

ISSN 1974-4110 (on line edition)
ISSN 1594-7645 (print edition)



WP-EMS

***Working Papers Series in
Economics, Mathematics and Statistics***

“EXUBERANT PROCLIVITY TOWARDS NON-STANDARD EMPLOYMENT:EVIDENCE FROM LINKED EMPLOYER-EMPLOYEE DATA”

- Alessandro Arrighetti (University of Parma)
- Elena Bartoloni (ISTAT, Regional Office for Lombardy in Milan, University of Parma)
- Fabio Landini (University of Parma, Bocconi University, ICRIO)
- Chiara Pollio (University of Ferrara, EmiliaLab – Network of Departments of Economics of the Emilia-Romagna Region)

WP-EMS # 2019/05

Exuberant Proclivity Towards Non-Standard Employment: Evidence from Linked Employer-Employee Data¹

Alessandro Arrighetti^a, Eleonora Bartoloni^{b,a}, Fabio Landini^{a,c}, Chiara Pollio^{d,e}

^a University of Parma

^b ISTAT, Regional Office for Lombardy in Milan

^c Bocconi University, ICRIOS

^d University of Ferrara

^e EmiliaLab – Network of Departments of Economics of the Emilia-Romagna Region

Abstract

In most industrialized countries temporary and non-standard forms of employment (NSFE) have become a pervasive feature of the labor market. However, at the firm level, the diffusion of NSFE is less uniform than expected: while some firms exhibit high propensity to use NSFE, others make no use of it. Most conventional explanations of NSFE use (market uncertainty, production regimes, competitive pressure) fail to account for such heterogeneity. In this article the authors develop an alternative explanation that links the use of NSFE to firm-specific availability of managerial resources: whenever the latter are relatively scarce, firms make larger use of NSFE to reduce coordination and operating costs. Using a linked employer-employee panel of manufacturing firms from the Emilia-Romagna region (Italy), the authors provide empirical support for this hypothesis. The result is robust to different estimation strategies and controlling for alternative drivers of NSFE use. This novel finding suggests that, the use of NSFE has strong managerial roots: it allows firms to compensate for firm-specific managerial weaknesses.

Key words: non-standard employment, managerial resources, span of control, firm heterogeneity,

JEL Code: D22, L23, M51, M52, J41, J23.

¹**Acknowledgment:** This work is the result of collaboration developed within two projects: a) “Competence for manufacturing in Emilia-Romagna”, which is a two-years project funded by the Regione Emilia Romagna in collaboration with EmiliaLab; and b) “Business demography during the great recession: patterns of resilience and productivity dispersion”, which is part of a three-year strategic research plan promoted by the National Institute of Statistics (ISTAT). The empirical part of this research was carried out at the ISTAT Regional Office for Lombardy in Milano. We would like to acknowledge the support of Stefano Menghinello, Director for Economic Statistics and Rosalia Coniglio, Director of the Regional Office for Lombardy. The views expressed in this paper are those of the authors and do not necessarily reflect the views of ISTAT. We thank Sandro Montresor, Davide Castellani, Antonello Zanfei as well as participants to the workshop on “Technology, Work and Internationalization” held at the University of Urbino for the useful comments. All remaining errors are ours.

“... Job security appears tenuous to many employees. Despite impressive performance, many U.S. companies continue to revamp jobs and organizational structures as if the economy were in a tailspin” (Powell, 2000, p.3)

1. Introduction

During the last decades, several countries have enacted labor market reforms designated to increase firm's external flexibility, i.e. the freedom employers enjoy to expand or contract the workforce as they wish and to employ workers on a temporary and part-time basis (Treu, 1992). Such reforms made it easier for both manufacturing and service firms to hire workers through non-standard forms of employment (NSFE) (Kalleberg 2011; Hipp, Bernhardt and Allmendinger 2015; Millward, Bryson and Forth 2000; Peck and Theodore 2006; Cappelli and Keller 2013; ILO 2015). NSFE differ markedly from ordinary labor contracts, which provide an indefinite duration of the employment relationship, full-time schedules and a precise correspondence between employer and hierarchical authority, i.e. between work and employment (Quinlan 1998; Allan, 2000; Kalleberg 2000; Keller and Seifert 2005; Cappelli and Keller 2013): in NSFE at least one of such requirements is missing. The International Labour Organization (ILO) (2018) identifies four non-standard employment typologies: (1) temporary contracts; (2) part-time and on-call work; (3) temporary agency work and other forms of employment involving multiple parties; and (4) disguised employment relationships and dependent self-employment.

Although the rate of NSFE varies depending on the industry and the country (Hipp et al. 2015; Eichhorst, Feil and Marx 2010; ILO 2018), these forms of employment have become pervasive. Millward et al. (2000), for instance, show that in Britain the share of workers hired on the basis of temporary as well as part-time and self-employment contracts has been on the rise since the 1980s. Keune (2013) and Cappelli and Keller (2013) confirm the existence of a growing, although differentiated, trend in the use of fixed-term contracts in most advanced countries. Some recent works suggest that the firm's propensity to rely on NSFE may increase in presence of severe downturns, following the need to adjust the use of inputs to demand shocks (Boeri, Garibaldi and Moen 2013; Bartelsman, Lopez-Garcia and Presidente 2019; Bachmann et al. 2015; ILO 2015; Luo, Mann and Holden 2010). With specific reference to the Great Recession, for instance, this increase has been particularly high in Italy, where the share of employees with fixed-term contract has grown by 50% in the

overall working-age population (from 8% in 2009 to 12% in 2017) and by 57% among the youngest, i.e. between 15 and 24 years-old (from 35% in 2009 to 55% in 2017). This pattern has been less pronounced (and sometime even opposite) in countries where the use of these contracts was relatively common, such as Germany and France (see Figure A1 and A2 in the Appendix).

The growing relevance of NSFE has attracted the attention of scholars and policy makers. The research has focused on two main issues. First of all, the impact of external flexibility on work relations and job conditions, which turns out to be sizable. In particular, NSFE are shown to increase job instability, persuade workers that they are replaceable (Kalleberg 2011), introduce wage penalties (especially for temporary agency workers, see ILO 2015 and 2018) and shift part of the entrepreneurial risk to employees (Kleinknecht et al. 2006). Moreover, as highlighted by OECD (2015), being on a temporary contract significantly reduces the likelihood of receiving employer-sponsored training. Secondly, a large number of contributions investigate the impact of NSFE on different components of firm performances such as returns on equity (Lepak, Takeuchi and Snell 2003), productivity growth (Boeri and Garibaldi 2007; Ichino and Riphahn 2005; Valverde, Tregaskis and Brewster 2000; Bardazzi and Duranti 2016; Lucidi and Kleinknecht 2010; Damiani, Pompei and Ricci 2016), innovation and R&D (Kleinknecht, van Schaik and Zhou 2014) as well as workers' motivations (Blanchard and Landier 2002; Battisti and Vallanti 2013) and the propensity to accumulate firm-specific skills (Lepak and Snell 2002). Overall, the evidence produced by these works is mixed, fueling doubts about the role of NSFE as drivers of long-term firm efficiency.

In this paper we depart from this literature by studying the drivers of firm's recourse to NSFE. In particular, rather than focusing on the effect of external flexibility on some outcome variable, e.g. work conditions and/or firm performance, we ask what drives the firm's propensity to rely on NSFE in the first place. This question is relevant for three reasons. First, because it helps explaining where the need for external flexibility originates from, whether outside (e.g., rising uncertainty of market dynamics) or inside (e.g., managerial resources) the boundary of the firm (or both). Secondly, because it improves our understanding of how firms may eventually respond to policy interventions aimed at tailoring the use of NSFE. Finally, because it may provide an explanation for the diversity of firm's proclivity towards NSFE within and between industries. To the best of our knowledge, this article is the first that focuses explicitly on this issue.

To address this question we first compare different theoretical arguments that can explain the firm's propensity to rely on NSFE. Then, we check the validity of these arguments by making use of a linked employer-employee database that combines two sources: a) firm- and worker-level information taken from the Italian Statistical Office (ISTAT)'s registry of active firms (*ASIA*) for the years 2012-2016; and b) accounting and financial information derived from ISTAT's *Limited Companies Balance Sheets Panel*, which gathers the balance sheets of all Italian limited companies from 2001 to 2014. To limit issues related to labor market dualism and diffusion of informal employment we focus our analysis on Emilia Romagna, an Italian region in which both features are limited and homogeneously distributed. With our work we make two main contributions to the literature. First, we outline a theoretical framework that can be used to study the drivers of NSFE at the firm level. Second, we provide empirical evidence in support (or against) some of these drivers.

2. Common theoretical explanations and preliminary evidence

While the diffusion of NSFE is a widely debated topic, especially due to the related social, economic and organizational implications (Nienhueser 2005), the drivers of their use are only partially known (Cappelli and Keller 2013). In fact, information concerning the characteristics of the firms involved in NSFE and the actual reasons that lead them to adopt these contractual forms are relatively limited. Nevertheless, the most common explanations converge around three *structural/contextual* factors²: a) market uncertainty and volatility, b) knowledge-intensive production regime and c) increasing market openness and competitive pressure.

Market uncertainty and volatility. Flexibility represents one of the distinguishing features of the post-Fordist production regime, which has come to dominate most industries in advanced countries (Duguay, Landry and Pasin 1997). In such a regime, unpredictable product demand and uncertainty in consumer preferences are considered the main factors that force firms to achieve some degree of flexibility in production (Atkinson 1987; Gerwin 1993; Chang 2012). While in the past such flexibility was partly satisfied by holding stocks rather than by adjusting working time and production volumes, at the present this solution is not viable. The

²Other explanations stress the role and strength of unions (Devicienti, Naticchioni and Ricci 2018) and the use of temporary contracts as screening device for the new hiring (Portugal and Varejao 2009).

adoption of business models based on production to order and the growing number of product varieties associated with mass customization limit the possibility to keep parts in stock as a buffer between market and production (Bosch 2004). An alternative is to adapt to unforeseen market signals by changing the internal composition of productive resources, including labor (Volberda 1996). In this sense, the design of labor market institutions and regulations is certainly influential, but, as argued by Saint-Paul (1996), the dichotomy between primary (stable) and secondary (unstable) employment can endogenously arise within a firm as a response to demand fluctuations. Since searching, recruiting, monitoring and replacing workers with high skills is particularly costly, firms are pushed to split their workforce into a higher-paid, primary workforce and a secondary, or peripheral, workforce, whose adjustment costs are substantially lower (Aleksynska and Berg 2015). In this view employers react to uncertainty by creating a buffer of flexibility based on precarious, fixed-term or external employees (Kalleberg 2011; ILO 2015). Following this argument, it is therefore the high market uncertainty of most modern industries that leads firms to increase their use of NSFE.³

Knowledge-intensive production regime. A parallel argument can be developed by looking at the knowledge content of production activities. According to Piore and Sabel (1984), Tolliday and Zeitlin (1986) and Streeck (1987), in fact, together with market uncertainty, another central feature of the change towards post-Fordist production regimes lies in the emergence of knowledge-intensive modes of production. The evolution of the technological supply towards the adoption of fungible plants and machinery fosters the restructuring of firms (especially in manufacturing), making the constant accumulation of internal knowledge exceedingly important (Danneels 2002; Vrontis et al. 2017). In a business environment characterized by globalization and rapid technological change (Vrontis and Thrassou 2013), activities such as the acquisition of new competencies and the collection and processing of information currently absorb most part of the economic and managerial resources in nearly every sector (Verdu-Jover, Llorens-Montes and Garcia-Morales 2005). At different organizational layers,

³ According to Aleksynska and Berg (2015) empirical evidence both in economics and in management literature shows that temporary workers can indeed be used to help firms attain numerical flexibility (Bentolila and Dolado 1994; Abraham and Taylor 1996; Bentolila and Saint-Paul 1994), allowing them to survive in the adverse macroeconomic conditions (Holmlund and Storrie 2002), and deal with seasonal demand or with fluctuations in labour supply (Ko 2003). In addition, organizations in industries with highly volatile demand are more likely to recur to temporary labour (Cappelli and Keller 2013); but also organizations of smaller size, which are less likely to have employees available to meet temporary adjustment needs (Davis-Blake and Uzzi 1993).

firms need workers who are able to adapt to the demands of new technologies as they emerge, because this is the only way to maximize the advantage from technology and innovation (Brewster, Mayne and Tregaskis 1997). In other words, the whole organization has to become functionally, and not only externally, flexible. This goal can be achieved by means of intensive internal training, enlarging worker participation in decision-making and increasing incentives to individual and collective investment in firm-specific skills and competences. Clearly, such firm-specific commitment requires a time perspective which is at odds with short-term and flexible forms of employment (Mayer and Nickerson 2005). It follows, that in presence of highly sophisticated and firm-specific knowledge, the propensity to rely on NSFE will tend to be low (both to save on training costs and to improve firm's internal know-how). As a result, increasing *knowledge-intensive production regime* will tend to reduce non-standard employment rate at plant/firm level.

Competitive pressure. A third commonly used argument links the increasing use of NSFE to competition. Over the last decades, in fact, in most advanced countries the changes in market uncertainty and production technology coupled with extended trade and market liberalization (ILO 2018). As a consequence, in most industries both the market size of individual products and the number of market players expanded, amplifying the cost/price competitive pressures among incumbent firms (Feenstra and Weinstein 2017). As showed by Chen et al. (2009) and Lee and Pak (2018), trade liberalization brought about a significant compression of prices and markups. The latter has become particularly challenging to manage due to the existence of a hypercompetitive landscape (D'Aveni 1994; 1999), where firms have to provide quick responses and adaptations to heterogeneous global rivals (Harvey and Novicevic 2001). Faced with this competitive environment, firms rely on NSFE as useful tools to strengthen their bargaining power in wage negotiations, favoring a partial recovery of profitability through labor cost savings. Landini, Arrighetti and Bartoloni (2017), for instance, show that the larger availability of non-standard employment contracts is indeed associated with a reduction in average wages. Consequently, according to this view, the increasing diffusion of NSFE can be interpreted as deriving from firms' attempts to search for additional sources of profit in contexts characterized by strong and growing competitive pressures.

