) of Table 2. The full set of control variables include the internal organization of work (firm size, labour productivity, labour costs), the firm's economics conditions (profitability, per-employee capital stock), and the features of permanent workers (education, nationality, gender).

Figure 5 – Marginal effects of temporary employment by deciles of labour productivity



Source: authors' own elaboration on INAPP, SILER and AIDA data. Conditional marginal effects of temporary employment on the quality of permanent jobs are obtained by estimating our Pooled OLS baseline model, as specified in column (4) of Table 2. The full set of control variables include the internal organization of work (firm size, labour productivity, labour costs), the firm's economics conditions (profitability, per-employee capital stock), and the features of permanent workers (education, nationality, gender).

The second empirical exercise that we carry out takes a closer look at the task content of the occupations available within firms, in order to clarify whether the knock-on effect on the quality of permanent jobs translate also into a levelling down of the skills and competences required to the workers. Indeed, as already recalled, the low-road employment hypothesis suggests that firms pursuing a low-road employment strategy tend to increase the degree of substitutability between the two categories of workers in order to weaken the bargaining power of core employees (Fukao et al., 2022; Basu et al., 2021). As a consequence, this hypothesis entails a homogeneity between the cognitive competencies and the skills required to permanent and temporary workers, and therefore predicts a convergence in the activities carried out by the two categories of employees. Here, we test this prediction by analysing how the use of temporary employment affects the skills composition and the work contents of permanent jobs, placing particular attention on the difference between the latter and the skills composition and work content of temporary occupations.

To do so, we selected from the INAPP survey a set of cognitive skills and work contents that characterize complex occupations vis-à-vis routinized ones. Specifically, among the spectrum of

occupational-level information surveyed, we focused on four main information-processing skills distinguishing specialized, high-competence occupations: a) *learning strategies*, i.e., the ability to select and use learning methods and procedures that allow to learn or to train others about how to learn; b) *quality check*, i.e., the ability to run tests on products, services and processes to evaluate quality and performances; c) *complex problem-solving*, i.e., the ability to identify complex problems and gather information that allow to evaluate options and find solutions; d) *active learning*, i.e., the ability to understand the implications of new information to solve present and future problems.

In the INAPP survey, a Likert scale reports for each occupation the extent to which each one of these skills is involved. Clearly, at the firm level, the degree at which these competences are concentrated and relevant depends upon the occupational mix of the workforce. Hence, for each of these skills we computed – at the firm level – the corresponding average score for permanent workers, as well as the differentials between permanent and temporary workers. Then, we run a set of pooled regressions using the same specification as in columns (4) of Table 2, but using the average skill scores for permanent workers as well as the score difference between permanent and temporary workers as dependent variable. The results are reported in Table 5.

As expected, the knock-on effect that was observed in previous estimates for non-wage attributes of jobs is matched also by a levelling down of skills and competences. In particular, in all the estimated models, we find that a larger use of temporary employment is associated with the presence of permanent jobs that are on average characterized by weaker learning strategies, more routinized and less complex tasks, lower involvement in activities related to quality checks and less active learning. Moreover, in terms of competence differentials, we observe a downward convergence between permanent and temporary occupations across all types of skills that we considered. Overall, these results provide additional evidence suggesting that, in line with the low-road employment hypothesis, the choice to rely on temporary employment is often associated with the adoption of an occupational mix that tends to economize on highly skilled and costly job profiles. This is indeed one of the main drivers behind the diminishing quality of permanent jobs.

Table 5 – Temporary employment and skills of permanent workers: levels and differentials

	Learning Strategy		Quality Check		Complex-Problem solving		Active Learning	
	Permanent workers	Perm-Temp Differential	Permanent workers	Perm-Temp Differential	Permanent workers	Perm-Temp Differential	Permanent workers	Perm-Temp Differential
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of temp workers	-0.0525*** (0.005)	-0.1171*** (0.005)	-0.0563*** (0.005)	-0.1311*** (0.006)	-0.0652*** (0.006)	-0.1392*** (0.006)	-0.0523*** (0.006)	-0.1369*** (0.006)
log(Employees)	0.0068*** (0.001)	-0.0133*** (0.001)	0.0113*** (0.001)	-0.0175*** (0.001)	0.0090*** (0.001)	-0.0137*** (0.001)	0.0099*** (0.001)	-0.0142*** (0.001)
log(Labour productivity)	0.0187*** (0.002)	0.0027 (0.002)	0.0120*** (0.002)	-0.0038* (0.002)	0.0189*** (0.002)	0.0019 (0.002)	0.0201*** (0.002)	0.0031 (0.002)
Average labour costs	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)
ROE	0.000 (0.000)	-0.0001 (0.000)	0.000 (0.000)	0.0001*** (0.000)	-0.0001 (0.000)	-0.0001 (0.000)	-0.0001 (0.000)	-0.0001 (0.000)
log(Per-employee capital stock)	-0.0018** (0.001)	-0.0004 (0.001)	0.0005 (0.001)	-0.0003 (0.001)	-0.0005 (0.001)	-0.0006 (0.001)	0.0005 (0.001)	-0.0005 (0.001)
Education of perm workers	-0.0031** (0.001)	0.0097*** (0.001)	-0.0021 (0.001)	-0.0003 (0.001)	-0.002 (0.001)	0.0077*** (0.001)	-0.0004 (0.001)	0.0099*** (0.001)
Share of foreign perm workers	-0.0002*** (0.000)	0.0002*** (0.000)	0.0001 (0.000)	0.0004*** (0.000)	-0.0006*** (0.000)	0.0001** (0.000)	-0.0005*** (0.000)	0.0001** (0.000)
Share of female perm workers	-0.0001 (0.000)	0.0004*** (0.000)	-0.0009*** (0.000)	-0.0001* (0.000)	-0.0004*** (0.000)	0.0003*** (0.000)	0.000 (0.000)	0.0004*** (0.000)
Constant	0.1484*** (0.017)	0.1234*** (0.018)	0.2755*** (0.018)	0.3086*** (0.020)	0.1646*** (0.020)	0.1530*** (0.020)	0.1188*** (0.019)	0.1388*** (0.020)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	59495	59495	59495	59495	59495	59495	59495	59495
Log-Likelihood	51911.98	39407.4986	51953.81	32895.8816	43534.06	32560.8501	46827	33483.6525
BIC	-103307	-78295.1778	-103391	-65271.9438	-86551.4	-64601.8809	-93137.3	-66447.4856
AIC	-103730	-78718.9972	-103814	-65695.7632	-86974.1	-65025.7003	-93560	-66871.305
RSS	608.3092	620.641	607.4543	803.2609	806.1887	813.9917	721.7086	784.7756
R2_adjusted	0.1012	0.059	0.1011	0.0661	0.1165	0.061	0.1102	0.0605

