Gains and losses from *fixed-term contracts* among heterogeneous firms. Evidence from Italian firms

Valeria Cirillo.[±], Andrea Ricci[⊥]

(preliminary version, please do not cite)

Abstract

This paper investigates the relationship between the use of fixed-term contracts and the distribution of labour productivity and wages focusing on the role of firms' heterogeneity. At this aim we use data derived from the Rilevazione su Imprese e Lavoro (RIL) conducted by INAPP in 2007, 2010 and 2015 on a representative sample of Italian firms. Appling different quantile regression techniques, we find the following results. First, low-productive/high wage firms use temporary employment to sustain profits through wage compression -in presence of declining labour productivity. Second, in high-productive/high-wage firms the use of fixed-term employment does not affect labour productivity and only marginally compress workers' wages. Overall, our results seems to support the thesis of a dual labour market with an increasing polarization between, on the one hand, low-paying and low productive firms using fixed-term contracts to sustain own profitability and, on the other hand, high-paying and high-productive firms where labour flexibility does not affect labour productivity and only marginally decreases wages. These findings are confirmed and really fuelled by small firms with less than 50 employees.

Keywords: Labour Productivity Wages, Temporary employment, firm-level analysis

[±] National institute for Public Policy Analysis (INAPP). Corresponding author: v.cirillo@inapp.org
[⊥] National institute for Public Policy Analysis (INAPP), an.ricci@inapp.org

1. Introduzione

The diffusion of flexibilisation in European labour markets through an increasing adoption of short-term contracts has motivated a large concern about the effects of temporary employment on firms' productivity, wages and profits. On the one hand, the diffusion of fixed-term contracts in the Italian labour market - from 7.2% of total employment in 1995 to 14% in 2016 – and, on the other hand, the declining trend in labour productivity over the pre-crisis (1995-2007) and the crisis (2007-13) periods has re-opened the debate on the link between the use of temporary employment, labour productivity and wages. Indeed, recent reforms increasing the flexibility of the Italian labour market have been introduced with the aim of removing labour rigidities considered the major cause of stagnant labour market (OECD, 1999; 2003; IMF, 2007; Bugamelli et al., 2018). The claim for labour flexibility grounds on the hypothesis that more flexible labour markets without affecting innovative capacity and productivity growth influence firms' decisions in terms of new hirings impacting on firms' costs (Houseman, 2001); temporary contracts can allow a more efficient screening of workers and thus, by selecting more productive workers, the overall productivity of the workforce should increase (Wang and Weiss, 1998; Autor, 2001). However, other studies criticize the increasing flexibilisation of labour markets – mainly through the introduction of short-term contracts – because damaging career prospects for young people (Cazes and Tonin, 2010; OECD 2015); negatively affecting on-the-job training by firms (Albert et al., 2005; 2010), reducing workers' earnings (Booth e al., 2002; Garz, 2013) and aggregate labour productivity (Kleinknecht, 1998; Vergeeer and Kleinknecht, 2011; 2014). The relationship between fixed-term contracts and productivity has not been clearly established and both theory and empirics do not reach an unambiguous conclusion (Cappellari et al., 2012; Damiani and Pompei, 2010; Dolado and Stucchi, 2008; Nielen and Schiersch, 2012).

A growing literature has also examined the impact of labour contracts on wages showing the existence of a significant wage gap between permanent workers and short-term ones; this gap cannot be attributed to jobs' or individuals' characteristics (Bosio, 2009; Brown and Sessions, 2003; Comi and Grasseni, 2012; De la Rica, 2004). This empirical result moves away from what theory predicts (Rosen, 1974; Piore, 1978; Lindbeck and Snower, 1986) in terms of higher compensating wages for FTCs facing poorer working conditions and risk of losing their jobs.

Only few studies – see Garnero et al. (2016) – have explicitly linked the use of temporary contracts to wages and labour productivity, analyzing to what extent short-term contracts impact simultaneously on wages and labour productivity generating productivity-wage gaps.

Building on Garnero et al. (2016), this study aims to shed light on the relationship between the use of temporary contracts, firm productivity and wages, in order to analyze the distributional impact of short-term contracts and assessing how benefits or losses from their use are distributed between firms (profits) and workers (wages).