All the arguments sketched out above share a common aspect, namely they place the main driver of the growing use of NSFE outside the boundary of the firm. Whether the driver is the degree of market uncertainty, the characteristics of production technology or the strength of

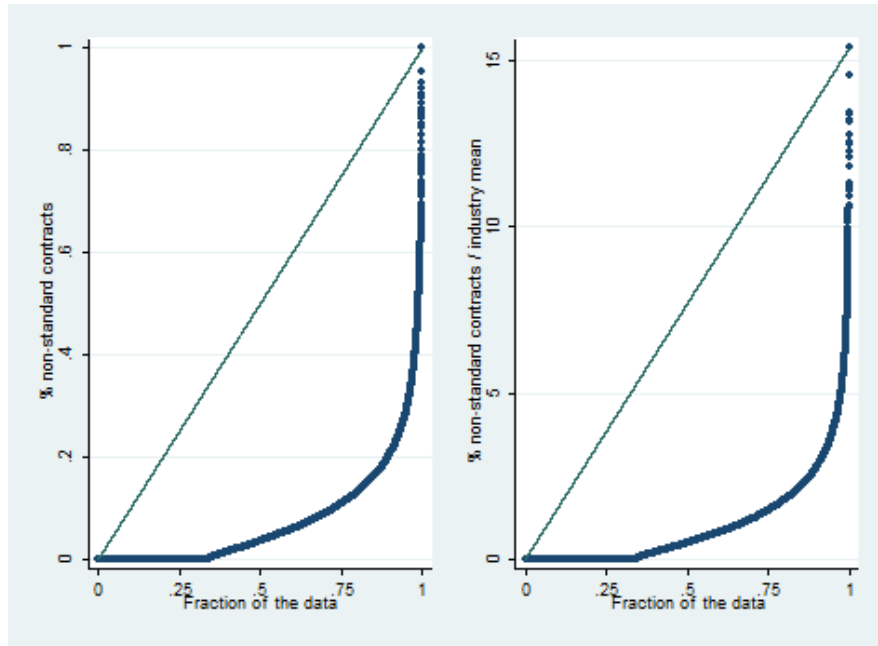
competitive pressure, the choice to rely on some forms of external flexibility depends on factors that a) are external to the firm and b) affect in a similar way all firms operating in the same competitive environment (e.g. the industry). Certainly one may expect the rate of NSFE to be higher (lower) in industries where demand is more (less) volatile, the production technology is less (more) knowledge intensive and the competitive pressure is stronger (weaker). Still, irrespective of the argument that one picks, the main empirical prediction would be that firm's recourse to NSFE tends to be relatively uniform within sectors (and possibly heterogeneous across them).

The evidence that emerges from the data, however, tells a different story. The left panel of Figure 1 shows the quantile distribution of the share of NSFE for the firms included in our dataset (for details, see Section 4). The right panel reports the quantile distribution of the same variable after normalization by the industry mean. In particular, the ISTAT's ATECO 2-digits classification has been used for the industry.⁴ On average, the workers hired with non-standard contracts account for only 7% of total employees. A more detailed analysis, however, reveals high heterogeneity in the population of firms. The median of this ratio, in fact, is barely above 3% and nearly 35% of the firms do not employ NSFE at all. Meanwhile, the top decile of firms relies extensively on external flexibility, with NSFE representing 20% to nearly 100% of total employees among these firms (on average 33%). Such evidence is even more compelling if one considers that the observed heterogeneity remains high even within industries. The shape of the distribution after normalizing by industry mean (right panel) remains virtually unchanged, with the top decile of firms relying on NSFE from 3 to 15 times more than their industry average.⁵

Figure 1 – Non-standard forms of employment: quantile distributions

⁴ ATECO is the Italian classification of economic activities; it corresponds to the EU Rev. 2 NACE Classification.

⁵ Figure 1 is computed combining fixed-term and temporary agency contract (see below). We computed the same figures distinguishing the two types of contract and the results are similar (see Figure A3 in the Appendix).



Note: The left panel reports the quantile distribution of the share of NSFE for the sample of firms included in our dataset. The right panel reports the quantile distribution of the same variable after normalising the share by the industry mean. The shape of the distribution does not change significantly after the normalisation. This suggests the existence of high within-industry heterogeneity.

The relatively low average diffusion of NSFE and, above all, the high within-industry asymmetry of their use cast doubt on the capacity of contextual-structural variables alone, such as market uncertainty, production regimes and competitive pressure, to account for the observed heterogeneity and the disproportionate use of NSFE in a subset of firms. To explain the latter, we need to focus on firm-specific factors that may lead firms operating within the same competitive environment to differentiate their recourse to NSFE. The next section deals precisely with this issue.

3. An alternative explanation: managerial resources and internal segmentation

An important factor that in our view explains part of the observed firm-level heterogeneity in the use of NSFE is managerial resources.⁶ In fact, among the changes brought about by the advent of post-Fordism there is not only the rising market uncertainty and

⁶ This view is shared also by scholars that consider NSFE as the modern version of labor contracts that were common in the initial phase of capitalism (Eichhorst, Feil and Marx 2010). According to this view, the use of NSFE signals a lack of propensity towards innovation as well as managerial backwardness and de-skilling of the wage-earners (Michie and Sheehan 2003; Zhou et al. 2011; Fernández-Kranz and Rodríguez-Planas 2011; Addabbo and Solinas 2012; Kleinknecht, van Schaik and Zhou 2014). In this sense, and referring to temporary staffing industry, Peck and Theodore (2007) argue that NSFE are “a means to manage and dissipate the effects of product market/personnel fluctuations, to tap skills required on a discontinuous basis, as well as to (re)establish a form of at-will employment relationship among some segments of the labour supply” (p.176).

complexity, but also the relevance of management as driver of firm behavior. The reason is twofold. First, because in presence of uncertainty firm success depends on the ability of managers to constantly review and update their decisions. The way such process unfolds can be very different, as managers do not react in mechanistic ways to external *stimuli*. Rather, as shown by recent management research, they are subject to a variety of constraints (e.g., resource endowments, demand conditions, governance), incentives (e.g., performance compensation, stakeholder activism) and psychological biases (e.g., overconfidence, hyperbolic discounting) (Banker et al. 2018). It follows that, depending on the managerial resources available within the organization, firm's decisions, including on the use of NSFE, can be highly differentiated, even for firms within the same competitive environment (Ketokivi 2006; Sanchez 1995; Kalleberg 2001; Lepak and Snell 1999 and 2002).

Secondly, the diffusion of post-Fordist production regimes has brought with it a significant reorganization of production activities, increasing the number of people involved in non-routine tasks (Acemoglu and Autor 2011). The latter are usually abstract cognitive tasks involving analytical and/or interpersonal skills (Autor et al. 2003, Fonseca, Lima and Pereira 2018). Typical activities include data analysis, creative thinking, directing or maintaining interpersonal relationships; all activities related to problem-solving, managing or carrying out complex communications (Fonseca, de Faira and Lima 2019). Such tasks are difficult to evaluate and compensate, requiring *ad-hoc* activities related to direction and monitoring that go beyond the simple definition of wage schemes. Moreover, in presence of rapid changes of the competitive environment, these tasks require a constant renewal of the related competences, which is often costly to accomplish. Altogether, this makes the coordination activity usually attributed to managers more challenging, increasing the importance of highly qualified managers. In this respect, several recent works indeed show that the quality of management accounts for large part of performance differentials among both manufacturing and service firms (Bloom et al. 2013; Bender et al. 2018).

Based on these considerations, we argue that managerial resources affect the recourse to NSFE. As suggested above, environmental uncertainty and technological volatility rise the costs of hierarchical coordination, generating strong pressures on management (Patel 2011). In line with contributions in the organizational economics and industrial relation literature⁷,

⁷According to Kalleberg (2001) the literature emphasize two distinct strategies of flexible labor organization: enhancing employees' ability to perform a variety of jobs and participate in decision-making, and reducing costs by limiting workers' involvement in the organization. These two strategies have been referred to variously as: functional vs. numerical flexibility (Atkinson 1984; Smith 1997; Hunter et al. 1993), internal vs. external flexibility (Cappelli and Neumark 2001), clan vs. market (Ouchi 1980), dynamic vs. static flexibility (Colclough

we argue that the reaction of managers can be twofold: a) to strengthen internal flexibility, *i.e.* enhancing the ability of standard employees to perform a variety of jobs and participate in decision-making; b) to rely on external flexibility, *i.e.* exploiting NSFES so as to reduce costs by limiting workers' involvement in the organization (Kalleberg 2001). Both options have advantages and disadvantages. Internal flexibility uses mainly standard forms of employment and thus entails relatively high operating costs (e.g., hiring and firing costs). Moreover, it requires an intensive and costly activity of coordination by highly qualified managers. At the same time, the combination of job variety and participation in decision-making makes this option particularly convenient when the tasks involved are non-routine, because it is more effective in fostering learning and information sharing. On the contrary, external flexibility is relatively expensive when it is used for tasks other than routine ones, since it discourages competence accumulation. However, it enjoys lower operating costs and less intensive use of managerial resources (*i.e.*, it exploits a mechanism of "external delegation" of coordination activities, see Bock et al. 2012). It follows, that the firm's rate of NSFES will depend both on the characteristics of the tasks and on the availability of managerial resources. For any given level of managerial resources, the probability to use NSFES is lower (higher) the less (more) routinized the tasks. On the other hand, for any given distribution of tasks, the probability to use NSFES is lower (higher) for firms with higher (lower) level of managerial resources.

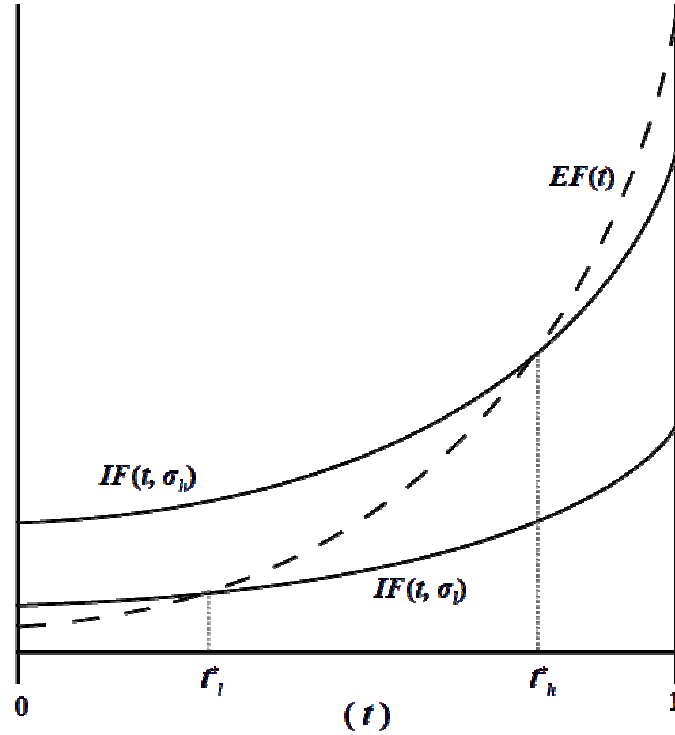
To illustrate our argument, we discuss a simple example. Consider an industry populated by a fixed number of firms. Each firm needs to produce a given output at minimum costs. For reasons not explicitly modeled and related to previous investments and learning paths, firms differ in their endowment of managerial resources. In particular, we characterize such endowment by the ratio $\sigma_i = \frac{b_i}{w_i}$ where $b_i (> 0)$ is the number of blue-collar workers and $w_i (> 0)$ the number of white-collar workers (*i.e.* managers) employed by firm i . In other words, σ_i represents the so-called span of control, *i.e.*, the average number of subordinates a supervisor or manager has (Bell 1967; Blau and Schoenherr 1971; Ouchi and Dowling 1974; Garicano 2000; Bandiera et al. 2014; Rajan and Wulf 2006). Whenever σ_i is low, the cognitive burden placed on each manager is small and managerial resources can be considered relatively abundant, *i.e.*, it is a case of slack managerial resources (see Penrose 1959). On the contrary, whenever σ_i is high, the cognitive burden placed on each manager is large and managerial resources are relatively scarce.

and Tolbert 1992; Deyo 1997), and organization-focused vs. job-focused employment relations (Tsui et al. 1995).

Each firm must decide how to organize its production activities, which consist of a continuum of tasks of unit size. Let us assume such tasks can be ordered from the most to the least routinized and call $t \in [0,1]$ the resulting ordered segment of tasks. For the sake of simplicity and without loss of generality, we assume such tasks to be the same for all firms. Given σ_i and t , firm i decides whether to manage each task via internal or external flexibility comparing the relative cost of the two options, i.e., respectively $IF(t, \sigma_i)$ and $EF(t)$, with i) $IF_t > 0$, ii) $EF_t > 0$, iii) $IF_{tt} > 0$, iv) $EF_{tt} > 0$, v) $EF_{tt} > IF_{tt}$, vi) $IF_{\sigma_i} > 0$, and vii) $IF_{t\sigma_i} > 0$. These conditions capture that a) the cost of both managerial solutions is higher for less routinized tasks, b) the cost of external flexibility rises in t at a faster rate than the one of internal flexibility and c) the cost of internal flexibility increases (reduces) in firms with scarce (slack) managerial resources. For all t such that $EF(t) < IF(t, \sigma_i)$ firm i will rely on external flexibility; the remaining tasks will instead be managed via internal flexibility, i.e., an internal labor segmentation will occur. Obviously, conditions vi) and vii) imply that the cutoff value of t which makes firm i to switch from external to internal flexibility will be higher, the higher σ_i .

Figure 2 summarizes our argument. The horizontal axis reports the ordered segment of task t , while the vertical axis represents managerial costs. We compare two firms with high (σ_h) and low (σ_l) span of control. Both firms face the same curve of costs of external flexibility $EF(t)$, as it does not depend on managerial resources. However, σ_l -firm enjoys a comparative advantage in the use of internal flexibility compared to σ_h -firm, because she can dedicate more resources to internal coordination. The two firms will rely on external flexibility up to task t_i^* such that $EF(t_i^*) = IF(t_i^*, \sigma_i)$, with $1 - t_i^*$ being the tasks managed via internal flexibility. As it is easy to see $t_l^* < t_h^*$, i.e. the cutoff point in which firms segment the internal labor force, is higher (lower) for the firm with higher (lower) span of control, i.e. scarcer (more abundant) managerial resources. In other words, the scarcer the managerial resources, the smaller the set of tasks that the firm will manage via internal flexibility and thus the higher the probability to extensively rely on external flexibility, i.e. NSFE.

Figure 2–Internal vs. external flexibility: managerial resources and task segmentation



*Note:*the curves represent the cost of internal (continuous) and external flexibility (dashed). Firms rely on external flexibility (EF) as long as it is cheaper than internal flexibility (IF). The cutoff point at which the firm switches from EF to IF is higher, the higher the span of control, *i.e.* the scarcer managerial resources.