Source: authors' own elaboration on INAPP, SILER and AIDA data. Robust clustered standard errors in brackets. Dependent variables: the ability to select and use learning methods and procedures that allow to learn or to train others about how to learn, columns 1 and 2; b) the ability to run tests on products, services and processes to evaluate quality and performances, columns 3 and 4; c) the ability to identify complex problems and gather information that allow to evaluate options and find solutions, columns 5 and 6; the ability to understand the implications of new information to solve present and future problems, columns 7 and 8. Significance levels: * 10%, ** 5%, *** 1%.

5. Conclusion

Our study sheds light on the interplay between temporary employment and the quality of permanent jobs in manufacturing firms. We found robust evidence that a larger use of temporary workers correlates with the presence of permanent jobs that are on average characterized by non-wage attributes (e.g. self-realisation, recognition, social support) of lower quality. Additional analysis suggests that this effect tends to be stronger in firms of smaller size and relatively low productivity. Moreover, in firms that makes large use of temporary employment the reduced quality of non-wage attributes of jobs seems to be matched by a leveling down of skills and competences between temporary and permanent occupations.

Overall, these results help us to disentangle among different interpretations for the use of temporary employment available in the literature. Indeed, while the core-periphery approach suggests that an increase in temporary work should correspond to an improvement in the quality of permanent jobs through increased internal segmentation and bargaining power of core employees, the screening approach predicts that the use of precarious jobs should be essentially unrelated to the feature of permanent occupations. None of these predictions, however, find support in our analysis.

Rather, our evidence is consistent with an alternative view grounded on the idea that firms (within the same industry and market segment) choose work arrangements to pursue specific competitive advantages. According to this perspective, which we labelled the high/low road employment hypothesis, the use of temporary work is primarily a tool to reduce the wage bill. The implications for the quality of permanent jobs are straightforward: first, low-road firms have incentives to adopt an occupational mix in which both permanent and temporary workers perform low skill jobs of relatively low quality, as by doing so they can economize on skilled and costly workers; second, in such firms the features of permanent jobs will tend to match quite closely those of temporary ones, since by maintaining these two categories of work as substitutable as possible, firms can strengthen the bargaining power vis-à-vis their employees.

We believe that these results carry relevant implications for both managers and policymakers. First, and foremost, our results suggest that alongside well-documented negative effects of temporary employment on the well-being of precarious workers, this type of employment can also undermine the quality of permanent positions. As long as job quality operates as a driver of positive externalities (e.g. through better social security, integration, inclusiveness), we thus identify a new channel that could potentially lead towards a socially inefficient over-use of temporary employment in the economy. Indeed, as argued by Rodrik and Sable (2020), private firms have the tendency not to consider the positive externalities related to job quality while outlying their employment strategies. This leads them to employ temporary work at a rate that is larger than the socially efficient level. Our

results, however, suggest that such suboptimal outcome does not occur only through the hiring of too many low quality *temporary* workers, but also through the employment of excessive low quality *permanent* workers. The combination of these two channels makes the distance from the socially efficient use larger than expected, thus providing further rationale for the introduction of limitation on the use of temporary employment.

Moreover, even if we neglect the social costs due to missing positive externalities, our finding documenting the levelling down of skills and competences in firms making larger use of temporary employment suggest also the existence of potentially relevant efficiency drawbacks for the productive system as a whole. Indeed, the extensive and generalized use of precarious forms of employment can push low-road firms to move towards low-productivity and low-quality productions, as the availability of poorly competent but cheap jobs works as a disincentive to invest in technology and innovation. As a result, aggregate productivity growth may slow down, with potentially negative consequences for the economy as a whole. In this case too, therefore, some degree of regulation concerning the use of temporary contracts should be welcome.

It is worth acknowledging some limitations of the study. First, our data source on labour contracts, although unique in scope and detail of the available information, allows us to track only changes of employment status that are subject to mandatory communications. This implies that, in our data, we have no information about the job features of those employees that kept their employment position stable for the entire observational period (i.e., 2008-2017). Even if we partially deal with this issue by estimating coefficients through models where the variables are taken in first difference (i.e. panel with fixed effect), some care must be taken in interpreting the results. Second our study refers only to Emilia-Romagna. Future research could investigate to what extent these results are generalizable to other regions and countries. Finally, our analysis remains primarily at the correlational level. In a robustness check we do improve the quality of our estimates through an instrumental variable approach, but we are far from a proper identification. Still, in spite of such limit, the empirical analysis allows us to compare the validity of different theoretical predictions concerning the use of temporary work and to derive a set of related policy implications.