Compared to Garnero et al. (2016), we explicitly consider the heterogeneity of the Italian production structure characterized by a high degree of firms heterogeneity along many dimensions of performance including labour productivity and growth rates (Bottazzi et al., 2007). Such heterogeneity also affects

firms within the same sector and relates to so-called "state-variables" for the firm (Winter, 1987; Dosi et al. 2008), namely those features identifying source of differentiation across firms entailing specific organizational forms and capabilities not easy to acquire in the short-term (Dosi et al. 2011), such as innovation, engagement in international transactions or both exporting and patenting activity. The relationship between labour flexibilisation – in the form of external numerical flexibility (temporary employment) – and labour productivity, wages and profits has not been studied emphasizing the role of firm heterogeneity in terms of productivity and wages.

Indeed, the economic literature has focused on the relationship between labour flexibility – such as the use of temporary employment - and productivity under different economic perspectives, but it mainly disregards the effect of temporary work on the whole distribution of the labour productivity, wages and profits: the productivity-enhancing effects of some covariates vary in low and high quantiles along the productivity distribution. The effect of the incremental use of temporary employment on labour productivity and wages is not homogeneous among enterprises. A special focus has been deserved to small firms – with less than 50 employees – that covers more than 90% of Italian firms and almost 80% of the sample.

Therefore, this study contributes to the existent literature on several points. First, we investigate the effects of the share of temporary employment at the firm level on labour productivity, wages and productivity-wage gaps (profits) through a quantile approach which explicitly considers the relationships among heterogeneous firms in terms of average productivity, wages, profits. Second, we consider the sub-sample of small firms with less than 50 employees. In small firms, the link between temporary employment and labor productivity/wages can be influenced by firm size and interpersonal relationships existing between management and employees, as well as the existence of fairness considerations among colleagues. Given that, it is likely that the impact of temporary employment on labour productivity, wages and profits changes according to firm size and workers' perceptions on the probability of transforming short-term contracts to permanent ones – short-term contracts as "stepping stones" more than "dead ends". However, in small low productive firms, it is likely that the use of temporary employment is a cost saving strategy implemented by firms to contain labour costs and face economic uncertainties.

To test such hypothesis, we take advantage of the information drawn from the *Rilevazione su Imprese e Lavoro* (RIL) conducted by INAPP for 2007, 2010 and 2015 on a representative sample of partnerships and limited liability firms.

The paper is organized as follows: Section 2 discusses the literature with an overview of the main results stemming from previous empirical analyses in order to state the main hypotheses we test; Section 3 presents data and descriptive statistics; Section 4 introduces the empirical strategy and main results; Section 5 introduce a brief discussion on causality and related results. Section 6 concludes.

2. **Related literature and hypothesis**

2.1   Temporary employment and labour productivity

Over the last decade the implementation of labour market reforms was aimed to relax so-called labour market rigidities – such as reducing firing and hiring costs - and making employment more flexible to allow firms to adjust to the needs of the markets and sustain competitiveness even during downturns. This process of flexibilisation has led to lower employment protection (EPL) for regular workers and to a larger use of atypical contracts for new entrants (Lucidi and Kleinknecht, 2010; Walwei, 2014; Eichhorst and Tobsch, 2015; ILO, 2016). Labour flexibilisation can be implemented both as "numerical flexibility" addressing the variation of the quantity of labour input taking place within the firm or, by the use of the external labour market flexibility such as fixed-term contracts aiming at reducing firm costs. A second form of flexibility concerns "functional flexibility" which is related to the multiple competencies of workers. Therefore, while "functional flexibility" leads to an internal re-organization of workplaces based on multi-skilling, multi-tasking, team-working, job-rotation, and, in general, to what is called "High-Performance Work Organization" practices; numerical flexibility has been defined as a process through which firms react to changes in the demand for their products/services by adjusting the amount of labour employed through part-time work and fixed-term contracts.

From a theoretical point of view, we can identify three main arguments in the labour economic literature explaining the relationship between temporary employment and labour productivity. The first one relies on the use of temporary employment to adjust workforce to product demand fluctuations. According to Bentolila and Saint-Paul (1992), Nunziata and Staffolani (2007), volatile product demand and, more generally, fluctuations in product demand lead firms to increase the use of flexible forms of employment in order to adjust firm production to markets' needs without facing high dismissal costs. Houseman (2001) empirically tests the relationship between demand fluctuations and the use of temporary employment finding a significant relationship between industry seasonality and the probability of employing temporary workers. On the same line, Vidal and Tigges (2009) and Hagen (2003) show that the use of fixed-term contracts is a tool to deal with changes in product demand which has a positive effect on labour productivity.