Overall, our argument is consistent with the so-called core-periphery hypothesis as proposed by Kalleber (2001) and Atkinson (1984, 1987), *i.e.*, the idea that firms ‘seek to establish long-term employment relations with part of their work-forces (the ‘core’, regular, permanent workers who are highly trained, skilled and committed to the organization, attributes that are thought to be needed for functional flexibility) at the same time as they externalize other activities and/or persons by means of transactional contracts.’ (Kalleber 2001: 484). Our contribution is to suggest that the relative size of the core and the periphery is not predetermined, but depends on the available managerial resources. When the latter are sufficiently abundant (scarce) the core (periphery) can be as large as the whole organization.

An important assumption in our argument is that managerial resources are heterogeneous across firms. Several works provide empirical evidence in support of it (Bloom and Van Reenen 2010; Arrighetti, Landini and Lasagni 2014). What lead these heterogeneous patterns of accumulation to unfold, however, is less clear. We suggest that two types of drivers exist. Some of them are of endogenous nature and depend on firm-specific strategies and learning paths (Landini et al. 2017). Others, however, are the result of external conditionings, which

affect the view about how firms ought to be managed. On this respect, Bagguley (1991) argues that the decision to combine scant accumulation of managerial resources and high use of NSFE can be motivated by different corporate rhetoric and cultures. In this view, the adoption of external flexibility as a managerial reference model was not simply a consequence of changes in monitoring and resource management practices brought about by the diffusion of post-Fordism. It was also the rejection of some objectives that were typical of Fordism, such as medium-term planning, the adaptation of resources and investments to medium-long term goals, the acquisition of stable competitive advantages (Volberda 1998; McGrath 2013). These objectives were replaced by short-term targets such as agility, exploitation of transitory strategic opportunities and ad-hocracy (Volberda 1996; Hyman 2016). This allowed the managerial culture that presents external flexibility as a pragmatic managerial response to a given set of circumstances (Brewster et al. 1997) and identifies the flexible company as a universal organizational paradigm (Atkinson 1985; Dreyer and Grønhaug 2004) to prevail. Such view was further strengthened by growing relevance of managerial ‘shortesism’, *i.e.*, the idea that management skills are to be assessed not by comparing different levels of profit among firms, but by considering the short-term performances and steadiness of profits of the same firm over time (Laverty 1996; Hirshleifer and Thakor 1992; Dunk 1993). Obviously, the way these corporate cultures affect firm decisions is not general and depend on several idiosyncratic factors. For instance, it may be contingent on managerial preferences and ideology. In general, however, we may expect that the more differentiated these idiosyncratic factors are, the more heterogeneous the resulting managerial responses will be.

4. Institutional context

Our empirical analysis focuses on the manufacturing sector of one Italian region, Emilia Romagna. Manufacturing is by far one of the most relevant sector of the Italian economy and a key driver of economic growth (Kaldor 1967; more recently Szirmai 2013; Andreoni and Chang 2016, only to cite a few). Emilia Romagna is one of the most prominent manufacturing region in Italy. It is calculated that about 60% of regional GDP is related to the manufacturing sector⁸ and the region ranks second in Italy and fifth in Europe for

⁸See the report by Technopolis Group: Regional Innovation Monitor Plus 2016 Regional Innovation Report Emilia-Romagna (Industry 4.0 and smart systems). Available online at: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/sites/default/files/report/2016_RIM%20Plus_Regional%20Innovation%20Report_Emiliana%20Romagna_0.pdf (last accessed on 19th of April 2019).

the number of people employed by this industry⁹. Moreover, the analysis of this region presents two additional advantages. First of all, Emilia Romagna has one of the lowest unemployment rates among all the Italian regions. In 2012 it was about 7%, compared to other regions such as Campania (19.2%) and Sicilia (18.4%), the country average being around 10%¹⁰. This implies that the high risk of unemployment from the factors that lead workers to accept NSFE is moderate in our case. Secondly, according to Di Caro and Nicotra (2016) Emilia Romagna is characterized by a relatively small diffusion of informal employment, which is on the contrary a common problem in other Italian regions. We can thus assume that for most firms in our data, informal employment does not represent a viable alternative to NSFE. All these factors strengthen the external validity of our results.

Since the mid-1990s and over the last twenty years, Italy went through a significant process of labor market deregulation (with the *Legge Treu* in 1997, the Legislative Decree 368 of 2001, and the Law 30 of 2003). Alike reforms approved in other European countries, these interventions introduced various types of NSFE without changing the legislation on permanent (open-ended) contracts. The most popular are *fixed-term contract* (FT) and *temporary agency contract* (TA), which together account for nearly 80% of all NSFE¹¹. FT is a contract that, according to the Italian legislation, can last no more than 12 – in extraordinary circumstances 24 – months¹². Its distinctive feature with respect to standard permanent contract is indeed its pre-fixed duration. TA, instead, is a contract that rests on the involvement of three subjects: the firm demanding labour, the worker and an intermediary agency that formally employs the worker – permanently or for a fixed term – and stipulates a supply contract with the firm¹³. In the empirical analysis we will consider these two types of contracts both altogether as NSFE and separately.

5. Data

⁹ Eurostat, data available online at: <https://ec.europa.eu/eurostat/data/database> (Last accessed on the 19th of April 2019)

¹⁰ Istat, data available online at: http://dati.istat.it/Index.aspx?DataSetCode=DCCV_TAXDISOCCU1 (last time accessed on the 11th of June 2019).

¹¹ According to Istat, the total number of manufacturing NSFE in 2012 were 348,675, out of which 205,866 (59%) were fixed-term contract and 64,445 (18%) were temporary agency contract. Data available online at: <http://dati.istat.it/> (last time accessed on the 11th of June 2019).

¹² The most recent Italian laws regulating fixed-term contracts are the so-called *Jobs Act* (*Decreto Legislativo 15 giugno 2015, n. 81 - Disciplina organica dei contratti di lavoro e revisione della normativa in tema di mansioni, a norma dell'articolo 1, comma 7, della legge 10 dicembre 2014, n. 183*) and the so-called *Decreto Dignità* (*Decreto Legge 12 luglio 2018, n. 87 - Disposizioni urgenti per la dignità dei lavoratori e delle imprese*)

¹³ The temporary agency contracts were first introduced in the Italian legislation by the so-called *Pacchetto Treu* in 1997 (*Legge 24 giugno 1997, n. 196 - Norme in materia di promozione dell'occupazione*) and modified to the current form by the so-called *Legge Biagi* (*Legge 14 febbraio 2003, n. 30 - Delega al Governo in materia di occupazione e mercato del lavoro*) and by the *Decreto Dignità*.

To conduct the empirical analysis we combined original data from three sources. We started from the entire population of manufacturing firms operating in Emilia Romagna according to *Asia-Imprese*, the ISTAT's registry of active firms. Such registry was established in 1996 and reports yearly information about structural characteristics of all Italian firms, including the legal form, total employees and geographic localization. It also provides a unique firm identifier that can be linked to *ASIA-Occupazione*, another ISTAT's registry. The latter is a linked employer-employee database with detailed information of each worker employed in any firms recorded in *ASIA-Imprese* since 2012. The available information includes gender, age, place of birth of the worker and, which is more relevant for the purpose of our study, a classification of the employment relationship. In particular, the type of employment is divided into internal, distinguishing between open-ended and fixed-term contracts, and external when the worker participates in the production process through forms of work remunerated with collaboration or temporary agency contracts. In all the cases, employment is measured in terms of average annual job positions (i.e. full-time equivalent), calculated on the basis of the worker's presence in the reference week of each month. To obtain information about the economic and financial conditions of the firms, we merge the previous two databases with the ISTAT's *Limited Company Balance Sheets Panel*, which gathers the balance sheets as well as information about import and export for all Italian limited companies from 2001 to 2014. The results is an unbalanced panel of nearly 9.000 manufacturing firms per year operating in Emilia Romagna between 2012 and 2014¹⁴. For each firm we observe a set of demographic and structural characteristics, economic and financial conditions, workforce composition as well as details about the geographic localization.

The main dependent variable of our empirical analysis is the firm-level rate of NSF, which is defined as follows. First, for each firm i and year t we sum the number of employees with fixed-term (FT) and temporary agency (TA) contracts. Then, we divide the result by the total number of employees. Employment is measured in full-time equivalent. In Section 2 we showed that the distribution of this variable is highly skewed, i.e., the use of NSF is very large among relatively few firms and small (or nearly absent) among the remaining ones. For this reason, we focus our attention on the large NSF users, which we define as the firms belonging to the fourth quartile of the distribution of the rate of NSF. In some empirical specifications we also consider the two components of NSF separately, i.e. we distinguish between FT and AT contracts. To this aim we define two additional variables: one that selects

¹⁴ In particular, the dataset includes 9.388 firms in 2012, 8.542 firms in 2013 and 8.518 firms in 2014.

the firms belonging to the fourth quartile of the distribution of the share of fixed-term contracts; and the other selecting the firms belonging to the fourth quartile of the share of temporary agency contracts.

Among the explanatory variables, our focus is on the availability of managerial resources, proxied by the span of control. We measure the latter as the logarithm of the ratio between the number of manual industrial workers and the number of office workers, executives and managers. A high span of control means that managers have to supervise a relatively large number of manual industrial workers, with the consequence that the cognitive constraints on their coordination activities are likely to be binding. Conversely, a low span of control means that each manager is responsible for a restricted number of subordinates implying that the cognitive workload associated with coordination activities is relatively small. The latter would represent a case of managerial resource slack.

Obviously, we cannot exclude that other factors affect the firm's propensity to use NSFE alongside the span of control. For this reason, we include a set of covariates using information retrieved from the firm's balance sheets and other structural characteristics. In particular, we focus on factors that are commonly associated with the need to rely on NSFE (see above).

To control for market uncertainty, we use three variables. The first one is the volatility of sales, which is computed for each firm i and year t as the ratio between the average standard deviation of sales over the ten years previous to t and the average sales over the same period. It is a firm-specific proxy of demand variability (for a similar approach see De Vicienti et al. 2018). The second variable is the yearly sales growth, which can be considered another firm-specific measure capturing short-term changes in product market. Finally, we include in our analysis a seasonality index which is computed starting from the ISTAT monthly series of industrial production indexes (2-digit ATECO) to account for sector-specific market fluctuations (See Table A1 for more details).

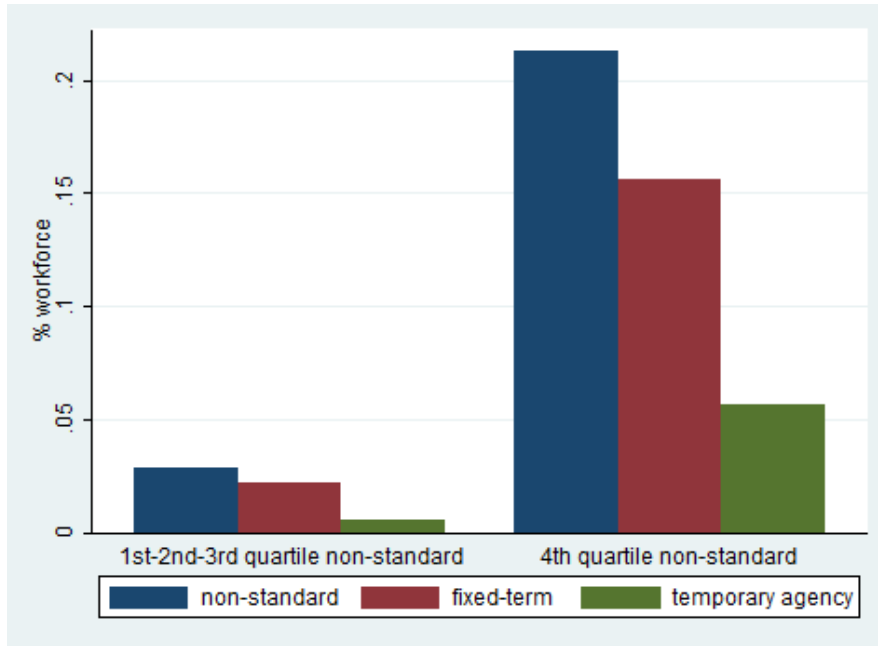
Part of the literature links the use of NSFE to specific characteristics of the production technology, such as the adoption of knowledge-intensive production regimes. The latter involve both hiring highly qualified workers and deploying advanced manufacturing equipment. To account for these two factors, we use two variables. The first is labour productivity, which we measure as the ratio between value added and total employees, in logs. The second one is the physical asset trend, which we measure as the ratio between the value of tangible asset at time t and the mean value of the same variable over the previous ten years, in logs.

Finally, to account for the competitive environment we combine information on international activities and profitability. In particular, we consider a) whether the firm is exposed to international competition through exports with a dummy variable taking value 1 if the firm i is an exporter in year t and 0 otherwise and b) the firm's profit variation using yearly growth rate of the return on sales (ROS).

6. Descriptive statistics

This section presents some descriptive statistics on our variables of interest. Figure 3 shows the average share of non-standard, fixed-term and temporary agency contracts distinguishing between large (*i.e.*, they belong to the fourth quartile of the share of NSFE) and small NSFE users (*i.e.*, first, second and third quartile of the share of NSFE). On average, the former employ a share of NSFE seven times larger than the latter (about 21% against 3%). A similar ratio exists also for fixed-term contracts (16% for firms in the upper quartile vs. 2% in the lower quartiles), while it raises up to 9:1 when looking at temporary agency contracts (6% vs. 0.6%). Overall, these figures confirm the existence of very large asymmetries in the use of non-standard employment, which encompass all typologies of contracts. Moreover, the values associated with fixed-term and temporary agency contracts suggest that firms making large use of NSFE tend to rely on both types of contracts to a much larger extent than the other firms. It follows that the need for external flexibility seems to be satisfied through a combination of different employment relationships, instead of privileging only one.