References

- Acemoglu, D. (2001). Good jobs versus bad jobs. *Journal of Labor Economics*, 19(1), 1-21.
- Addessi, W. (2014). The productivity effect of permanent and temporary labor contracts in the Italian manufacturing sector. *Economic Modelling*, 36, 666-672).
- Aiginger, K., and Rodrik, D. (2020). Rebirth of industrial policy and an agenda for the twenty-first century. *Journal of Industry, Competition and Trade*, 20(2), 189-207.
- Aleksynska, M. (2018). Temporary employment, work quality, and job satisfaction. *Journal of Comparative Economics*, 46(3), 722-735).
- Amuedo-Dorantes, C. (2000). Work transitions into and out of involuntary temporary employment in a segmented market: evidence from Spain. *ILR Review*, 53(2), 309-325.
- Andreoni, A., and Chang, H. J. (2016). Industrial policy and the future of manufacturing. *Economia e politica industriale*, 43, 491-502.
- Arranz, J. M., García-Serrano, C., and Toharia, L. (2010). The influence of temporary employment on unemployment exits in a competing risks framework. *Journal of Labor Research*, 31(1), 67-90.
- Arranz, J. M., García-Serrano, C., and Hernanz, V. (2018). Employment quality: Are there differences by types of contract?. *Social Indicators Research*, 137(1), 203-230
- Arrighetti, A., Bartoloni, E., Landini, F., and Pollio, C. (2022). Exuberant proclivity toward non-standard employment: evidence from linked employer–employee data. *ILR Review*, 75(4), 1024-1053.
- Arrighetti, A., Cattani, L., Landini, F., and Lasagni, A. (2021). Work flexibility and firm growth: evidence from LEED data on the Emilia-Romagna region. *Industrial and Corporate Change*, 30(6), 1516-1538.
- Atkinson, J. (1984). Manpower strategies for flexible organizations. *Personnel Management*, 16(8), 28-31.
- Atkinson, J. (1987). Flexibility or fragmentation? The United Kingdom labour market in the eighties. *Labour and Society*, 12, 87-105.
- Atkinson, J. and Meager, N. (1986). *Changing Working Patterns: How Companies Achieve Flexibility to Meet New Needs*. London: National Economic Development Office.
- Autor, D. H., and Houseman, S. N. (2010). Do temporary-help jobs improve labor market outcomes for low-skilled workers? Evidence from "Work First". *American Economic Journal: Applied Economics*, 2(3), 96-128.
- Autor, D. H., and Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *American economic review*, 103(5), 1553-1597.
- Baranowska, A., Gebel, M. and Kotowska, I. E. (2011). The role of fixed-term contracts at labour market entry in poland: Stepping stones, screening devices, traps or search subsidies?, *Work, Employment & Society*, 25, 777-793.
- Barbieri, P., and Scherer, S. (2009). Labour market flexibilization and its consequences in Italy. *European Sociological Review*, 25(6), 677-692.
- Basu, A. K., Chau, N. H., and Soundararajan, V. (2021). Contract employment as a worker discipline device. *Journal of Development Economics*, 149, 102601.

- Battisti, M., and Vallanti, G. (2013). Flexible wage contracts, temporary jobs, and firm performance: Evidence from Italian firms. *Industrial Relations: A Journal of Economy and Society*, 52(3), 737-764;
- Bellani, D., and Bosio, G. (2021). Knockin' on heaven's door? Reframing the debate on temporary employment and wages: evidence from Europe. *Socio-Economic Review*, 19(3), 869-907.
- Berton, F., Devicienti, F., and Pacelli, L. (2011). Are temporary jobs a port of entry into permanent employment? Evidence from matched employer-employee. *International Journal of Manpower*, 32, 879-899.
- Biegert, T., and Kühhirt, M. (2018). Taking lemons for a trial run: does type of job exit affect the risk of entering fixed-term employment in Germany?. *European Sociological Review*, 34(2), 184-197.
- Bowles, S. (1985). The production process in a competitive economy: Walrasian, neo-Hobbesian, and Marxian models. *American Economic Review*, 75 (1), 16–36.
- Braverman, H. (1974). *Labor and Monopoly Capital*. New York: Monthly Review Press.
- Broschak, J. P., and Davis-Blake, A. (2006). Mixing standard work and nonstandard deals: The consequences of heterogeneity in employment arrangements. *Academy of Management Journal*, 49(2), 371-393.
- Bryson, C., and Harvey, R. (2000). The impact of precarious jobs on life decisions and choices. *Management Research News*, 23(9/10/11), 28-29
- Cappelli, P. (1995). Rethinking Employment. *British Journal of Industrial Relations*, 33(4), 563-602.
- Card, D., Cardoso, A.R., Heining, J., Kline, P. (2016). Firms and labor market inequality: Evidence and some theory. IZA Discussion Paper No. 9850. Bonn, Germany: Institute of Labor Economics
- Carrieri, V., Di Novi, C., Jacobs, R., and Robone, S. (2012). Well-being and psychological consequences of temporary contracts: the case of younger Italian employees
- Cetrulo, A., Guarascio, D., and Virgillito, M. E. (2020). Anatomy of the Italian occupational structure: concentrated power and distributed knowledge. *Industrial and Corporate Change*, 29(6), 1345-1379.
- Chadi, A., and Hetschko, C. (2016). Flexibilization without hesitation? Temporary contracts and job satisfaction. *Oxford Economic Papers*, 68(1), 217-237
- Clarke, M., Lewchuk, W., de Wolff, A., and King, A. (2007). 'This just isn't sustainable': Precarious employment, stress and workers' health. *International journal of law and psychiatry*, 30(4-5), 311-326
- Consoli, D., Marin, G., Marzucchi, A., and Vona, F. (2016). Do green jobs differ from non-green jobs in terms of skills and human capital?. *Research Policy*, 45(5), 1046-1060.
- Consoli, D., and Rentocchini, F. (2015). A taxonomy of multi-industry labour force skills. *Research Policy*, 44(5), 1116-1132.
- D'Addio, A. C., and Rosholm, M. (2005). Exits from temporary jobs in Europe: A competing risks analysis. *Labour Economics*, 12(4), 449-468.
- Davis-Blake, A., and Uzzi, B. (1993). Determinants of employment externalization: A study of temporary workers and independent contractors. *Administrative Science Quarterly*, 195-223.