A second argument explaining the potential link between temporary work and labour productivity is related to the screening for new productive workers. Firms cannot observe the productivity of new employees before hiring them, therefore firms use fixed-term contracts to screen new employees for a certain period (Wang and Weiss, 1998). This mechanism implies that during the probation period the employee has an incentive to increase his/her effort to get an open-ended contract; firms offering permanent contracts only to more productive workers have the chance to increase the overall productivity (Engellandt and Riphahn, 2005; Gerfin et al., 2005; Addison and Surfield, 2009; Boockmann and Hagen, 2008; Gash, 2008; McGinnity et al., 2005; Mertens and McGinnity, 2004; Amuedo-Dorantes, 2000). Focusing on absenteeism, Jimeno and Toharia (1996) and Ichino and Riphahn (2005) underline that temporary workers are more productive because they fear of dismissal; on the same line, Malo and Sanchez-Sanchez (2014) show the low correlation between temporary employment and labour conflicts, short-term workers have a lower probability of being involved in labour conflicts with a positive aggregate effect on labour productivity.

At the same time, fixed-term employees used to substitute core workforce can negatively impact on workers' motivation resulting in lower labour productivity (Brown and Sessions, 2005). Therefore, this stream of literature has stressed that the total effect of temporary work on labour productivity with respect to screening and motivation depend on the share of fixed-term workers on the total workforce. The conclusion from this literature is that a moderate use of fixed-term contracts should increase labor productivity due to screening and positive motivational aspects; however, an excessive use of such contracts can be detrimental affecting workers motivation.

A third explanation of the link between fixed-term contracts and productivity relies on human capital. In case of short term contracts, firms have little incentive to invest in the firm specific human capital leading to decrease investments in specific human capital and therefore in labour productivity (Arulampalam et al., 1998; Arulampalam et al., 2004; Booth et al., 2002; Zwick, 2006). The same argument holds for workers who are induced to invest in firm-specific skills when the employment relationship is expected to last; conversely, workers tend to invest in general skills when they perceive a high risk of losing their jobs (Wasmer, 2006). Related to the human capital argument, some authors have highlighted the relationship between temporary employment and innovation. Vergeer and Kleinknecht (2014) underline that temporary workers might be less willing to cooperate with their employers in developing innovations because they are not sure to enjoy the expected benefits. Furthermore, temporary employment are more inclined to develop general skills than firm-specific ones because there is a lack of long-term commitment with the employers (MacLeod and Navakachara, 2007). An increasing use of temporary employment can affect workforce training leading to a reduction of labour productivity. Given the short duration of temporary contracts, firms are not incentivized to invest in training. As several empirical studies have underlined, temporary workers in European countries have less access to on-the-job training provided by firms (Alba-Ramirez, 1994; Booth et al., 2002; OECD, 2007; Albert et al. 2005; 2010).

Another set of theories focusing on "high-trust" human resource management practices states that long-lasting working relations imply a commitment between employees and employers boosting productivity (Lorenz, 1999; Buchele and Christiansen, 1999; Naastepad and Storm, 2006).

Also evidences from empirical studies are quite heterogeneous leading to different results. At the firm level, Arvanitis (2005) using data for Swiss firms estimates the relationship between the importance of temporary work and average labour productivity, measured as logarithm of sales per employee, without finding any statistically significant relationship. However, part-time work – which is also considered as a measure of numerical flexibility – correlates negatively with average labour productivity, this effect holds particularly for firms with low human capital intensity. Conversely, a significantly positive relationship emerges between temporary work and labour productivity for firms with a high human capital intensity.

Nielen and Schiersch (2016) on German manufacturing firms find no effects of temporary employment on labour productivity controlling explicitly for the selection problem into using fixed-term contracts. Perotin and Robinson (2000) estimate the relationship between the percentage of part-time workers and productivity without finding a significant relationship, while on UK firm level data,

Michie and Sheehan (1999) and (2001) and Chadwick and Cappelli (2002) found a positive correlations for measures of numerical flexibility and productivity.