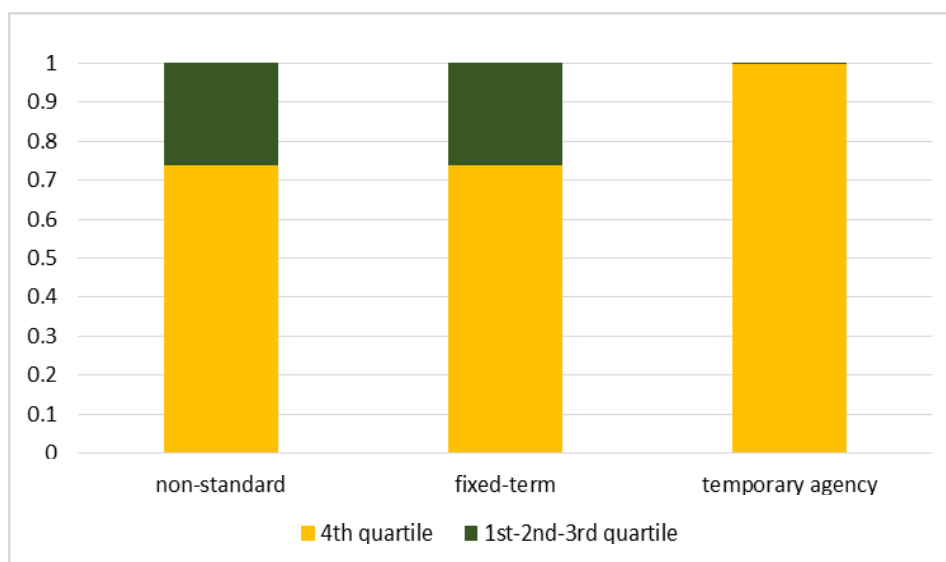
Figure 3 – Employment contracts: comparison across quartiles of non-standard



Note: share of non-standard workers distinguishing between large NSFE users (i.e. they belong to the fourth quartile of the share of NSFE) and small NSFE users (i.e. first, second and third quartile of the share of NSFE) as well as type of contracts. Depending on the contracts large users exhibit a share of non-standard workers between seven and nine times larger than the one of small users.

The existence of large asymmetries in the use of NSFE is confirmed also by Figure 4, which shows the distribution of non-standard employees between firms that make large and small use of non-standard contracts. This time, the use level is defined according to the quartile to which the firms belong, computed separately for each typology of contract (while in Figure 3 we used the share of NSFE as a reference category). Figure 4 suggests that the top 25% of large NSFE users employ more than 70% of all non-standard workers. This figure is similar when we restrict the analysis to fixed-term contracts and it even rises up to nearly 100% for temporary agency contracts. Altogether, these figures suggest that for all types of NSFE the use is highly concentrated, with a clear demarcation between ‘exuberant’ and ‘conventional’ users. Explaining such demarcation is precisely the aim of our empirical analysis.

Figure 4 – Concentration of non-standard employment contracts

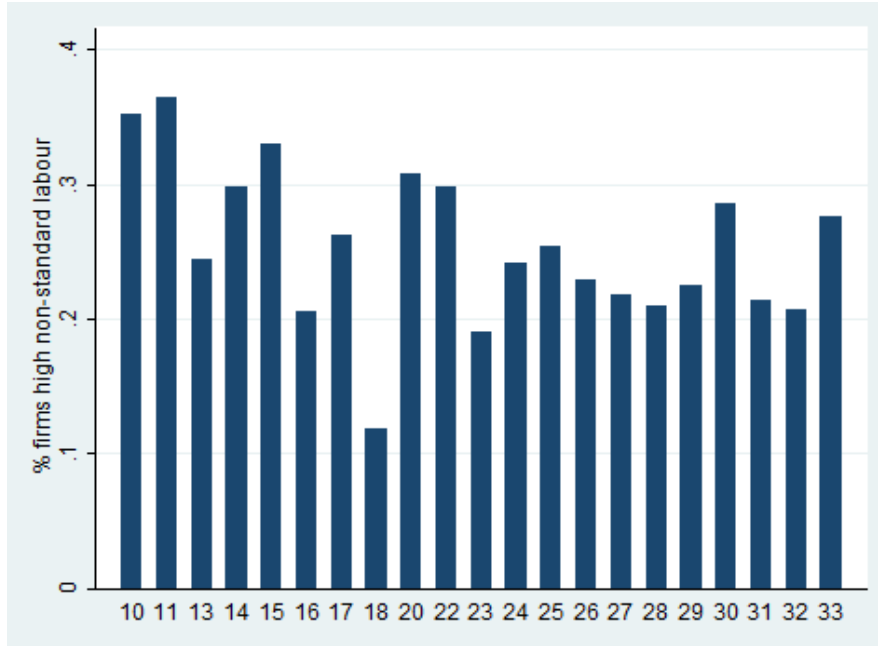


*Note:*for each type of contract the figure reports the share of non-standard workers employed by large users (*i.e.* they belong to the fourth quartile of the share of the corresponding contract) and small users (*i.e.* first, second and third quartile of the share of the corresponding contract) of non-standard contract. Depending on the contract, large users employ between 73% and 99% of all non-standard workers.

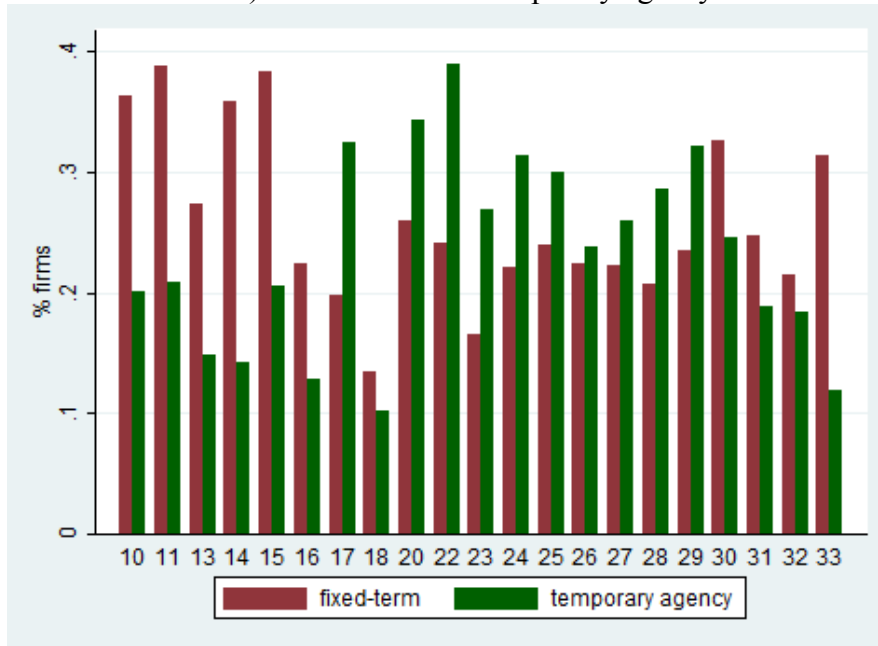
One potential candidate to explain the heterogeneity of NSFE use is the industry to which firms belong. For this reason, we report in Figure 5 the distribution of firms that make large use of non-standard, fixed-term and temporary agency contracts across sectors, using the ISTAT's ATECO 2-digits classification for industries. Large NSFE users (panel a) are present in all sectors, although they are slightly more concentrated in industries related to food and beverage transformation (codes 10 and 11), textile (14 and 15) and, to a lesser extent, in some heavy industries such as chemicals (20), rubber (22), vehicles (30) and machinery installation (33). When we distinguish between fixed-term and temporary agency contract (panel b), we observe that the large users of the former tend to be more concentrated in food, beverage and textile, together with machinery installation, while the large users of the latter are relatively more present in chemicals and rubber. Overall, however, a clear pattern of industry differentiation does not emerge, confirming that much of the variation in the share of NSFE needs to be explained on the basis of firm-specific variables.

Figure 5 – Employment contracts: distribution across industries

a) Non-standard



b) Fixed-term and temporary agency

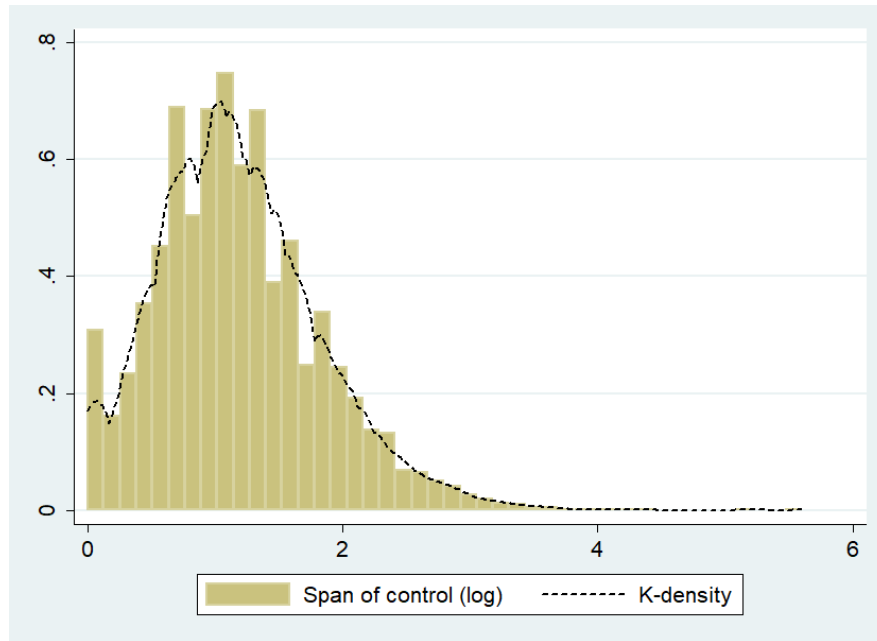


Note: Panel A shows the distribution of the share of large NSFE users across industries (ATECO 2-digits classification). Panel B shows the same distribution considering the share of firms that make large use of fixed-term and temporary agency contracts. In all cases a clear pattern of industry differentiation does not emerge, *i.e.* variation of NSFE use is to be explained by firm-specific variables.

Along these lines, we focus our attention on the span of control. A key precondition for the latter to be able to explain (at least part of) the firm-level asymmetric use of NSFE is that its distribution is sufficiently heterogeneous. To verify whether this is actually the case, we report in Figure 6 the frequency distribution and kernel density function of the span of control for all firms and years in our dataset. We notice the existence of high heterogeneity.

While most firms have a span of control smaller than 2 (in logs), there exist a long right tail with much larger values. The latter represents a relatively small group of firms with highly scarce managerial resources, which according to our argument should make large use of NSFE

Figure 6 – Span of control: distribution

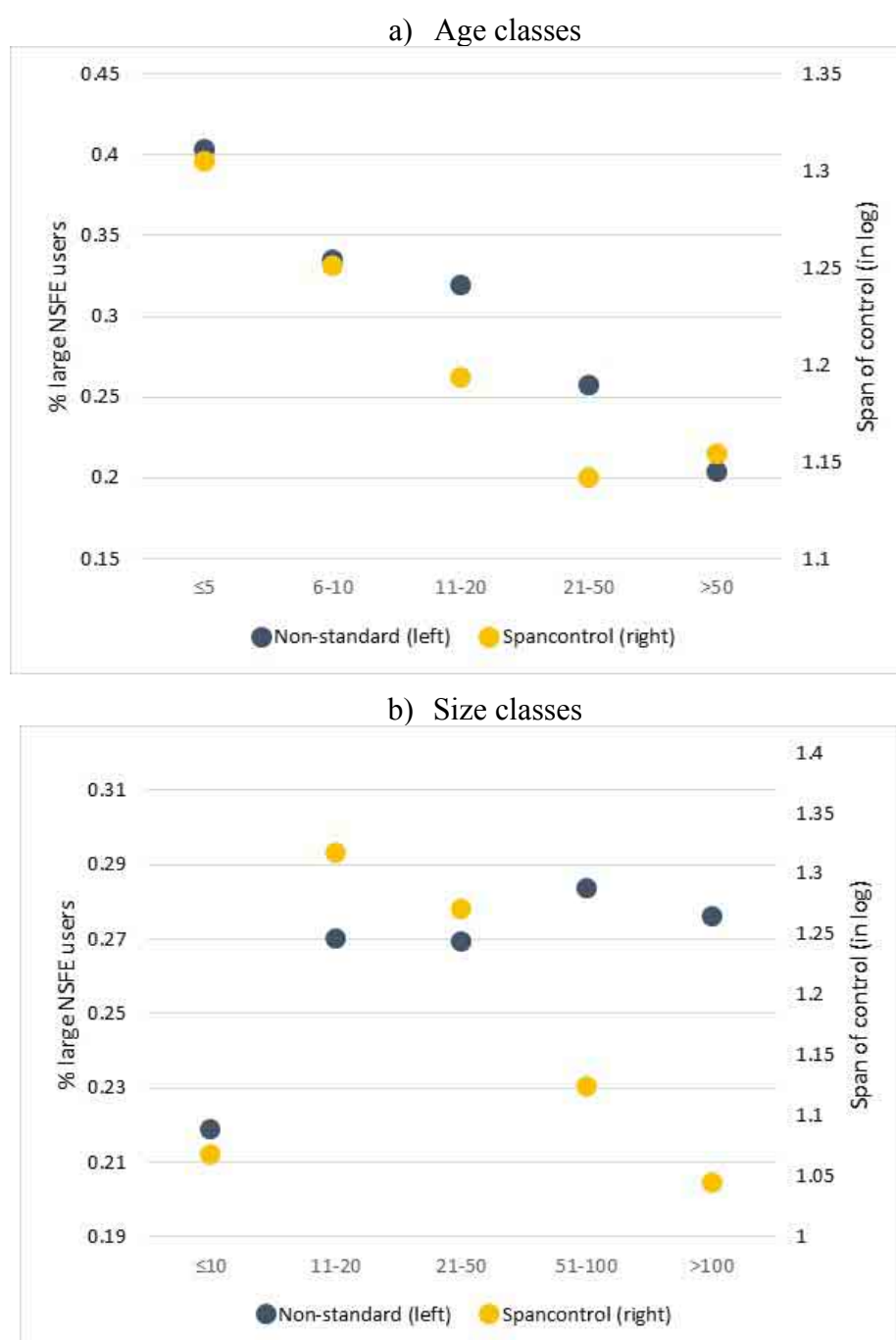


Note: Frequency distribution and Kernel density function of the span of control. There exist a long right tail of firms with high span of control, *i.e.* a relatively small group of firms with highly scarce managerial resources

Additional descriptive evidence in support of the existence of a positive relationship between NSFE use and span of control comes from Figure 7, which shows the variation in the share of large NSFE users and in the mean values of the span of control depending on age (number of years since firm's foundation, panel a) and size (number of employees, panel b). Three main results stand out. First of all, older firms exhibit lower frequencies of large NSFE users and smaller mean values of the span of control. Secondly, both measures are significantly smaller in firms with less than 11 employees. Finally, for larger firms, the mean value of the span of control peaks between 11 and 20 employees and then substantially declines. The share of large NSFE users, instead, rises and remains substantially stable for all firms with more than 10 employees. Altogether, these results suggest that the scarcity of managerial resources and, we argue, the consequent use of NSFE is an issue that affects mainly medium-sized (*i.e.* between 10 and 50 employees) and young firms. In other words,

firms that display a sufficiently high degree of organizational complexity, but have not had enough time to accumulate managerial capabilities, are more incline to use non-standard contracts. If anything, this result reinforces the interpretation of NSFE use as a typology of firm behaviour that has strong managerial roots.