- Davis-Blake, A., Broschak, J. P., and George, E. (2003). Happy together? How using nonstandard workers affects exit, voice, and loyalty among standard employees. *Academy of Management Journal*, 46(4), 475-485.
- De Cuyper, N., and De Witte, H. (2006). Autonomy and workload among temporary workers: Their effects on job satisfaction, organizational commitment, life satisfaction, and self-rated performance. *International Journal of Stress Management*, 13(4), 441
- De Cuyper, N., De Jong, J., De Witte, H., Isaksson, K., Rigotti, T., and Schalk, R. (2008). Literature review of theory and research on the psychological impact of temporary employment: Towards a conceptual model. *International Journal of Management Reviews*, 10(1), 25-51
- De Cuyper, N., De Witte, H., Kinnunen, U., and Nätti, J. (2010). The relationship between job insecurity and employability and well-being among Finnish temporary and permanent employees. *International Studies of Management & Organization*, 40(1), 57-73
- de Graaf-Zijl, M., Van den Berg, G. J., and Heyma, A. (2011). Stepping stones for the unemployed: the effect of temporary jobs on the duration until (regular) work. *Journal of Population Economics*, 24(1), 107-139.
- De Witte, H., and K. Näswall. (2003). Objective versus Subjective Job Insecurity: Consequences of Temporary Work for Job Satisfaction and Organizational Commitment in Four European Countries. *Economic and Industrial Democracy*. 24(2): 149–188;
- Dixon, S. (2011). Temporary employment and the quality of temporary jobs. *New Zealand Journal of Employment Relations*, 36(1), 1-20.
- Doeringer, P. B. and Piore, M. (1971). *Internal Labor Markets and Manpower Analysis*. Lexington, Mass.: D. C. Heath.
- Dolado, J. J., García-Serrano, C., and Jimeno, J. F. (2002). Drawing lessons from the boom of temporary jobs in Spain. *Economic Journal*, 112(480), F270-F295.
- Dwyer, R. E., and Wright, E. O. (2019). Low-wage job growth, polarization, and the limits and opportunities of the service economy. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 5(4), 56-76
- Elia, L. (2010). Temporary/Permanent Workers' Wage Gap: A Brand-new Form of Wage Inequality?. *Labour*, 24(2), 178-200;
- Esser, I., and Olsen, K. M. (2012). Perceived job quality: Autonomy and job security within a multi-level framework. *European sociological review*, 28(4), 443-454
- Faccini, R. (2014). Reassessing labour market reforms: Temporary contracts as a screening device, *The Economic Journal*, 124, 167-200
- Fukao, K., Perugini, C., and Pompei, F. (2022). Non-standard Employment and Rent-sharing. *Economica*, forthcoming
- Fuller, S., and Stecy-Hildebrandt, N. (2015). Career pathways for temporary workers: Exploring heterogeneous mobility dynamics with sequence analysis. *Social Science Research*, 50, 76-99.
- Gagliarducci, S. (2005). The dynamics of repeated temporary jobs. *Labour Economics*, 12(4), 429-448.

- Gash, V., and McGinnity, F. (2007). Fixed-term contracts—the new European inequality? Comparing men and women in West Germany and France. *Socio-Economic Review*, 5(3), 467-496.
- Gebel, M., and Giesecke, J. (2011). Labor market flexibility and inequality: the changing skill-based temporary employment and unemployment risks in Europe. *Social Forces*, 90(1), 17-39.
- George, E. (2003). External solutions and internal problems: The effects of employment externalization on internal workers' attitudes. *Organization Science*, 14(4), 386-402.
- Gerfin, M., Lechner, M., and Steiger, H. (2005). Does subsidised temporary employment get the unemployed back to work? Aneconometric analysis of two different schemes. *Labour Economics*, 12(6), 807-835.
- Giesecke, J. (2009). Socio-economic risks of atypical employment relationships: Evidence from the German labour market. *European Sociological Review*, 25(6), 629-646.
- Gintis, H. (1976). The nature of labor exchange and the theory of capitalist production. *Review of Radical Political Economy*, 8 (2), 36–54.
- Green, C., Kler, P., and Leeves, G. (2010). Flexible contract workers in inferior jobs: reappraising the evidence. *British Journal of Industrial Relations*, 48(3), 605-629.
- Groshen, E. (1991). Sources of intra-industry wage dispersion: How much do employers matter? *Quarterly Journal of Economics* 106(3): 869–84
- Heinrich, C. J. (2005). Temporary employment experiences of women on welfare. *Journal of Labor Research*, 26(2), 335-350.
- Holzer H. J., Lane J. I., and Vilhuber, L. (2004). Escaping low earnings: The role of employer characteristics and changes. *Industrial and Labor Relations Review* 57(4): 560–78;
- Ichino, A., Mealli, F., and Nannicini, T. (2005). Temporary work agencies in Italy: a springboard toward permanent employment?. *Giornale degli Economisti e Annali di Economia*, 64(1), 1-27.
- ILO. (2016). Non-standard employment around the world : understanding challenges, shaping prospects (1st ed.).
- Kalleberg, A. L. (2001). Organizing flexibility: the flexible firm in a new century. *British Journal of Industrial Relations*, 39(4), 479-504.
- Kalleberg, A. L. (2018). *Precarious lives: Job insecurity and well-being in rich democracies*. John Wiley & Sons;
- Kauhanen, M., and Nätti, J. (2015). Involuntary temporary and part-time work, job quality and well-being at work. *Social Indicators Research*, 120(3), 783-799).
- Kleinknecht, A., Oostendorp, R. M., Pradhan, M. P., and Naastepad, C. W. M. (2006). Flexible labour, firm performance and the Dutch job creation miracle. *International Review of Applied Economics*, 20(2), 171-187.
- Landini, F., Arrighetti, A., and Bartoloni, E. (2020). The sources of heterogeneity in firm performance: lessons from Italy. *Cambridge Journal of Economics*, 44(3), 527-558.