Conversely, Cappellari et al. (2010) on Italian firm level data between 2004 and 2007 detect a small negative effect of reforms on fixed-term contracts on labour productivity rejecting the hypothesis that reforms in the legislation of fixed-term increase labour productivity. Kleinknecht et al. (2006) on Dutch firm observations estimate the relationship between fixed-term contracts and sales growth finding overall no significant effect. However major differences arise when focusing on innovative and non-innovative firms. While among firms with high R&D expenditure temporary employment does not have effects on labour productivity growth; on the other hand, non-innovating firms show lower labour productivity when employing a higher rate of workers under short-term contracts. Boeri and Garibaldi (2007) on Italian firm level data detect a negative effect of the share of fixed-term contracts on labour productivity growth in a sample of manufacturing firms. A negative relationship also emerges from Lucidi and Kleinknecht (2010) showing that high shares of flexible workers can negatively affect labour productivity growth. Ortega and Marchante (2010) on Spanish firm-level data detect that productivity growth has been decreasing due to the extensive use of temporary contracts.

Among sectoral and macro analysis, Lisi and Malo (2017) explicitly analyze the relationship between the share of temporary employment and productivity considering the differential effect in skilled and unskilled economic sectors. On the same line, Cetrulo, Cirillo and Guarascio (2018) focus on the use of temporary employment and its relationship with sectoral strategies of innovation finding that an higher share of temporary employment is associated with a lower propensity to introduce product innovations and lower labour productivity. Damiani and Pompei (2010) and Damiani, Pompei and Ricci (2011) analyze respectively the effect of temporary contracts and deregulation of temporary jobs on Total Factor Productivity (TFP) growth across European countries and they find a negative effect of deregulation of temporary contracts on growth rates of TFP. Auer et al. (2005) analyze the relationship between employment tenure and productivity in European countries for the period 1992 – 2002, showing that productivity increases with job tenure, but decreases after thirteen years of job tenure, therefore firms with a lower share of fixed-term workers register higher productivity. Lisi (2013) on a panel of EU countries finds that an increase of the share of flexible jobs lead to a decrease in labour productivity growth. Micco and Pages (2006) on a sample of 16 OECD countries and 18 non-OECD countries found that a stricter job security regulation slows down job turnover and productivity and the magnitudes of these effects are larger in sectors more volatile. Some studies focus on part-time employment as a further strategy implemented by firms to face uncertainty of the general economic conditions and competition among firms leading to prefer flexible working arrangements, such as part-time and temporary work (Kalleberg, 2000). Devicienti et al. (2015) analyze the impact of part-time work on firm productivity for a panel of Italian firms. They found that part-time work – mostly horizontal and mixed part-time combining horizontal and vertical characteristics - is detrimental to firm productivity increasing communication, coordination and transaction costs lowering firm organizational efficiency. On the same line, Specchia and Vandenberghe (2013) on a panel of Belgian firms over the period 2002-2009 find that part-time workers are relatively less productive with respect to full-time workers. Conversely, Garnero et al. (2014) on Belgian private sector firms for the period 1999-2010

find that part-time workers are relatively more productive than full-time ones. There are several explanations of the potential link between the use of part-time work and productivity focusing, on the one hand, on the impact of part-time work on the individual labour productivity (Barzel, 1973; Brewster et al., 1994; Becker, 2009) and, on the other, on the impact of part-time work on firms' organizational efficiency in terms of coordination costs, information inefficiencies and communication costs (Lewis, 2003), or to deal with market fluctuations (Owen, 1978). Considering part-time – mainly involuntary part-time – such as a further measure of flexible work, the overall effect of part-time work on labour productivity is not clear but it emerges as the outcome of the interplay of contrasting forces (Devicienti et al., 2015).

Overall, the empirical literature provides no-clear cut evidence on the relationship between numerical flexibility – proxied by temporary workers – and productivity; however, the effect of temporary contracts on productivity depends on the reason for their use (Arvanitis, 2005) and on the share of short-term contracts on the total workforce which not linearly affects labour productivity (Altuzarra and Serrano, 2010; Hirsch and Mueller, 2012).

Summing up, theories and empirics state the existence of both a negative and a positive relationship between temporary employment and labour productivity at the firm level. However, they state that such relationship is not homogeneous among firms and it can vary accordingly to firms' characteristics, reasons for using part-time workers, human capital accumulation, macro-economic conditions. Therefore, we expect that the relationship between temporary employment and labour productivity is not constant among firms. A detrimental effect of temporary employment on low-productive firms can emerge, while a not-significant or even positive effect on labour productivity arises in high-productive firms. Therefore, we can state our first hypothesis:

Hypothesis 1: The effect of temporary employment on labour productivity is not homogeneous and varies in high and low productive firms.