Figure 7 – High NSFE users and span of control by size and age classes



Note: Panel A shows the share of large NSFE users and the mean value of the span of control across distinct firm's age classes. Panel B shows the share of large NSFE users and the mean value of the span of control across distinct firm's size classes. The scarcity of managerial resources and the large use of NSFE are present mainly in medium-sized and young firms.

To complete the descriptive analysis, we report in Table 1 some summary statistics for the main covariates, distinguishing between large and small NSFE users (for a full description of all variables as well as the correlation matrix among them see respectively Tables A.1 and A.2 in the Appendix). The “Test” column shows the results of an F-test comparing the mean difference between columns 2 and 3. On average, large NSFE users have a larger span of control (*i.e.*, scarcer managerial resources) than small users, which is in line with our main theoretical hypothesis. Additionally, large NSFE users are characterized by higher volatility of sales and larger yearly sales growth. While these two results provide support for market uncertainty being a driver of NSFE use, the fact that the mean difference of the seasonality index is not statistically significant suggests that, if anything, this effect tend to be weak. Quite interestingly, we find that large and small NSFE users do differ in the characteristics of their production technology, but in ways that seemingly contrast with literature on knowledge-intensive production regimes. In fact, both labour productivity and physical asset trend are on average larger for large NSFE users than for small users. In our view this result can be interpreted as the consequence of the internal division of labour, through which large NSFE users identify a core of highly qualified (and productive) standard employees who are provided with advanced manufacturing equipment. In this sense, the direction of the observed mean difference is coherent with our theoretical hypothesis. Finally, for what concerns the variables associated with the characteristics of the competitive environment we notice that while being an exporter does not differentiate between small and large NSFE users, the latter present a higher profit growth. Also in this case, the results contrast with the arguments put forward by literature that links the use of NSFE with rising competitive pressures.

Table 2 – Descriptive statistics: non-standard contracts

	(1) All (N=26,448)		(2) Quartile n. 1-2-3 (N=19,845)		(3) Quartile n. 4 (N=6,603)		Test
	Mean	St.Dev	Mean	St.Dev	Mean	St.Dev	
Span of control (log)	1.176	0.639	1.133	0.610	1.305	0.704	***
Volatility of sales	0.241	0.148	0.233	0.140	0.266	0.168	***
Sales growth	0.042	0.514	0.017	0.465	0.118	0.634	***
Seasonality index	0.125	0.025	0.125	0.026	0.125	0.024	
Labour productivity (log)	10.642	0.634	10.610	0.639	10.738	0.609	***
Physical asset trend (log)	0.743	0.354	0.720	0.346	0.812	0.367	***

Export (d)	0.610	0.488	0.609	0.488	0.614	0.487	
Profit growth	-0.699	0.511	-0.717	0.502	-0.645	0.534	***
Size (log)	2.681	1.101	2.645	1.115	2.787	1.054	***
Age (log)	2.798	0.852	2.869	0.814	2.583	0.924	***
Group (d)	0.061	0.240	0.058	0.234	0.071	0.257	***

Note: significance levels: * 10%, ** 5%, *** 1%. Robust standard errors in brackets.

6. Econometric analysis

Our econometric analysis aims at identifying the drivers of large NSFE use, placing particular attention on the role of the span of control. Thus, our baseline specification takes the form of the following probit model¹⁵:

$$\Pr[LNS_{i,t} = 1] = \Phi(\beta\sigma_{i,t} + X_{i,t}\gamma), \quad (1)$$

where $\Phi(\cdot)$ is the cumulative distribution function for the standard normal, $LNS_{i,t}$ is a dummy variable taking value 1 if firm i in year t is a large NSFE users and zero otherwise, $\sigma_{i,t}$ is the span of control and $X_{i,t}$ is a vector of control variables, while β and γ are the parameters to be estimated. In addition to the covariates of NSFE use discussed above, in all the estimated models we include the following set of control variables: firm's size (logarithm of the number of employees), firm's age (in years), a dummy for the participation into a group, sector dummies (OECD classification based on low tech, mid-low tech, mid-high tech, high tech)¹⁶ and year dummies. The parameters of model (1) are estimated via maximum likelihood (ML) estimation.

A potential issue in our empirical analysis is the endogeneity of the span of control, which could arise for two reasons. The first is omitted variables, *i.e.*, the span of control affects the use of NSFE through some unobservable variable (*e.g.*, managers' ideology) that we do not/cannot include in the model. The second is simultaneity, *i.e.*, the internal composition of the workforce, here included the rate of NSFE, affects the managerial resources of the firm, giving rise to reverse causality. To deal with these issues we rely on two alternative approaches: instrumental variable (IV) models and fixed-effects (FE)

¹⁵ As robustness check, we also estimate a set of logit models. Results are available upon request and show no significant differences with respect to our main hypothesis.

¹⁶ In other specifications, available upon request, we substitute the OECD technology level dummies with ATECO-2-digit dummies. The results are robust to the change.

models¹⁷. We have greater confidence in the validity of our results when they are robust to the two alternative methods.

The main benefit of an IV approach is that it can potentially deal with both time-invariant and time-variant omitted variable biases as well as simultaneity. The major challenge, however, is to find suitable instruments for the span of control. Ideally, we would like to instrument $\sigma_{i,t}$ with an external variable that is correlated with the span of control but not with the error term (*i.e.*, it affects the use of NSFE only through $\sigma_{i,t}$). This is not a simple task and requires the imposition of some exclusion restrictions. An alternative solution would be to use an internal IV approach that relies on heteroskedasticity-based identification without exclusion restrictions (Lewbel 2012). The disadvantage is that these methods have been applied mainly to linear models, which fail to account for the double-censored nature of our dependent variable (*i.e.* the share of NSFE lies by construction between 0 and 1). At the same time, linear models are better placed for dealing with the potential endogeneity of right-hand-side variables (De Vincenzi et al. 2018).

For these reasons, in our IV approach we combine both external and internal instruments. In particular, we proceed as follows. First, we run an IV probit with an external instrument. Then, we check the robustness of the results by running an ordinary least square (OLS) regression (with the logarithm of the share of NSFE as dependent variable), where we correct for endogeneity using Lewbel's (2012) methods for internal instruments. Finally, we run a linear model combining both internal and external instruments. To build the external instrument we exploit the fact that we observe the local labor market area each firm belongs to. Local labor market areas (LLMAs) are self-contained territorial units whose boundaries are defined on the basis of the residents' commuting patterns (Sforzi-Istat 2005). Several authors suggest that LLMAs are the most appropriate unit to study the territorial distribution of economic activities as well as knowledge spillovers (Brusco 1982; Becattini 1989, Lasagni 2011; Breschi and Lissoni 2001). On this basis, we suggest that a viable instrument for any firm i 's span of control (*i.e.* its managerial resources) is represented by the number of managers of all non- i firms operating in the same LLMA. The rationale is that a large pool of local managers facilitates the emergence of knowledge spillovers, in the forms of formal and informal exchanges of information related to managerial, administrative and organizational practices. The latter may in turn improve the firms' managerial resources and weaken the

¹⁷ We are aware that both approaches have benefits and costs. This is the reason why we do not depend solely on either the FE or the IV, but rather conduct the empirical analyses using both of them.

constraints imposed by large spans of control. At the same time, we see no reason why the pool of local managers in all non- i firms should have direct effect on i 's use of NSFE.

A second solution to the potential endogeneity of the span of control is to assume that endogeneity is due to time-invariant omitted variables. In these cases, consistent estimates can be obtained through the introduction of fixed-effects. Given the limited time-span of our data (2012-2014), the use of fixed-effect in the probit model is discouraged due to the low time variability of large NSFE use. We thus resort to a linear model. With respect to the usefulness of estimating linear OLS models in presence of double-censored dependent variables and endogenous regressors, the same reasoning outlined above holds.

7. Results

7.1 Preliminary analysis

Before moving to the main empirical exercise, we explore the correlation between the share of NSFE and span of control using standard pooled OLS regressions. This is to verify how much of the variance of NSFE use can be explained by firm-specific variables, and in particular the span of control, as opposed to contextual variables such as the industry of activity. We first regress the logarithm of the share of NSFE against industry dummies alone (using the OECD classification). Then, we add control variables as well as span of control and compare the variation of R-squared.

Table 3 reports the results. Industries alone (column 1) explain a very limited portion (0.3%) of the variation of NSFE use. Firms belonging to low- and mid-low tech industries make larger use of NSFE compared to firms in mid-high tech ones (the excluded category), whereas being part of high-tech industries has no effect on NSFE use. When we add the control variables and exclude the span of control (column 2) the explicative power of the model improves up to 9% of the variance. The coefficients associated with industry dummies are in line with the previous specification. We then consider a model with span of control, industry dummies and no control variables (column 3). The span of control exhibits a positive correlation with the share of NSFE, while industry dummies lose predictive power. In particular, the coefficient of low-tech industry is not significantly different from zero, while for mid-low tech industry the sign of the coefficient changes. Quite interestingly, we notice that the span of control alone explains up to 2.3% of NSFE use variation. Finally, in the model with all the covariates (column 4) being part of low-tech industry and span of control are both positively correlated with the share of NSFE. Such specification accounts for nearly

11% of the NSFE use variance. Overall, these results confirm that the industry of activity is a relatively weak predictor of the firm's propensity to use NSFE.

Table 3 – Correlation between share of NSFE and span of control

<i>Models</i>	OLS			
	(1)	(2)	(3)	(4)
Span of control (log)			0.023*** (0.00)	0.021*** (0.00)
Low tech industry	0.014*** (0.00)	0.021*** (0.00)	0.004 (0.00)	0.012*** (0.00)
Mid-low tech industry	0.005* (0.00)	0.009*** (0.00)	-0.006** (0.00)	0.000 (0.00)
High tech industry	0.001 (0.00)	0.002 (0.00)	-0.003 (0.00)	-0.002 (0.00)
Constant	Yes	Yes	Yes	Yes
Firm-level controls	No	Yes	No	Yes
Year dummies	Yes	Yes	Yes	Yes
Obs	26448	26448	26448	26448
Adjusted R2	0.003	0.09	0.031	0.109

Note: significance levels: * 10%, ** 5%, *** 1%. Robust standard errors in brackets.

7.2 Baseline specification

Table 4 shows the results of our baseline specification, *i.e.* probit model with random effects. Column (1) reports the estimated marginal effects when the dependent dichotomous variable refers to large NSFE users, while columns (2) and (3) show the results related only to fixed-term and temporary agency contracts respectively. The latter can thus be considered robustness checks for the outcomes in column (1).

In all the estimated models, the span of control has a positive and statistically significant effect on the probability of being a large NSFE user. More specifically, a one-percentage increase in span of control increases the probability that the firm is a large NSFE user by eight-percentage point. This effect is similar when we consider fixed-term contract and it reduces to an increase by 1.2 percentage point when we restrict the analysis to temporary agency contracts. Altogether, these results are consistent with our theoretical argument.

Table 4–Baseline model: probit with random effects

<i>Models</i>	Probit		
	Non-standard (1)	Fixed-term (2)	Temp. Ag. (3)
Span of control (log)	0.080***	0.079***	0.012**

	(0.01)	(0.01)	(0.01)
Volatility of sales	0.170***	0.173***	0.046**
	(0.02)	(0.02)	(0.02)
Sales growth	0.031***	0.036***	0.009*
	(0.01)	(0.01)	(0.00)
Seasonality index	-0.159	-0.058	0.572***
	(0.16)	(0.16)	(0.17)
Labor productivity (log)	0.058***	0.010	0.144***
	(0.01)	(0.01)	(0.01)
Physical asset trend (log)	0.065***	0.062***	0.029***
	(0.01)	(0.01)	(0.01)
Export (d)	0.007	0.008	0.012
	(0.01)	(0.01)	(0.01)
Profit growth	0.007	0.022***	-0.053***
	(0.01)	(0.01)	(0.01)
Size (log)	0.025***	0.020***	0.103***
	(0.00)	(0.00)	(0.00)
Age (log)	-0.089***	-0.091***	-0.009**
	(0.00)	(0.00)	(0.00)
Group (d)	0.017	0.004	0.025**
	(0.01)	(0.01)	(0.01)
Industry dummies	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Random effects	Yes	Yes	Yes
Obs	26448	26448	26448
LogL	-11917.185	-12291.103	-10338.317
Chi2	951.71***	980.47***	1488.08***

Note: significance levels: * 10%, ** 5%, *** 1%. The table reports the values for margins; firms-clustered standard errors in brackets.

For what concerns the other covariates, which control for alternative explanations of NSFEE use, we find mixed evidence. First, referring to market uncertainty and volatility, there is a positive and significant effect of sales volatility and growth on the probability of being a large NSFEE user. This effect holds across the different types of non-standard contracts. However, when looking at seasonality index, the positive effect on the extra-use of NSFEE is relevant only for temporary contract, while there is no significant effect for either fixed-term or non-standard contracts as a whole.

Moving to the variables related to knowledge-intensive production regimes, *i.e.* labour productivity and physical asset trend, we obtain results that contrast with the prevailing arguments in the literature. In particular, both labour productivity and physical asset trend have a positive and significant effect on the probability of being a large NSFEE user. These effects hold also when we limit the analysis to temporary agency contracts, while only the

coefficient associated with physical asset trend remains significant in the case of fixed-term contracts. As argued above, while these results contradict the idea that the most productive and technologically advanced firms make little use of NSFE, we believe they are consistent with the core-periphery hypothesis (Kalleber, 2001; Atkinson, 1984, 1987). According to the latter, firms with high technological endowments undergo a process of sustained polarization of the internal labour. Alongside highly qualified, trained and stable workers in charge of core non-routine operations, the firm rely on NSFE to deal with peripheral routine tasks. In the sense, our estimates capture the high productivity of core workers.

Thirdly, also competitive pressures, as proxied by export and profit growth, do not seem to be a strong predictor of NSFE use. In particular, a lower profit growth increases the probability of being a large user of temporary-agency contracts, but reduces the likelihood of extensively relying on fixed-term ones. At the aggregate level, *i.e.* considering all NSFE types in a single category, no significant effect stands out. Similarly, being involved in international markets via export does not have any significant effect on the use of NSFE.