- Lane, J., Mikelson, K. S., Sharkey, P., and Wissoker, D. (2003). Pathways to work for low-income workers: The effect of work in the temporary help industry. *Journal of Policy Analysis and Management*, 22(4), 581-598.
- Lane J., Salmon L. A., and Spletzer J. R. (2007). Establishment wage differentials. *Monthly Labor Review* 130(4): 3–17
- Levy, F., and Kochan, T. (2012). Addressing the problem of stagnant wages. *Comparative Economic Studies*, 54(4), 739-764
- Lewchuk, W. (2017). Precarious jobs: Where are they, and how do they affect well-being?. *The Economic and Labour Relations Review*, 28(3), 402-419
- Marglin, S. A. (1974). What Do Bosses Do? The Origins and Functions of Hierarchy in Capitalist Production. *Review of Radical Political Economics*, 6(2), 60–112.
- Mishel, L. (2015). Causes of wage stagnation (p. 5). Washington, DC: Economic Policy Institute;
- Montgomery, J.D. (1991). Equilibrium Wage Dispersion and Interindustry Wage Differentials, *The Quarterly Journal of Economics*, Volume 106, Issue 1, February 1991, Pages 163–179
- Moscone, F., Tosetti, E., and Vittadini, G. (2016). The impact of precarious employment on mental health: The case of Italy. *Social Science & Medicine*, 158, 86-95
- Nagaraj, R. (1994). Employment and Wages in Manufacturing Industries: Trends, Hypothesis and Evidence. *Economic and Political Weekly*, 29(4), 177–186
- OECD. (2015). *In It Together: Why Less Inequality Benefits All*. Paris: OECD Publishing
- Osterman, P. (2000). Work reorganization in an era of restructuring: Trends in diffusion and effects on employee welfare. *ILR Review*, 53(2), 179-196.
- Osterman, P. (2011). Institutional labor economics, the new personnel economics, and internal labor markets: A reconsideration. *ILR Review*, 64(4), 637-653.
- Osterman, P. (2018). In search of the high road: meaning and evidence. *ILR Review*, 71(1), 3-34.
- Portugal, P. and Varejão, J. (2010). The hidden side of temporary employment: Fixed-term contracts as a screening device. Banco de Portugal. Working Paper 29/2010.
- Rodrik, D., and Sabel, C. F. (2020). Building a good jobs economy. Harvard Kennedy School, John F. Kennedy School of Government.
- Rodrik, D., and Stantcheva, S. (2021). Fixing capitalism's good jobs problem. *Oxford Review of Economic Policy*, 37(4), 824-837.
- Scherer, S. (2004). Stepping-stones or traps? The consequences of labour market entry positions on future careers in West Germany, Great Britain and Italy. *Work, Employment and Society*, 18(2), 369-394.
- Szirmai, A. (2013). Manufacturing and economic development. Pathways to industrialization in the twenty-first century: New challenges and emerging paradigms, 53-75.
- Von Hippel, C., and Kalokerinos, E.K. (2012). When temporary employees are perceived as threatening: Antecedents and consequences. *Leadership and Organization Development Journal* 33(2): 200–216).

- Yu, W. H. (2012). Better off jobless? Scarring effects of contingent employment in Japan. *Social Forces*, 90(3), 735-768.
- Zeynep, T. (2014). *The Good Jobs Strategy: How the Smartest Companies Invest in Employees to Lower Costs and Boost Profits*. Boston: Houghton Mifflin Harcourt.

Appendix A – Additional Figures and Tables

Table A1. Distribution of firms across industries, 2011

Ateco 2 digit code	SILER and AIDA sample		ISTAT – ASIA sample	
	N	%	N	%
10: Manufacture of food products	404	9.08	4896	12.57
11: Manufacture of beverages	35	0.79	152	0.39
12: Manufacture of tobacco products				
13: Manufacture of textiles	72	1.62	1102	2.83
14: Manufacture of wearing apparel	206	4.63	3692	9.48
15: Manufacture of leather and related products	60	1.35	687	1.76
16: Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	92	2.07	1967	5.05
17: Manufacture of paper and paper products	67	1.51	336	0.86
18: Printing and reproduction of recorded media	140	3.15	1337	3.43
19: Manufacture of coke and refined petroleum products	6	0.13	9	0.02
20: Manufacture of chemicals and chemical products	126	2.83	450	1.15
21: Manufacture of basic pharmaceutical products and pharmaceutical preparations	11	0.25	27	0.07
22: Manufacture of rubber and plastic products	213	4.79	1029	2.64
23: Manufacture of other nonmetallic mineral products	215	4.83	1556	3.99
24: Manufacture of basic metals	77	1.73	330	0.85
25: Manufacture of fabricated metal products, except machinery and equipment	1,025	23.04	6997	17.96
26: Manufacture of computer, electronic, and optical products	128	2.88	703	1.8
27: Manufacture of electrical equipment	209	4.7	1046	2.68
28: Manufacture of machinery and equipment	893	20.08	4590	11.78
29: Manufacture of motor vehicles, trailers, and semitrailers	82	1.84	310	0.8
30: Manufacture of other transport equipment	40	0.9	256	0.66
31: Manufacture of furniture	109	2.45	1201	3.08
32: Other manufacturing	99	2.23	2134	5.48
33: Repair and installation of machinery and equipment	139	3.13	4157	10.67
Total	4,448	100	38,964	100