However, we also expect that the labour productivity-temporary employment relationship varies according to firm size, therefore we can state hypothesis 1a, which is a refinement of hypothesis 1.

Hypothesis 1a: In high-productive small firms, we expect a positive or not significant relationship between temporary employment and labour productivity because temporary contracts are seen by workers as "stepping stones" more than "dead ends" without lowering workers' motivation. Conversely, in low-productive small firms, we expect that an increasing share of temporary employment is detrimental for labour productivity because short-term contracts are perceived as "dead ends" and human capital accumulation does not occur.

2.2 Temporary employment and wages

The relationship between fixed-term contracts and wages has been deeply studied in theoretical and empirical literature. A first set of explanations refers to compensating wage differentials theories

concluding that workers with disadvantaged working conditions have to earn more. Sattinger (1977) emphasized the role of non-monetary factors into the formation of wages and the existence of a sort of premium for unpleasant job (Rosen, 1986). Amuedo-Dorantes and Serrano-Padial (2007) suggest that the pay-gap should favor short-term contracts giving the uncertainty they have to face. However, most empirical evidences detect a wage gap disfavoring temporary employees (Stancanelli, 2002; Kahn, 2016; Kahn, 2012; da Silva et al., 2015; Comi and Grasseni, 2012; Brown and Session, 2003; Picchio et al. 2006; Bosio, 2014). Almost all empirical exercises focusing on workers' wages have shown a negative gap toward temporary employees (OECD, 2003; Brown and Session, 2005; Booth and Francesconi, 2002; Picchio, 2008). Decomposing the wage differential across the entire wage distribution, Comi and Grasseni (2012) highlight that workers with the same characteristics as temporary workers would receive higher wages if they worked on permanent contracts. Such well-documented negative wage differential can be easily explained by either efficiency-wage or insider/outsider arguments. In the first case, Rebitzer and Taylor (1991) showed that it may be optimal for a profit-maximising firm to hire both temporary and permanent workers paying a lower wages to temporary workers in case of high monitoring costs and uncertainty of product demand. Therefore the possibility of contract renewal may be used as an effort-incentive device instead of wages. According to the insider/outsider framework, the presence of firing costs make more efficient for firms to have a buffer stock of workers on fixed-term contracts to be fired in case of adverse shocks. Mertens et al. (2007) evaluate the wage gap across the entire wage distribution of temporary and permanent workers through a quantile approach finding that the wage gap decreases as higher quantiles are considered, and that having a fixed-term contract penalizes low-skilled workers more than high-skilled ones.

We expect that temporary workers are paid less than permanent ones in both high and low paying firms, however we expect that such negative relationship is mostly verified for low paying firms while the wage gap between permanent and fixed-term workers shrinks in high-paying firms.

Hypothesis 2: Temporary employees are paid less than permanent ones in both high and low paying firms. In low-paying firms temporary employees are paid comparatively less than temporary employees in high-paying firms.

Few studies have focused on the distributional impact of the use of fixed-term contracts looking at wages and profits at the firm level. One of the few attempts has been done by Garnero et al. (2016) estimating the relationship between the share of fixed-term employees and the productivity-wage gap controlling for unobserved firm characteristics and endogeneity of fixed-term contracts with respect to shocks in labour productivity. Overall, the distributional consequences stemming from an incremental use of fixed-term contracts have been quite unexplored. The incidence of temporary employment on the one hand impacts on the firm wage share – fixed-term employees are on average paid less than permanent workers.

Furthermore, few empirical studies have explicitly take into account firms' heterogeneity and intra-industry differences. Italian labour market is characterized by high degree of firms heterogeneity, and such heterogeneity is an intrinsic property of industries (Dunne et al., 1988, 1989; Haltiwanger et al., 1999; Bartelsman and Doms, 2000). A group of empirical and theoretical contributions analyses the

impact of labour flexibility accounting for differences in production structures, technological regimes and macroeconomic conditions (Cirillo and Guarascio, 2015; Dosi et al., 2016) highlighting that in presence of structural weaknesses such as prevalence of low-tech sectors, weak aggregate demand can even negatively affect productivity dynamics (Cetrulo et al., 2018). Firm size influences firms' paying systems, such as the adoption of PRP schemes according to which a worker's pay is linked to her output (Cowling, 2001).