Finally, with respect to firm-level baseline characteristics, we find evidence that the use of NSFE is positively associated with firm's size and negatively associated with firm's age. A relatively weak positive effect of being part of a group is found only for temporary contracts.

7.3 IV and fixed-effect specifications

Given that the exogeneity of the span of control in our baseline specifications is a questionable assumption, we move to a series of IV and fixed-effects models. Table 5 shows the results of the IV probit where we instrument the span of control with the number of external managers active in the LLMA. To account for non-linearities of knowledge spillover we include the instrumental variable both in linear and quadratic form. Column (1) reports the outcome of the first stage. As expected, a larger number of external manager reduces the span of control (*i.e.* it strengthens managerial resources via the exchange of information at the local level). This effects, however, is non-linear as the quadratic term exhibit a positive and significant coefficient. The whole regression is confirmed as a sufficiently powerful model to predict the endogenous variable, as the Wald test for exogeneity reject the null that that the span of control is exogenous. The results for the second stage and the related predicted margins are reported in columns (2) and (3), respectively. In line with our theoretical prediction, we find that the span of control positively and significantly affects the use of NSFE. In particular, a one-percentage increase of the span of control raises the probability of being a large NSFE user by 14 percentage points.

Table 5 –IV probit model, all NSFE

	IV probit		
	I stage (1)	II stage (2)	Margins (3)
Managers in LLA	-0.000*** (0.00)		
Managers in LLA ²	0.000*** (0.00)		
Span of control (log)		0.485*** (0.13)	0.142*** (0.04)
Volatility of sales	-0.034 (0.02)	0.722*** (0.06)	0.212*** (0.02)
Sales growth	0.020*** (0.01)	0.107*** (0.02)	0.031*** (0.00)
Seasonality index	0.380** (0.16)	-0.713* (0.39)	-0.210* (0.11)
Labor productivity (log)	-0.096*** (0.01)	0.246*** (0.02)	0.072*** (0.01)
Physical asset trend (log)	0.088*** (0.01)	0.231*** (0.03)	0.068*** (0.01)
Export (d)	0.007 (0.01)	0.026 (0.02)	0.008 (0.01)
Profit growth	-0.357*** (0.01)	0.131** (0.05)	0.038** (0.02)
Size (log)	0.156*** (0.00)	0.009 (0.02)	0.003 (0.01)
Age (log)	-0.037*** (0.00)	-0.238*** (0.01)	-0.070*** (0.00)
Group (d)	-0.202*** (0.02)	0.123*** (0.05)	0.036*** (0.01)
Constant	1.785*** (0.08)	-3.490*** (0.29)	
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Fixed effects	No	No	No
Obs		26448	
LogL		-37260.607	
Chi2		1614.189***	
Wald Chi2 for Exogeneity		3.02*	

Note: significance levels: * 10%, ** 5%, *** 1%. Standard errors in brackets.

With respect to the other covariates, the results are similar to the previous ones. In particular, both the sales' volatility and growth rate are positively associated with the probability of being a large NSFE user. In this IV probit specification, a rise in market fluctuations captured by the seasonality index has a negative, although weakly significant, impact on NSFE use. This result provides further evidence that the effect of market uncertainty and volatility on NSFE use is far from clear-cut. Labour productivity, physical asset trend and profit growth all have positive and significant coefficients, whereas export is confirmed not to be a significant predictor of NSFE use. Among the baseline characteristics, the fact that being a young firm and member of a group increase the likelihood of making large use of NSFE is confirmed. Quite interestingly, in this model the coefficient of size is not significantly different from zero, which suggests that the extension of business operations does not explain the firm's propensity to use NSFE.

A series of IV and fixed effects estimations based on linear models are reported in Table 6. Differently from the analysis conducted so far, we employ the logarithm of the share of NSFE as depend variable and run a series of OLS regressions against the same set of regressors used above. In Column (1) we instrument the span of control with an internal variable following Lewbel's (2012) heteroskedasticity-based method. In column (2) we use the same set of external instruments as in the IV probit (Table 5). Column (3) shows the results when combining both internal and external instruments. Finally, in column (4) we report the outcome of a linear fixed-effect model. As previously argued, the fixed-effect models deal with endogeneity due to time-invariant unobserved heterogeneity and provide an alternative identification strategy to the IV models.

Table 6 –IV (second stage) and fixed effects OLS models, all NSFE

	OLS			
	Internal IV (1)	External IV (2)	Int. & Ext. IV (3)	Fixed effects (4)
Span of control (log)	0.004*** (0.009)	0.043*** (0.005)	0.042*** (0.004)	0.020*** (0.00)
Volatility of sales	0.054*** (0.004)	0.054*** (0.004)	0.054*** (0.004)	-0.026** (0.01)
Sales growth	0.014*** (0.002)	0.014*** (0.002)	0.014*** (0.002)	0.006*** (0.00)
Seasonality index	-0.089*** (0.024)	-0.09*** (0.024)	-0.09*** (0.024)	0.348*** (0.13)
Labor productivity (log)	0.017*** (0.002)	0.017*** (0.002)	0.017*** (0.002)	0.011*** (0.00)

Physical asset trend (log)	0.017*** (0.002)	0.017*** (0.002)	0.017*** (0.002)	0.004 (0.00)
Export (d)	0.000 (0.002)	0.000 (0.002)	0.000 (0.002)	-0.003* (0.00)
Profit growth	0.009*** (0.003)	0.01*** (0.002)	0.01*** (0.002)	-0.003 (0.00)
Size (log)	0.003** (0.002)	0.003*** (0.001)	0.003*** (0.001)	0.051*** (0.01)
Age (log)	-0.018*** (0.001)	-0.018*** (0.001)	-0.018*** (0.001)	-0.041*** (0.01)
Group (d)	0.011*** (0.003)	0.012*** (0.003)	0.012*** (0.003)	0.003 (0.00)
Constant	0.749*** (0.116)	0.742*** (0.115)	0.743*** (0.115)	-0.132*** (0.04)
Instrument list ¹	L1	L2	L1 & L2	
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Fixed effects	No	No	No	Yes
Obs	26448	26448	26448	26448
LogL				48215.4
Adjusted R2				0.055
RMSE	0.0866	0.0869	0.0869	
Hansen J	3.13*	127***	130***	

Note: significance levels: * 10%, ** 5%, *** 1%. Standard errors in brackets. Robust standard errors for Lewbel's instruments.

¹The instrument list in L1 is the number of managers in LLMA and the number of managers in LLMA squared. The instrument list in L2 is the internal instrument generated with Lewbel's (2012) methods.

Results for the span of control are consistent across the different models. In particular, its positive and significant effect on the use of NSFE survives all alternative ways of dealing with endogeneity. The estimated effects suggest that a 1-percentage increase in the span of control raises the use of NSFE by 0.5 to 4-percentage point, depending of the model. The results of other covariates are once again mixed. While sales growth has always a positive and significant impact on the use of NSFE, the effect of volatility of sales and seasonality index change depending on the model. This result confirms the lack of robust evidence on the role of market uncertainty and volatility as driver of NSFE use. Regarding labour productivity and physical asset trend we find similar results to those discussed above. The only difference is that physical asset trend is not significant in the specification with fixed effects. Export is weakly significant – and negative -only in OLS with fixed effects model. Profit growth has a positive impact on NSFE use in all IV models, but not when we control

for time-invariant unobservable characteristics. Finally, size and age have respectively positive and negative impact on the use of NSFE in all models, whereas being member of a group is positively associated with NSFE use only in the IV specifications.

8. Conclusion

Most parts of the literature explain the use of fixed-term, agency and not permanent employment contracts on the basis of external flexibility requirements that are imposed on firms by increasingly uncertain global markets. Although seldom subjected to direct empirical scrutiny, three are the factors considered to be the main sources of the need for external flexibility: a) wider and unpredictable demand fluctuations in product markets, which require the creation of secondary wide workforce buffer; b) the adoption of knowledge-intensive production regimes, which create incentives for firms to invest in training and the accumulation of firm-specific skills by highly qualified workers while shifting the burden of flexibility on the least qualified components of employment; c) the increase of competitive pressure in international markets, which brings about a significant compression of mark-ups, strengthening the role of NSFE as means to reduce costs by transforming labour into a variable expenditure, closely related to demand and business cycles, rather than a fixed and long-term investment.

The above mentioned *structural/contextual* factors should in principle affect all manufacturing firms. It follows that a relatively uniform within-industry distribution of NSFE use should be expected. The evidence gathered in this work, however, contradicts this conclusion. The rate of NSFE use is markedly heterogeneous, with some firms that do not rely on NSFE at all and others that make an intensive use of them. In fact, in our data more than two thirds of all NSFE are underwritten by only a quarter of the firms. Such marked concentration of NSFE in relatively few firms led us to questioning the firm-level drivers of intensive NSFE use.

Specifically, in this article we study firm-specific factors that may push firms operating within the same competitive environment to differentiate their use of NSFE. In particular, we emphasize the role of managerial resources (which we proxy with the span of control): whenever such resources are relatively scarce (*i.e.*, the span of control is high), we argue that firms are more willing to make large use of NSFE to reduce coordination and operating costs. We verify this hypothesis using a linked employer-employee panel of manufacturing firms from the Emilia Romagna region (Italy).

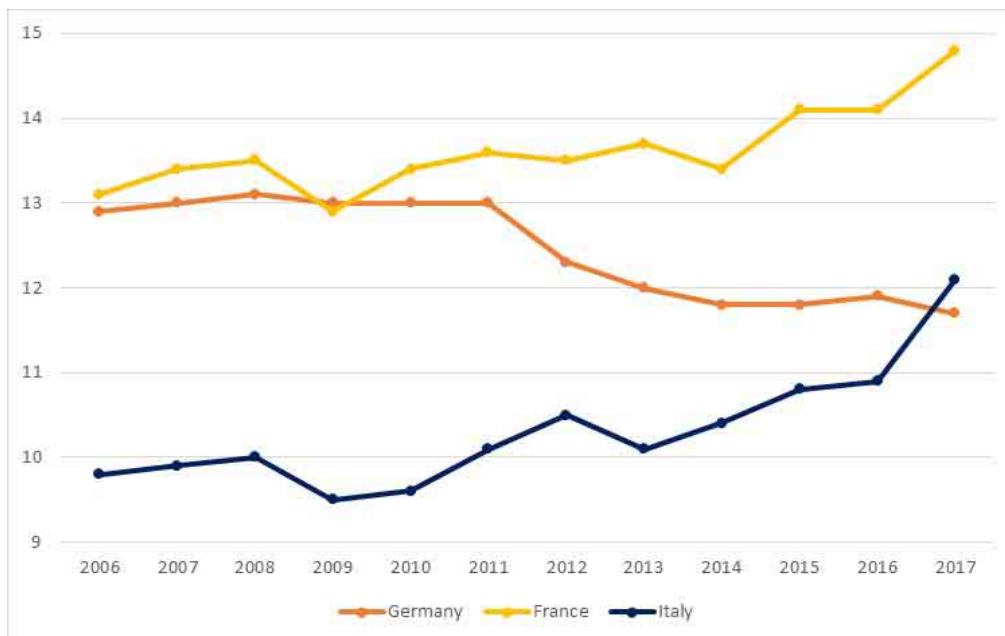
Summing up the econometric results, we obtain a fairly confirmative picture. The span of control has a positive and significant impact on the probability that a firm makes large use of NSFE. This result holds controlling for alternative drivers of NSFE use and combining both IV and fixed effects models. This finding provides strong support for the idea that managerial competences explain large part of the observed firm-level heterogeneity in the use of NSFE.

With reference to the *structural/contextual* explanations of NSFE use, we obtain much less supportive evidence. Market uncertainty and volatility seem to affect the extra-use of NSFE, but this result is not robust to either alternative measures of volatility or different model specifications. For the variables related to knowledge-intensive production regimes, we obtain results that contrast with the arguments prevailing in the literature. In particular, they have a positive and significant effect on the probability of being a large NSFE user. Finally, also competitive pressure does not seem to be a strong predictor of NSFE use.

Overall, our findings contribute to the previous literature by suggesting that, contrary to the prevailing arguments focusing solely on contextual/structural factors, the use of NSFE has strong managerial roots: it allows firms to compensate for firm-specific managerial weaknesses. We believe that this has important implications for policy design and implementation. First, managerial roots in NFSE use should be taken into account especially while designing policy interventions such as labor market reforms. In fact, to assume that the demand for enhanced labor flexibility is entirely driven by factors that are outside the boundary of the firms, may bias the perception of policy makers regarding the right amount of NSFE required by the markets. On the contrary, firms may ask for more flexibility in the labor market, *i.e.* external flexibility, so as to avoid the need to increase managerial capabilities, which would allow them to rely on internal flexibility. Such misperception suggests that policy makers may have to reconsider the appropriate rate of NFSE diffusion. Moreover, considering the social costs that precarious jobs entail, we argue that policy measures should be aimed at encouraging the use of internal flexibility (e.g. supporting workforce training programs, team organization, working time flexibility arrangements) and should devote more resources to strengthening the manager's ability to comply with complexity - for example by promoting the diffusion of good managerial practices and more generally managerial resources via local spillovers.