Source: authors' own elaboration on SILER, AIDA-BVD and ASIA data

Table A2 – Main variables decomposition into within and between components

Variable	Component	Mean	Stand. Dev.	Min	Max
Average quality of permanent jobs	Overall	0.493	0.096	0.001	0.772
	<i>Between</i>		<i>0.095</i>	<i>0.005</i>	<i>0.772</i>
	<i>Within</i>		<i>0.057</i>	<i>-0.021</i>	<i>0.897</i>
Share of temporary workers	Overall	0.168	0.192	0.000	1.000
	<i>Between</i>		<i>0.200</i>	<i>0.000</i>	<i>1.000</i>
	<i>Within</i>		<i>0.095</i>	<i>-0.689</i>	<i>1.021</i>

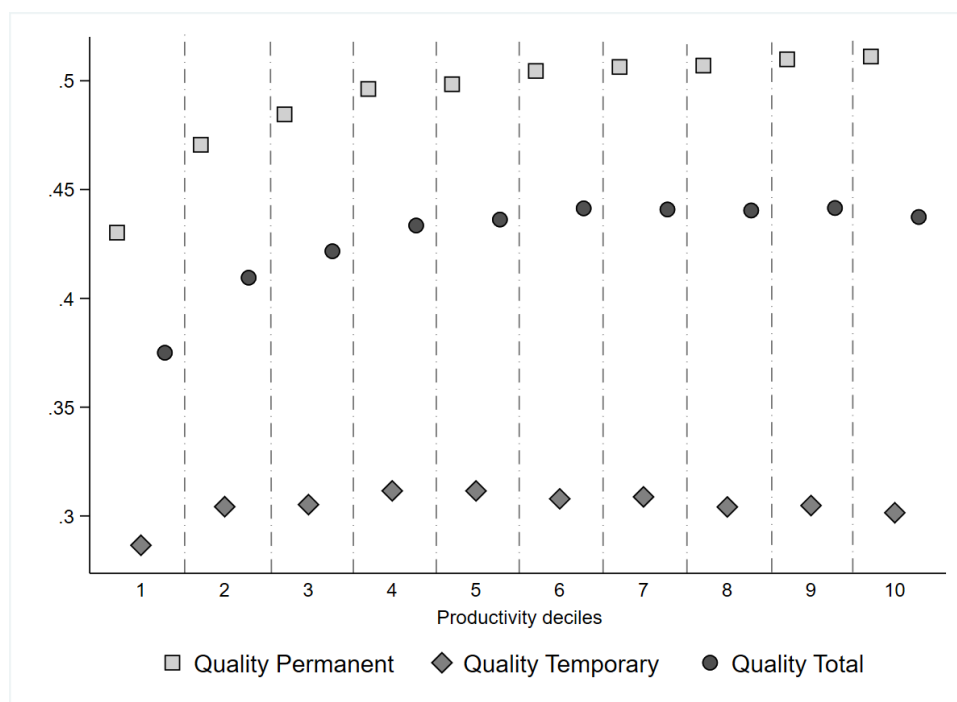
Source: authors' own elaboration on SILER, AIDA-BVD and INDAPP data

Table A3 – Additional results – Pooled OLS

	(1) Quality Differential	(2) Self Realisation	(3) Recognition	(4) Support
Share of temp workers	-0.1624*** (0.006)	-0.0625*** (0.006)	-0.0516*** (0.005)	-0.0727*** (0.006)
log(Employees)	-0.0131*** (0.001)	0.0099*** (0.001)	0.0076*** (0.001)	0.0153*** (0.001)
log(Labour productivity)	0.0018 (0.002)	0.0183*** (0.002)	0.0197*** (0.002)	0.0210*** (0.002)
Average labour costs	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)
ROE	0.000 (0.000)	0.0000 (0.000)	0.0000 (0.000)	0.0001 (0.000)
log(Per-employee capital stock)	-0.0018** (0.001)	-0.0016* (0.001)	-0.0036*** (0.001)	-0.0004 (0.001)
Education of perm workers	0.0062*** (0.001)	-0.0002 (0.001)	0.0074*** (0.001)	-0.0262*** (0.001)
Share of foreign perm workers	0.0003*** (0.000)	-0.0006*** (0.000)	-0.0003*** (0.000)	0 (0.000)
Share of female perm workers	0.0004*** (0.000)	-0.0004*** (0.000)	-0.0003*** (0.000)	-0.0007*** (0.000)
Constant	0.2177*** (0.021)	0.2775*** (0.019)	0.2209*** (0.017)	0.3289*** (0.018)
Year fixed effects	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes
Province fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	No	No
N. Observations	50140	64380	64380	64380
Log-Likelihood	29704.3286	48312.7019	54451.6781	51276.0217
BIC	-58889	-96094	-108372	-102021
AIC	-59313	-96529	-108807	-102456
RSS	897.7052	840.3518	694.4429	766.4454
R2_adjusted	0.1339	0.1143	0.1039	0.1092