Building on these considerations, we explicitly explore the relationship between temporary employment, labour productivity and wages in small firms with less than 50 employees hypothesizing that:

Hypothesis 3: In small firms, the negative relationship between temporary employment and labour productivity is verified in low-productive firms and it is comparatively stronger than in medium and medium-large firms. In high-productive and high-paying firms, temporary employment do not impact on labour productivity nor on wages. The latter can be explained by confidential relationships among employers and employees where it is likely that efficiency wages à la Akerlof are implemented.

In this study we consider the relationship between the share of temporary employment and the productivity-wage gap expressed as difference between labour productivity and wages. Compared to previous studies, we take into account firms' heterogeneity estimating the relationship across the productivity and wage distributions dealing with unobserved heterogeneity through the implementation of a fixed-effects strategy.

Furthermore, we explicitly consider the relationship between labour productivity, wages and temporary employment in the cluster of small firms with less than 50 employees.

3. Data and descriptive statistics

The empirical analysis is based on data drawn from the three last waves of the *Rilevazione su Imprese e Lavoro* (RIL) conducted by INAPP for 2007, 2010 and 2015 on a representative sample of partnerships and limited liability firms[1]. Each waves of the survey interviews over 25000 firms operating in non-agricultural private sector. A subsample of the included firms (around 35%) are followed over time, making the RIL dataset partially panel over the period under study.

Each wave of the RIL questionnaire provides a rich set of information about the employment composition and personnel organization (type of contracts, training activities, ecc), industrial relations and other workplace and firms productive characteristics.[2]

---

[1] For more details on sample design, methodological issues and procedures for requesting data related to RIL, see: http://www.inapp.org/it/ril

[2] The detailed list of variables included in the analysis is shown in the Appendix – table A1.

The RIL survey however contains incomplete information on financial and accounting variables, which had to be recovered from another source. For this purpose, we use the national tax number to merge RIL data with AIDA archive provided by the Bureau Van Dijk for the period 2005-2014. The AIDA data offers comprehensive information on the balance sheets of almost all the Italian corporations operating in the private sector, except for the agricultural and financial industries. In particular, this dataset contains yearly values of such variables as revenues, value added, net profits, book value of physical capital, total wage bill and raw-material expenditures. Then, we are able to use indicators of labour productivity (value added per employee), wages (total labour cost per employee), fixed capital (the total amount of physical asset per employees) and other balance sheet variables (raw material expenditures, net profits, etc)[3].

The resulting "RIL-AIDA" merged sample was then restricted to limited liability firms that disclose detailed accounts in accordance with the scheme of the 4th Directive CEE. As for sample selection, we excluded firms with no employees. After excluding also firms with missing information for the key variables, the longitudinal RIL-AIDA sample is made up of approximately 2600 firm-year observations analyzed over the period 2007-2015.

3.1 Descriptive statistics

Table 1 shows the descriptive statistics for labour productivity, labour costs and productivity-wage gaps (profits) distributions in each sample year.

Both high-productive and low-productive firms have registered a decline of labour productivity over time and mostly over the crisis (2007-2010). Focusing on the last two available years – 2010 and 2014 – it emerges that high-productive firms have recovered faster compared to low-productive firms.

The evolution of the labour costs reflects that of the productivity: labor costs is decreasing below the median while they are stable or even increasing at last decile, mostly over the last two years. Overall low-productive firms have reacted to the crisis compressing wages from 2010 onwards, while high-productive firms register a modest decline in labour costs in 2007.

Panel C shows the difference between labour productivity and wage (productivity-wage gap). A strong heterogeneity emerges among firms – from 0.12 in the lower quantile to 0.9 in the upper one -. This heterogeneity is even sharper compared to labour productivity and wage distributions suggesting major differences across Italian firms. Furthermore, the productivity-wage gap is declined across the entire sample from 2007 to 2014, reaching negative performances in low-performing firms. Even high-profits' firms register a decline in profitability without reaching a negative result. As a consequence, Panel C shows that the overall declining trend of the profits is more severe in the lower tail of the distribution.

[Table 1 here]

---

[3] These financial variables have been deflated according to specific deflators provided by the national statistics institute (ISTAT).