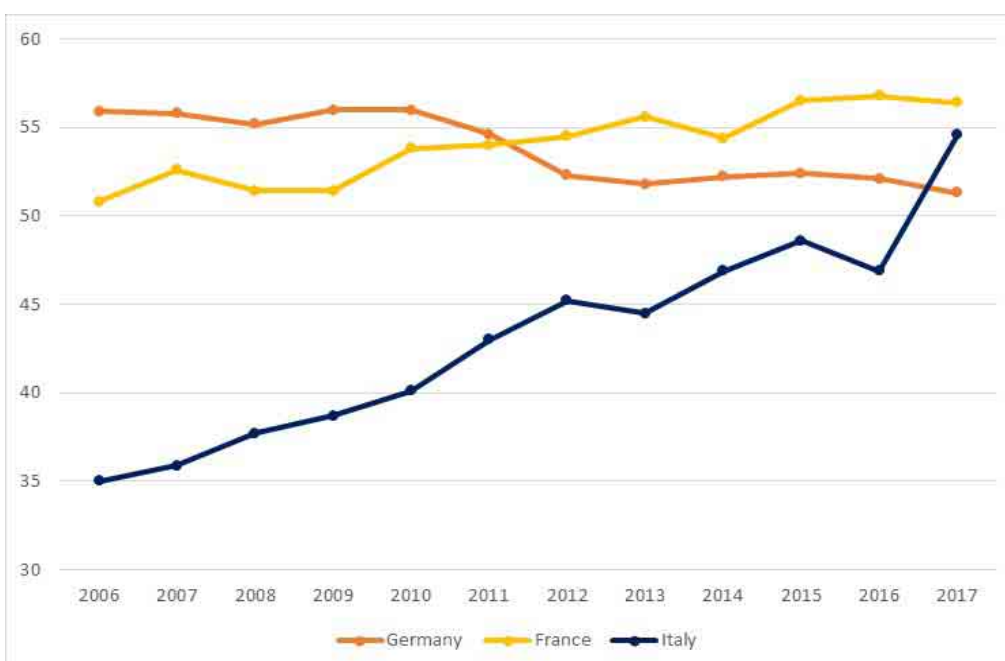
Appendix – Additional figures and tables

Figure A1 – Share of non-standard contracts across countries, 15-64 years



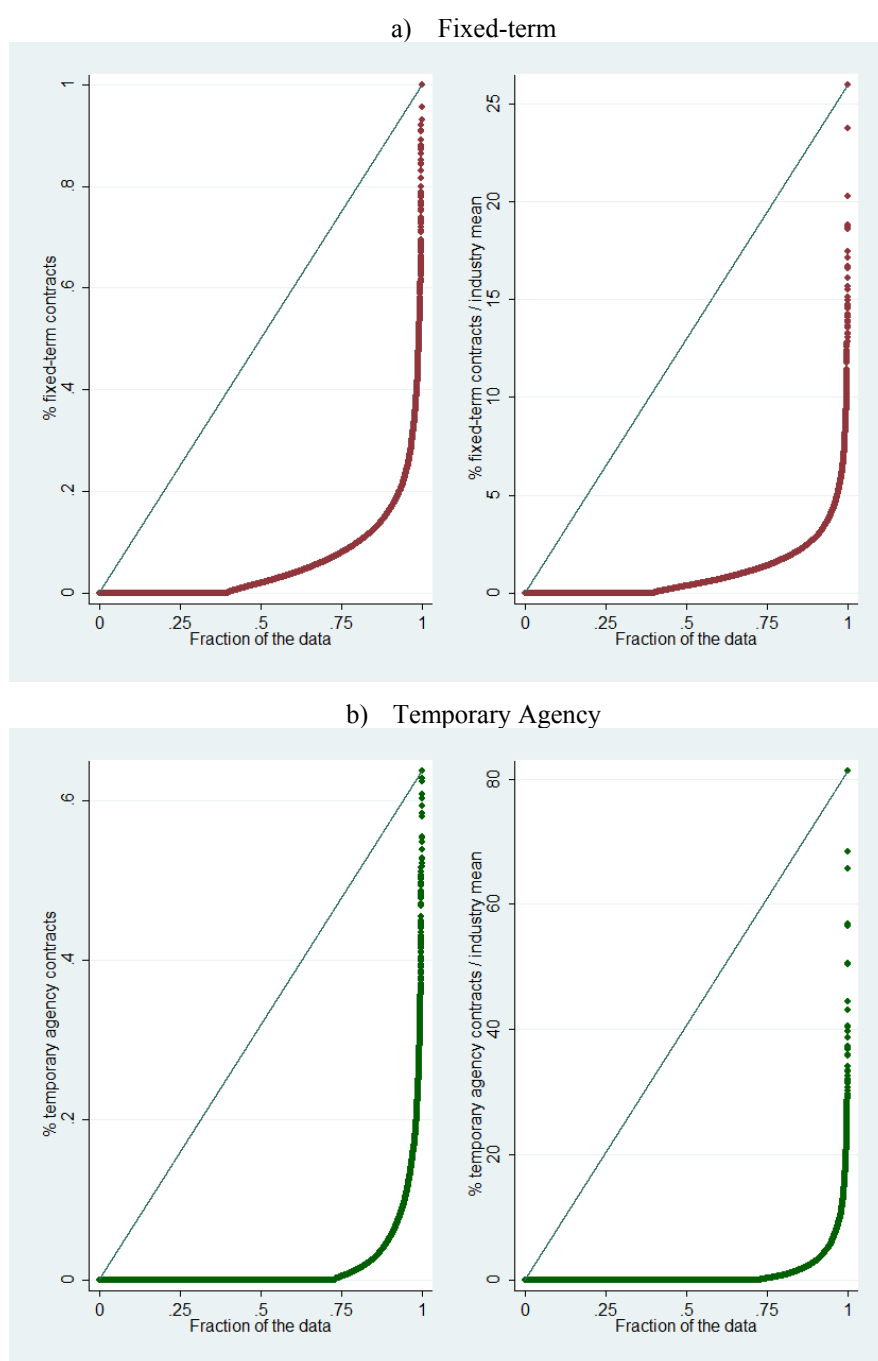
Source: Eurostat. *Note:* Share of non-standard contracts (total economy) between 2006 and 2017. Italy starts with lower share compared to Germany and France, but since 2009 such share has risen steadily.

Figure A2 – Share of non-standard contracts across countries, 15-24 years



Source: Eurostat. *Note:* Share of non-standard contracts among young workers (total economy) between 2006 and 2017. Italy starts with lower share compared to Germany and France, but since 2006 such share has risen steadily.

Figure A3 – Employment contracts: quantile distribution



Note: Panel A reports on the left the quantile distribution of the share of fixed-term contracts and on the right the same variable after normalising the share by the industry mean. Panel B reports on the left the quantile distribution of the share of temporary agency contracts and on the right the same variable after normalising the share by the industry mean. In both cases the shape of the distribution does not change significantly after the normalisation.

Table A.1 – Explanatory variables

Variable	Measured dimension	Data source
Span of control (log)	Log of the ratio between the number of blue-collar and white-collar workers	ISTAT ASIA Imprese and Occupazione
Volatility of sales	10-years coefficient of variation of sales, <i>i.e.</i> ratio between the average standard deviation and mean sales	ISTAT Limited Company Balance Sheets Panel
Sales growth	Yearly growth rate of sales	ISTAT Limited Company Balance Sheets Panel
Seasonality index	Based on ISTAT 2001-2014 series of monthly indexes of industrial production (2-digit ATECO), we compare the unadjusted and seasonal adjusted indexes and derive percent differences (in absolute value). The seasonality index is derived as the overall average of these monthly percent differences. The higher the index the higher the degree of sector specific fluctuations.	ISTAT
Labour productivity (log)	Log of the ration between value added and total number of employees	ISTAT Limited Company Balance Sheets Panel
Physical asset trend (log)	Log of the ratio between the value of tangible asset at time t and the mean value of tangible assets during the previous ten years	ISTAT Limited Company Balance Sheets Panel
Export (d)	Dummy equal to 1 if the firm is exporter (0 otherwise)	ISTAT Limited Company Balance Sheets Panel
Profit growth	Yearly growth rate of the return on sales	ISTAT Limited Company Balance Sheets Panel
Size (log)	Total number of employees	ISTAT Limited Company Balance Sheets Panel
Age (log)	Number of years since firm's foundation	ISTAT Limited Company Balance Sheets Panel
Group (d)	Dummy equal to 1 if the firm is member pf a group (0 otherwise)	ISTAT Limited Company Balance Sheets Panel

Table A2 – Correlation matrix

	1	2	3	4	5	6	7	8	9	10
Span of control (log)	1									
Volatility of sales	-0.024*	1								
Sales growth	0.008	-0.007	1							
Seasonality index	0.065*	0.057*	-0.011	1						
Labour productivity (log)	-0.092*	0.020*	0.104*	-0.080*	1					
Physical asset trend	0.060*	0.074*	0.079*	-0.017*	0.176*	1				
Export (d)	-0.233*	0.022*	0.006	-0.004	0.280*	0.071*	1			
Profit growth	-0.062*	0.047*	0.116*	-0.035*	0.445*	0.086*	0.034*	1		
Size (log)	0.093*	-0.024*	0.006	0.027*	0.399*	0.144*	0.400*	-0.069*	1	
Age (log)	-0.052*	-0.083*	-0.137*	-0.045*	0.187*	-0.056*	0.192*	-0.045*	0.277*	1
Group (d)	-0.065*	0.025*	0.022*	-0.028*	0.133*	-0.017*	0.091*	-0.008	0.218*	-0.004

Note: * significance level 5%

References

- Abraham, Katharine G., and Susan K. Taylor. 1996. Firms' use of outside contractors: Theory and evidence. *Journal of Labor Economics* 14(3): 394–424.
- Acemoglu, Daron, and David Autor H. 2011. Skills, tasks and technologies: Implications for employment and earnings. In Orley Ashenfelter and David Card (Eds.). *Handbook of labor economics*, Vol. 4, pp. 1043–1171. Amsterdam: Elsevier-North Holland.
- Addabbo, Tindara, and Giovanni Solinas. (Eds.). 2011. *Non-standard employment and quality of work: the case of Italy*. Springer Science & Business Media.
- Aleksynska, Mariya, and Janine Berg. 2015. Understanding firms' demands for temporary labour in developing countries. Regulating for Decent Work 2015 Conference. International Labour Organization, Geneva.
- Allan, Cameron. 2000. The hidden organizational costs of using non-standard employment. *Personnel Review* 29(2): 188–206.
- Andreoni, Antonio, and Ha-Joon Chang. 2016. Industrial policy and the future of manufacturing. *Economia e Politica Industriale* 43(4): 491–502.
- Ansoff, Igor H., and Robert G. Brandenburg. 1971. A language for organizational design: parts I and II. *Management Science* 17(12): 350–393.
- Arrighetti, Alessandro, Fabio Landini, and Andrea Lasagni. 2014. Intangible assets and firm heterogeneity: evidence from Italy. *Research Policy*, 43(1): 202–213.
- Atkinson, John. 1984. Manpower strategies for flexible organizations. *Personnel Management*, 16(8): 28–31.
- Atkinson, John. 1985. Flexibility: planning for an uncertain future. *Manpower Policy and Practice* 1(1): 26–29.
- Atkinson, John. 1987. Flexibility or fragmentation? The United Kingdom labor market in the eighties. *Labor and Society* 12(1): 87–105.
- Autor, David H., Frank Levy, and Richard J. Murnane. 2003. The skill content of recent technological change: an empirical exploration. *Quarterly journal of economics* 118(4): 1279–1333.
- Bachmann, Ronald, Peggy Bechara, Anica Kramer, and Sylvi Rzepka. 2015. Labour market dynamics and worker heterogeneity during the Great Recession—Evidence from Europe. *IZA Journal of European Labor Studies*, 4(1): 19.
- Bagguley, Paul. 1991. Post-fordism and enterprise culture: flexibility, autonomy and changes in economic organization. In Russel Keat and Nicholas Abercrombie (Eds.). *Enterprise Culture*. London: Routledge.
- Banker, Rajiv D., Dimitri Byzalov, Shunlan Fang, and Yi Liang. 2018. Cost management research. *Journal of Management Accounting Research* 30(3): 187–209.
- Bandiera, Oriana, Andrea Prat, Raffaella Sadun, and Julie Wulf. (2014). Span of control and span of attention. Harvard Business School Strategy Unit Working Paper, No. 12-053.
- Bardazzi, Rossella, and Silvia Duranti. 2016. Atypical work: a threat to labour productivity growth? Some evidence from Italy. *International Review of Applied Economics* 30(5): 620–643.

- Bartelsman, Eric, Paloma Lopez-Garcia, and Giorgio Presidente. 2019. Labour Reallocation in Recession and Recovery: Evidence for Europe. *National Institute Economic Review* 247(1): R32-R39.
- Battisti, Michele, Giovanna Vallanti. 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.
- Bell, Gerald D. 1967. Determinants of the span of control. *American Journal of Sociology* 73(1): 100-109.
- Bender, Stefan, Nicholas Bloom, David Card, John Van Reenen, and Stefanie Wolter. 2018. Management practices, workforce selection, and productivity. *Journal of Labor Economics* 36(S1): S371-S409.
- Benner, Chris. 2008. *Work in the new economy: Flexible labor markets in Silicon Valley*. Oxford: Blackwell Publishers.
- Bentolila, Samuel, and Juan J. Dolado. 1994. Labour flexibility and wages: Lessons from Spain. *Economic Policy* 18: 55–99.
- Bentolila, Samuel, and Gilles Saint-Paul. 1994. A model of labor demand with linear adjustment costs. *Labour Economics* 1(3–4): 303–26.
- Bergh, Donald D., and Michael W. Lawless. 1998. Portfolio restructuring and limits to hierarchical governance: The effects of environmental uncertainty and diversification strategy. *Organization Science* 9(1): 87-102.
- Blanchard, Olivier, and Augustine Landier. 2002. The perverse effect of partial labour market reform: fixed-term contracts in France. *Economic Journal* 112 (480): F214–F244.
- Blanchard, Olivier J., and Justine Wolfers. 2000. The role of shocks and institutions in the rise of European unemployment: the aggregate evidence. *Economic Journal* 110(462): C1–33.
- Blau, Peter M., and Richard A. Schoenherr. 1971. *The structure of organizations*. New York: Basic Books.
- Bloom, Nicholas, Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts. 2013. Does management matter? Evidence from India. *Quarterly Journal of Economics*, 128(1): 1-51.
- Bloom, Nicholas, and John Van Reenen. (2010). Why do management practices differ across firms and countries? *Journal of Economic Perspectives* 24(1): 203-24.
- Bock, Adam J., Tore Opsahl, Gerard George, and David M. Gann. 2012. The effects of culture and structure on strategic flexibility during business model innovation. *Journal of Management studies* 49(2): 279-305.
- Boeri, Tito, and Pietro Garibaldi. 2007. Two tier reforms of employment protection: a honeymoon effect? *Economic Journal* 117(521): F357–85.
- Boeri, Tito, Pietro Garibaldi, and Espen R. Moen. 2013. Financial shocks and labor: facts and theories. *IMF Economic Review* 61(4): 631-663.
- Bosch, Gerard. 2004. Towards a new standard employment relationship in Western Europe. *British journal of industrial relations* 42(4): 617-636.
- Brewster, Chris, Lesley Mayne, and Olga Tregaskis. 1997. Flexible working in Europe. *Journal of World Business* 32(2): 133-151.