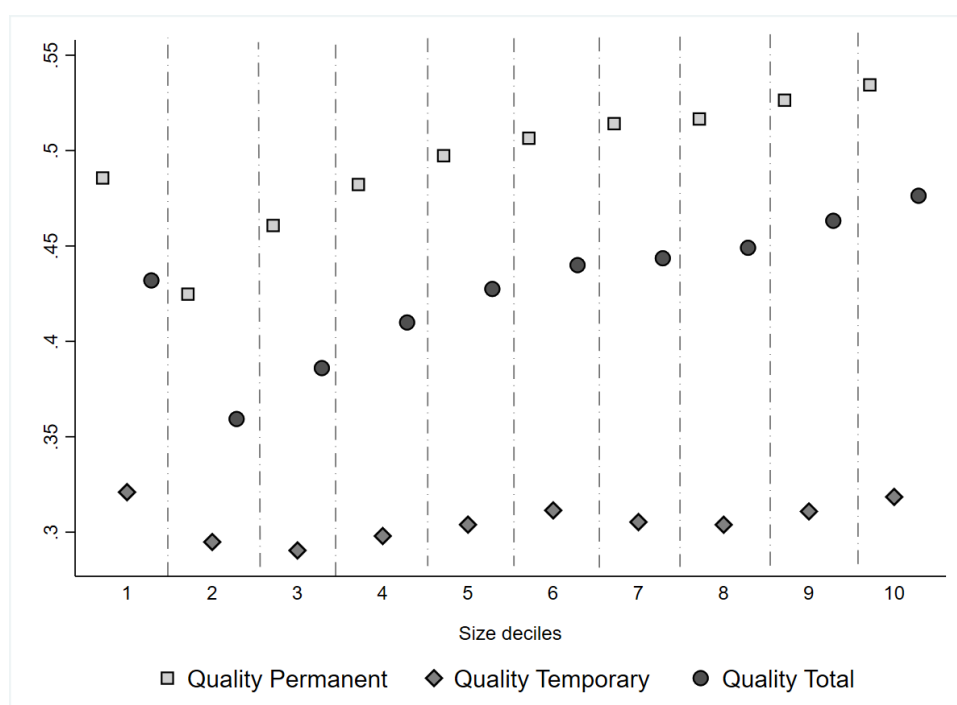
Source: authors' own elaboration on INAPP, SILER and AIDA data. Robust clustered standard errors in brackets. Dependent variables: for column (1) absolute difference between average quality of permanent occupations and average quality of temporary occupations; for column (2) PCA factor related to self-realisation; for column (3) PCA factor related to recognition; for column (4) PCA factor related to support. Significance levels: * 10%, ** 5%, *** 1%.

Figure A1. Change in quality for temporary and permanent jobs by productivity decile



Source: authors' own elaboration on INAPP, SILER and AIDA data.

Figure A2. Change in quality for temporary and permanent jobs by size decile



Source: authors' own elaboration on INAPP, SILER and AIDA data.

Appendix B – Principal Component Analysis

A principal component analysis has been conducted using information contained in the ICP Survey, which was carried out by the National Institute for Public Policy Analysis (INAPP) in collaboration with the Italian National Statistical Institute (ISTAT) in 2013. The ICP survey adopts the O*Net (Occupational Information Network) methodology and aims at investigating, at the highest level of disaggregation (i.e. five-digits), the characteristics of Italian professions, with particular reference to the required skills and knowledge, the requirements necessary for their execution and the characteristics of the working contexts in which the various jobs are carried out. The questionnaire, divided into ten thematic sections for a total of 255 questions, allows for the collection of information according to standardized taxonomies which make the individual professions comparable with each other. The interviews are administered to a sample of workers of all professions attributable to the professional units of the ISTAT CP2011 classification.

Table B.1 - Items identifying work values

Item	Description [<i>possible answers</i>]
E1	Those who carry out this job make full use of their skills [<i>1 Strongly disagree – 5 Strongly agree</i>]
E2	Those who carry out this job feel accomplished [<i>1 Strongly disagree – 5 Strongly agree</i>]
E3	Those who carry out this job are constantly busy [<i>1 Strongly disagree – 5 Strongly agree</i>]
E4	Those who carry out this job perform their duties alone [<i>1 Strongly disagree – 5 Strongly agree</i>]
E5	Those who carry out this job are busy every day in diversified activities [<i>1 Strongly disagree – 5 Strongly agree</i>]
E6	Those who carry out this job are well paid [<i>1 Strongly disagree – 5 Strongly agree</i>]
E7	Those who carry out this job have secure employment [<i>1 Strongly disagree – 5 Strongly agree</i>]
E8	Those who carry out this job work in a good working environment [<i>1 Strongly disagree – 5 Strongly agree</i>]
E9	Those who carry out this job have the possibility to make career advancements [<i>1 Strongly disagree – 5 Strongly agree</i>]
E10	Those who carry out this job receives due recognition for what they do [<i>1 Strongly disagree – 5 Strongly agree</i>]
E11	Those who carry out this job supervise and instruct others [<i>1 Strongly disagree – 5 Strongly agree</i>]
E12	Those who carry out this job are appreciated by others in their company and in the community [<i>1 Strongly disagree – 5 Strongly agree</i>]
E13	Those who carry out this job get along well with their coworkers [<i>1 Strongly disagree – 5 Strongly agree</i>]
E14	Those who carry out this job execute tasks that commit them to work also for the benefit of others [<i>1 Strongly disagree – 5 Strongly agree</i>]
E15	Those who carry out this work execute activities that conform to their moral principles [<i>1 Strongly disagree – 5 Strongly agree</i>]
E16	Those who carry out this job are treated well by their company [<i>1 Strongly disagree – 5 Strongly agree</i>]
E17	Those who carry out this job can count on the support of their supervisors [<i>1 Strongly disagree – 5 Strongly agree</i>]
E18	Those who carry out this job can count on supervisors who undertake good staff training [<i>1 Strongly disagree – 5 Strongly agree</i>]
E19	Those who carry out this job can experiment with their ideas [<i>1 Strongly disagree – 5 Strongly agree</i>]
E20	Those who carry out this job plan their activities with little supervision [<i>1 Strongly disagree – 5 Strongly agree</i>]
E21	Those who carry out this job can make decisions independently [<i>1 Strongly disagree – 5 Strongly agree</i>]

Source: ICP Survey 2013.

Section E of the ICP, contains information concerning the work values of each profession (797 professional units), which is collected on the basis of the 21 items reported in Table B.1. These items are used to construct the factors capturing the quality of each job.

As first step of our analysis we check the adequacy of our data for factor analysis through the Kaiser-Meyer-Olkin (KMO) test. This test aims at evaluating the degree of common variance among the selected variables. In particular, the higher the proportion of the variance among such variables that turns out to be common variance, the higher the KMO test. In our case the KMO test turns out to be 0.842, which appears entirely satisfactory. Moreover, the adequacy of the data is confirmed also by the Bartlett's sphericity test. Indeed, the high significance of such test (p-value = 0.000) allows us to reject the null hypothesis that the observed correlation matrix coincides with the identity matrix, i.e., that the selected variables are orthogonal.