Small firms deserve a peculiar attention. Table 2 shows descriptive statistics for the sub-sample of small firms. Both productivity and wage dynamics are confirmed in the sub-sample of small firms with a declining trend in labour productivity over time which is sharper in the lower part of the labour productivity distribution. Wages have declined over time mostly in low-paying firms, while they even increased in the upper part of the distribution, as for medium and medium-large firms.

[Table 2 here]

Finally, table 3 displays mean and standard deviation of the share of FT contracts across different quantiles of productivity and labour cost distribution. Two major patterns emerge. First, the share of FT contracts is higher in low quantiles of both labour productivity and labour costs distributions. Low-paying and low-productive firms are the ones recurring to temporary employment. Second, the share of FT contracts has increased over time – at least till 2010 – for low and medium productive firms, while it has constantly decreased over the entire period for high productive firms at the top of the labour productivity distribution. Third, in 2014 the share of FT contracts has declined with respect to 2010 in both high and low-productive firms and high and low-paying firms.

Overall, the share of FT contracts is significantly higher in the first and second quantile rather than third and fourth ones. This is detected for both productivity and labour costs suggesting that temporary employment is used more frequently by low-competitive/low-productive firms.

[Table 3 here]

4. Econometric strategy

Given the wide dispersion both in productivity and wages among firms, we resort to a quantile regression approach. Quantile regression originally developed in Koenker and Bassett (1978) allows to understand the impact of fixed term contracts along the entire distributions of productivity and wages. Then we explore the following econometric specifications:

$$(1) \qquad ln(lab\ prod)_{i,t} = \alpha_\theta \cdot FT_{i,t} + \beta_\theta \cdot X_{i,t} + \eta_i + \varepsilon_{i,t}$$

$$(2) \qquad ln(wage)_{i,t} = \alpha_\theta \cdot FT_{i,t} + \beta_\theta \cdot X_{i,t} + \eta_i + \varepsilon_{i,t}$$

$$(3) \qquad ln(productivity\ wage\ gap)_{i,t} = \alpha_\theta \cdot FT_{i,t} + \beta_\theta \cdot X_{i,t} + \eta_i + \varepsilon_{i,t}$$

where $ln(lab\ prod)_{i,t}$ and $ln(wage)_{i,t}$ are the (log of) valued added per employee and the (log) of labour cost per employee, respectively; $FT_{i,t}$ is the share of fixed term contracts while the vector $X_{i,t}$

controls for a wide set of firms' characteristics (physical capital, age, sector of activity, size, macro-region, etc.) and employment composition (gender, education, age, contractual arrangement, professions, etc.). The parameter η_i denotes the firms' time-invariant unobserved heterogeneity and ε_{it} is an error term capturing the idiosyncratic component of labour productivity in (1), wages in (2) and productivity wage gap in (3). Finally the vector of the coefficients α_θ, β_θ, are estimated at each of chosen quantiles $\theta = 0.1, 0.25, 0.5, 0.75$ and 0.9.

As in Garnero et al. (2016) the estimation of equations (1) and (2) allows to detect the effect of the share of temporary employment on firm productivity and wages, while equation (3) as in van Ours and Stoeldraijer (2011) allows to test for the significance of productivity-wage gaps given by the difference of labour productivity and wages and regressed on the same set of explanatory variables of equations (1) and (2).

Within this econometric framework, we start performing quantile regression with robust and clustered standard errors controlling for heteroschedasticity and autocorrelation within firms across the distribution (Machado and Santos Silva, 2000; Parente and Santos-Silva, 2016). Then, we rely on the simple two step procedure proposed by Canay (2011) in order to control for time-invariant firm-specific unobserved heterogeneity. Following this procedure, the estimation is carried out controlling for fixed effect under the assumption that these effects are pure location shifters across the productivity (wage) distribution. In our case, the first step is needed to estimate the unobserved fixed effect using a standard within FE estimators of equations (1)-(2) and (3). In the second step, the consistently estimated FE are used to demean the (log of) labour productivity (or alternatively the log of wages) and this transformed (adjusted) measure is taken as dependent variable to conduct a standard conditional quantile regression of equations (1)-(2) and (3)[4].