- Bushman, Robert, Qi Chen, Ellen Engel, and Abbie Smith. 2004. Financial accounting information, organizational complexity and corporate governance systems. *Journal of Accounting and Economics* 37(2): 167-201.
- Cappelli, Peter, and Joseph (JR) H. Keller. 2013. Classifying work in the new economy. *Academy of Management Review* 38(4): 575-596.
- Cappelli, Peter, and Neumark, David 2001. External job churning and internal job flexibility. NBER Working Paper No. 8111.
- Caudron, Shari. 2002. Another God that's failed, *Across the Board* 39(3): 1-3.
- Chang, An-Yuan. 2012, Prioritising the types of manufacturing flexibility in an uncertain environment. *International Journal of Production Research* 50(8): 2133-2149.
- Chen, Natalie, Jean Imbs, and Andrew Scott. 2009. The dynamics of trade and competition. *Journal of International Economics* 77(1): 50-62.
- Colclough, Glenna and Tolbert, Charles M. 1992. Work in the fast lane: flexibility, divisions of labor, and inequality in high-tech industries. Albany: SUNY.
- Comin, Diego, and Thomas Philippon. 2005. The rise in firm-level volatility: causes and consequences. *NBER Macroeconomics Annual* 20: 167-201.
- Damiani, Mirella, Fabrizio Pompei, and Andrea Ricci. 2016. Temporary employment protection and productivity growth in EU economies. *International Labour Review* 155(4): 587-622.
- Danneels, Erwin 2002. The dynamics of product innovation and firm competences. *Strategic Management Journal* 23(12): 1095-1121.
- Davis-Blake, Alison, and Brian Uzzi. 1993. Determinants of employment externalization: A study of temporary workers and independent contractors. *Administrative science quarterly* 38(2): 195-223.
- D'Aveni, Richard A. 1994. *Hypercompetition: managing the dynamics of strategic maneuvering*. New York: Free Press.
- D'Aveni, Richard A. 1999. Strategic supremacy through disruption and dominance. *Sloan Management Review* 40(3): 127-36.
- Devicienti, Francesco, Paolo Naticchioni, and Andrea Ricci. 2018. Temporary employment, demand volatility, and unions: firm-level evidence. *ILR Review* 71(1): 174-207.
- Deyo, Frederic C. 1997. Labor and post-Fordist industrial restructuring in East and Southeast Asia. *Work and Occupations*, 24(1): 97-118.
- Di Caro, Paolo, and Giuseppe Nicotra. 2016. Short, long and spatial dynamics of informal employment. *Regional Studies* 50(11): 1804-1818.
- Dreyer, Bent, and Kjell Grønhaug. 2004. Uncertainty, flexibility, and sustained competitive advantage. *Journal of business research* 57(5): 484-494.
- Duguay, Claude R., Sylvain Landry, and Federico Pasin. 1997. From mass production to flexible/agile production. *International Journal of Operations & Production Management* 17(12): 1183-1195.
- Dunk, Alan S. 1993. The effect of budget emphasis and information asymmetry on the relation between budgetary participation and slack. *Accounting Review* 68(2): 400-410.
- Eichhorst, Werner, Michael T. Feil, and Paul Marx. 2010. Crisis, what crisis? Patterns of adaptation in European labor markets. *Applied Economics Quarterly* 56(61): 29-64.

- Feenstra, Robert C., and David E. Weinstein. 2017. Globalization, markups, and US welfare. *Journal of Political Economy*, 125(4), 1040-1074.
- Fernández-Kranz, Danile, and Núria Rodríguez-Planas, N. 2011. The part-time pay penalty in a segmented labor market. *Labour Economics* 18(5): 591-606.
- Fonseca, Tiago, Pedro de Faria, and Francisco Lima. 2019. Human capital and innovation: the importance of the optimal organizational task structure. *Research Policy* 48(3): 616-627.
- Fonseca, Tiago, Francisco Lima, and Sonia C. Pereira. 2018. Job polarization, technological change and routinization: evidence for Portugal. *Labour Economics* 51(April): 317-339.
- Garicano, Louis. 2000. Hierarchies and the organization of knowledge in production. *Journal of political economy* 108(5): 874-904.
- Gerwin, Donald. 1993. Manufacturing flexibility: a strategic perspective. *Management Science* 39(4): 395-410.
- Gittell, Jody H. 2000. Paradox of coordination and control. *California Management Review* 42(3): 101-117.
- Harvey, Michael, and Milorad M. Novicevic. 2001. The impact of hypercompetitive “timescapes” on the development of a global mindset. *Management Decision* 39(6): 448-460.
- Hipp, Lena, Janine Bernhardt, and Jutta Allmendinger. 2015. Institutions and the prevalence of nonstandard employment. *Socio-Economic Review* 13(2): 351-377.
- Hirshleifer, David, and Anjan V. Thakor. 1992. Managerial conservatism, project choice and debt. *Review of Financial Studies* 5(3): 437-470.
- Holmlund, Bertil, and Donald Storrie. 2002. Temporary work in turbulent times: the Swedish experience. *Economic journal* 112(480): F245-F269.
- Hunter, Laurie, Alan McGregor, John MacInnes, and Alan Sproull. 1993. The “flexible firm”: strategy and segmentation. *British Journal of Industrial Relations*, 31(3): 383-407.
- Hyman, Louis. 2016. Temps, consultants, and the rise of the precarious economy. *Hedgehog Review* 18(1): 18.
- Ichino, Andrea, and Regina T. Riphahn. 2005. The effect of employment protection on worker effort: absenteeism during and after probation. *Journal of the European Economic Association* 3(1): 120-43.
- [ILO] International Labour Office. 2015. Non-standard forms of employment. Geneva: report.
- [ILO] International Labour Office. 2018. Informality and non standard forms of employment, G20 Employment Working Group meeting 20-22 February 2018, Buenos Aires.
- Jin, Yan, Margaret M. Hopkins, and Jenell L. S. Wittmer. 2010. Linking human capital to competitive advantages: Flexibility in a manufacturing firm's supply chain. *Human Resource Management* 49(5): 939-963.
- Kaldor, Nicholas. 1967. Strategic factors in economic development, New York State School of Industrial and Labor Relations, Cornell University, Ithaca.
- Kalleberg, Arne L. 2000. Non-standard employment relations: part time, temporary or contract work. *Annual Review of Sociology* 26 (1): 341-65.

- Kalleberg, Arne L. 2001. Organizing flexibility: the flexible firm in a new century. *British Journal of Industrial Relations* 39(4): 479-504.
- Kalleberg, Arne L. 2011. *Good jobs, bad jobs: the rise of polarized and precarious employment systems in the United States, 1970s-2000s*. New York: Russell Sage Foundation.
- Keller, Berndt, and Hartmut Seifert. 2005. Atypical Employment and Flexicurity. *Management Review* 16(3): 304-323.
- Ketokivi, Mikko 2006. Elaborating the contingency theory of organizations: the case of manufacturing flexibility strategies. *Production and Operations Management* 15(2): 215-228.
- Keune, Maarten. 2013. Trade union responses to precarious work in seven European countries. *International Journal of Labour Research* 5(1): 59.
- Kleinknecht, Alfred, Oostendorp, Remco M., Menno P. Pradhan, and C. W. M. Naastepad. 2006. Flexible labour, firm performance and the Dutch job creation miracle. *International Review of Applied Economics* 20(2): 171-187.
- Kleinknecht, Alfred, Flore N. van Schaik, and Haibo Zhou. 2014. Is flexible labour good for innovation? Evidence from firm-level data. *Cambridge journal of economics* 38(5): 1207-1219.
- Ko, Jyh-Jer R. 2003. Contingent and Internal Employment Systems: Substitutes or Complements?. *Journal of Labor Research*, 24(3): 473-90.
- Landini, Fabio, Alessandro Arrighetti, and Eleonora Bartoloni. 2017. The sources of heterogeneity in firm performance: lessons from Italy. University of Parma, Department of Economics WP, (2017-02).
- Lasagni, Andrea. 2011. Agglomeration economies and employment growth: new evidence from the information technology sector in Italy. *Growth and Change* 42(2): 159-178.
- Laverty, Kevin J. 1996. Economic "short-termism": the debate, the unresolved issues, and the implications for management practice and research. *Academy of Management Review* 21(3), 825-860.
- Lee, Raphael S. -H., and Mathilde Pak. 2018. Pro-competitive effects of globalisation on prices, productivity and markups: evidence in the Euro Area. Mimeo.
- Lepak, David P., Riki Takeuchi, and Scott A. Snell. 2003. Employment flexibility and firm performance: examining the interaction effects of employment mode, environmental dynamism, and technological intensity. *Journal of Management* 29(5): 681-703.
- Lepak, David P., and Scott A. Snell. 1999. The human resource architecture: toward a theory of human capital allocation and development. *Academy of management review* 24(1): 31-48.
- Lepak, David P., and Scott A. Snell. 2002. Examining the human resource architecture: The relationships among human capital, employment, and human resource configurations. *Journal of management* 28(4): 517-543.
- Lucidi, Federico, and Alfred Kleinknecht. 2010. Little innovation, many jobs: An econometric analysis of the Italian labor productivity crisis. *Cambridge Journal of Economics* 34(3): 525-546.
- Luo, Tian, Amar Mann, and Richard Holden. 2010. The expanding role of temporary help services from 1990 to 2008. *Monthly Labor Review* 133(8): 3-16.

- Martin, Geoffrey P., Robert M. Wiseman, and Luis R. Gomez-Mejia. 2016. Going short-term or long-term? CEO stock options and temporal orientation in the presence of slack. *Strategic Management Journal* 37(12): 2463-2480.
- Mayer, Kyle J., and Jack A. Nickerson. 2005. Antecedents and performance implications of contracting for knowledge workers: evidence from information technology services. *Organization Science* 16(3): 225-242.
- McGrath, Rita G. 2013. *The end of competitive advantage: how to keep your strategy moving as fast as your business*. Boston, MA: Harvard Business Review Press.
- Michie, Jonathan, and Maura Sheehan. 2003. Labour market deregulation, 'flexibility' and innovation. *Cambridge journal of economics*, 27(1), 123-143.
- Millward, Neil, Alex Bryson, and John A. Forth. 2000. *All change at work?* London: Routledge.
- Nickell, Stephen. 1997. Unemployment and labor market rigidities: Europe versus North America. *Journal of Economic Perspectives* 11(3): 55-74.
- Nienhueser, Werner. 2005. Flexible Work= Atypical Work= Precarious Work?: Introduction to the Special Issue. *Management Revue* 16(3): 299-303.
- [OECD] Organization for Economic Co-operation and Development. 2014. Employment Outlook. Paris: Report.
- Ouchi, William G. 1980. Markets, bureaucracies and clans. *Administrative Science Quarterly*, 25(1): 129-41
- Ouchi, William G., and John B. Dowling. 1974. Defining the Span of Control. *Administrative Science Quarterly* 19(3): 357-365.
- Patel, Pankaj C. 2011. Role of manufacturing flexibility in managing duality of formalization and environmental uncertainty in emerging firms. *Journal of Operations Management* 29(1-2): 143-162.
- Peck, Jamie, and Nik Theodore. 2006. Flexible recession: the temporary staffing industry and mediated work in the United States. *Cambridge Journal of Economics* 31(2): 171-192.
- Pfeifer, Christian. 2005. Flexibility, dual labour markets, and temporary employment: empirical evidence from German establishment data. *Management Revue* 16(3): 404-422.
- Piore, Michael J., and Charles C. Sabel. 1985. *The second industrial divide: possibilities for prosperity*. New York: Basic Books.
- Portugal, Pedro, and Jose Varejao. 2009. Why do firms use fixed-term contracts? IZA Discussion Papers 4380, August.
- Powell, Walter W. 2001. The capitalist firm in the 21st century: emerging patterns. In Paul DiMaggio (Ed.) *Twenty-first century firm: changing economic organization in international perspective*. Princeton, NJ: Princeton University Press.
- Quinlan, Michael. 1998. Labour market restructuring in industrialized societies: an overview. *Economic Labour Relations Review* 9(1): 1-30.
- Saint-Paul, Gilles. 1996. *Dual labor markets: a macroeconomic perspective*. Cambridge, MA: MIT press.
- Sanchez, Ron. 1995. Strategic flexibility in product competition. *Strategic management journal* 16(S1): 135-159.

- Sforzi-Istat. 2005. *I sistemi locali del lavoro*. Rome: Istat.
- Smith, Vicki. 1997. New forms of work organization. *Annual Review of Sociology* 23(1): 315–39.
- Streeck, Wolfgang 1987. The uncertainties of management in the management of uncertainty: employers, labor relations and industrial adjustment. *Employment and Society* 1(3): 281–308.
- Szirmai, Adam, Wim Naudé, and Ludovico Alcorta, 2013. *Pathways to industrialization in the twenty-first century: new challenges and emerging paradigms*. Oxford: Oxford University Press.
- Tolliday, Steven, and Jonathan Zeitlin. 1987. *The automobile industry and its workers: between Fordism and flexibility*. New York: St Martin's Press
- Tsui, Anne S., Jone L. Pearce, Lyman W. Porter, and Jennifer P. Hite. 1995. Choice of employee-organization relationship: influence of external and internal organizational factors. *Research in Personnel and Human Resources Management* 13(1): 117–51
- Treu, Tiziano. 1992. Labour flexibility in Europe. *International Labour Review* 131(4-5): 497–512.
- Valverde, Mireia, Olga Tregaskis, and Chris Brewster. 2000. Labor flexibility and firm performance. *International advances in economic research* 6(4): 649–661.
- Verdu-Jover, Antonio J., Javier F. Llorens-Montes, and Victor J. Garcia-Morales. 2005. Flexibility, fit and innovative capacity: an empirical examination. *International Journal of Technology Management* 30(1-2): 131–146.
- Volberda, Henk W. 1996. Toward the flexible form: how to remain vital in hypercompetitive environments. *Organization science* 7(4): 359–374.
- Volberda, Henk W. 1998. *Building the flexible firm*. Oxford: Oxford University Press
- Vrontis, Demetris, and Alkis Thrassou. 2013. *Innovative business practices: prevailing a turbulent Era*. Cambridge: Cambridge Scholars Publishing.
- Vrontis, Demetris, Alkis Thrassou, Gabriele Santoro, and Armando Papa. 2017. Ambidexterity, external knowledge and performance in knowledge-intensive firms. *The Journal of Technology Transfer* 42(2), 374–388.
- Zhou, Haibo, Ronald Dekker, and Alfred Kleinknecht. 2011. Flexible labor and innovation performance: evidence from longitudinal firm-level data. *Industrial and Corporate Change*, 20(3): 941–968.