Table B.2 – Communality scores

Code	Initial	Extraction
E1	1.000	0.629
E2	1.000	0.770
E3	1.000	0.702
E4	1.000	0.733
E5	1.000	0.696
E6	1.000	0.772
E7	1.000	0.758
E8	1.000	0.658
E9	1.000	0.576
E10	1.000	0.801
E11	1.000	0.711
E12	1.000	0.682
E13	1.000	0.554
E14	1.000	0.689
E15	1.000	0.777
E16	1.000	0.687
E17	1.000	0.837
E18	1.000	0.804
E19	1.000	0.752
E20	1.000	0.591
E21	1.000	0.807

Note: Authors' own elaboration on ICP data.
The extraction method is PCA.

Having established that the data are suitable for the analysis, we extract factors through a Principal Component Analysis (PCA). Communality scores turn out to be adequate, as each single variable shows an extraction value greater than 0.40 (see Table B.2). Table B.3 highlights the eigenvalues of the extracted components, while the scree plot reported in Figure B.1 shows the variance associated with each extracted factor. The presence of a significant change in the slope of

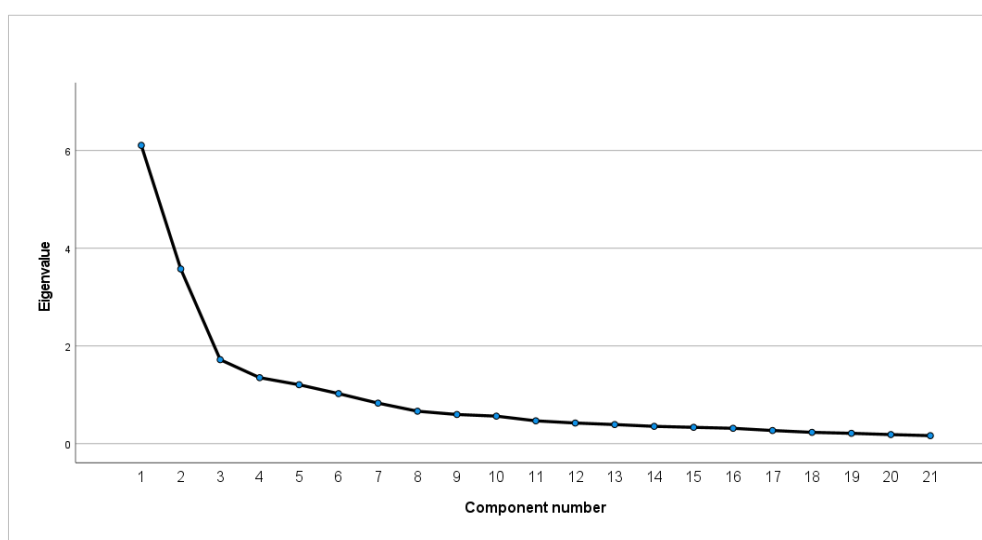
the curve signals the reduction of the eigenvalue and can be used to identify the factors with greater explanatory power. The graph can be thus used to select the number of factors to be retained in the analysis. In the case under examination, the decrease in the slope of the eigenvalue is placed to the right of the third factor, suggesting that the first three factors are those most suitable be taken into consideration.

Table B.3 – Total variance explained

Component	Eigenvalue	% Variance	% Cumulative variance
1	6.106	29.077	29.077
2	3.576	17.029	46.106
3	1.720	8.190	54.296
4	1.352	6.436	60.732
5	1.207	5.748	66.480
6	1.025	4.882	71.362
7	0.831	3.955	75.317
8	0.665	3.168	78.485
9	0.598	2.846	81.332
10	0.564	2.686	84.018
11	0.468	2.229	86.247
12	0.423	2.017	88.264
13	0.392	1.867	90.130
14	0.355	1.693	91.823
15	0.335	1.597	93.419
16	0.315	1.501	94.921
17	0.270	1.287	96.207
18	0.232	1.106	97.314
19	0.213	1.012	98.326
20	0.187	0.889	99.215
21	0.165	0.785	100.000

Note: Authors' own elaboration on ICP data. The extraction method is PCA

Figure B.1 – Scree plot



Source: Authors' own elaboration on ICP data.

To attach some content to the three extracted components, we report in Table B.4 the Pattern Matrix, which shows the weight with which each items enter into the specific factor. Component 1, which account for 29.1% of the explained variance, collects variables mainly related to the degree of *Self-realization*, such as the ability to make decisions independently (E21), to experiment with new ideas (E19), to feel accomplished (E2) and to make full use of the own skills (E1). Component 2, which explains 17% of the variance, can be labeled as *Recognition* since it aggregates variables such as the existence of due recognition for what the worker does (E10), a satisfactory level of pay (E6), a good working environment (E8), and adequate appreciation from others in the company and in the community (E12). Finally, Component 3, which adds 8.2 percentage points to the cumulative explained variance, collects variables belonging to the domains of *Social support* such as those related to the support received by one's own supervisors (E10), the presence of good staff training (E18) as well as good treatment by the company (E16)

Table B.4 – Pattern matrix

Item	Component		
	1	2	3
E21	0.879		
E19	0.862		
E2	0.761		
E1	0.749		
E5	0.715		
E20	0.621		
E11	0.585		
E10		0.863	
E6		0.740	
E8		0.654	
E12		0.576	
E17			0.902
E18			0.864
E16			0.731

Note: Authors' own elaboration on ICP data. The extraction method is PCA. The rotation method is Varimax with Kaiser normalization. Convergence for rotation is performed in seven iterations.