We acknowledge that there might be selection of firms into an intensive use of flexible contractual arrangements which is likely to be affected by firm productive and behavioural characteristics (size, sectorial specialization, type of corporate governance, etc). Further economic uncertainty and/or shock in wages and productivity levels might generate changes in the share of fixed-term employees who are the first to be affected by firings in case of a negative productivity shock. This avenue of selection at firm level represents potential biases for our estimates. Based on these arguments we also perform an instrumental variable quantile regression technique (Abadie et al.) to identify the causal effect of the share of FT contracts. In other words, endogenenity issues are addressed through i) the inclusion of a wide set of observed explanatory variables, ii) controlling for firm specific time invariant unobserved heterogeneity iii) performing separate instrumental regressions in a quantile framework.

---

[4] We also estimate equations (1)-(2)-(3) by performing quantile regression estimator for panel data (QRPD) with non-additive fixed effects, i.e assuming the non-separable disturbance term associated with quantile estimation (Powell, 2016). Although QRPD is straightforward to implement, this approach is computationally burden and shows problems of convergence in our data. For this reason we use conditional quantile models with additive fixed effects (Canay, 2011; Koenker, 2004) rather than the unconditional one with non-additive fixed effects (Baker and Powell 2016).

4.1. Main Results

Table 4 reports the pooled quantile regression results for equations (1)-(2) and (3).

In particular, Panel A of Table 4 reports the quantile estimates across labour productivity distribution. Here we find that the incremental use of short-term contracts negatively affects labour productivity across the distribution. In detail, we observe that the share of fixed-term employees is significantly and negatively related with labour productivity at the 10th, 25th and 50th quantiles of the productivity distribution by respectively -0.59, -0.41 and -0.28. No significant effects emerge for the upper tail of the labour productivity distribution, namely at the 90th quantile suggesting a non-uniform relationship along the whole distribution. For less productive firms – at the 10th quantile – an increase by one percentage point of the share of fixed-term contracts reduces by almost 0.6% firm labour productivity. The same increase by one percentage point in the share of fixed-term contracts would decrease firm productivity by 0.41% for those firms in the 25th quantile. Firms at the median of the productivity distribution – 50th quantile – are also characterized by a negative relationship between an increase in the share of temporary employees and labour productivity, specifically an increase by one percentage point in the share of fixed-term employees decreases productivity by 0.28. Conversely, at the top of the productivity distribution – among more productive firms - the relationship between fixed-term contracts and labour productivity does not hold anymore, meaning that more productive firms are not affected by an incremental use of short-term employment while a vicious cycle between the use of fixed-term contracts and low productivity emerges for low productive firms.

Panel B of Table 4 displays the pooled quantile estimates for the labour cost distribution (wages).

Here we observe a negative correlation between the share of fixed term employees and labour costs paid by firms in each quantile. In particular, the negative relationship between the share of fixed term contracts at labour productivity is decreasing across the distribution, in a specular way to what found for the productivity analysis: being equal to -0.7 at 10th, -0.57 at 25th quantile, -0.45 at the median, -0.33 at the 75th quantile and -0.19 at the 90th quantile. Low paying firms are those where an incremental use of fixed-term contracts has a stronger and negative impact on firm level wage, while high paying firms – at the 90th quantile - show a weaker relationship between the use of fixed-term contracts and average wages.

These results are consistent with previous empirical evidences on the existence of wage differentials between permanent and fixed-term workers having detrimental conditions for workers covered by short-term contracts. Therefore firms registering a higher share of fixed-term employees show on average lower average wages, and this hold mostly for low-paying firms.

Combining results from Panel A and B of Table 4, it emerges that a higher share of fixed-term employees in high productive firms do not decrease labour productivity and reduces firm average wage by less than 0.2%. Conversely, in low productive firms a higher percentage of fixed-term workers is associated to a sharp decrease of labour productivity and compresses the average firm wage by almost 0.7%. Focusing on high productive firms, this pattern is almost reverted in high productive firms where an incremental use of short-term work does not impact on labour productivity. Short-term workers are

paid more in high-productive firms which is in line with previous empirical studies showing a small wage gap between high skilled permanent and fixed term workers compared to low skilled ones.

Given that both labour productivity and wage equations are estimated on the same samples with the same control variables, as suggested by Garnero et al. (2016), the parameters for productivity and wages can be compared in order to drawn some reflections on the subdivision of benefits and losses between firms (average productivity) and workers (average wage) due to the use of temporary contracts. What is worth is that the negative effect on wages is higher in magnitude than that found on labour productivity especially below the median, suggesting a sort of negative mechanism between flexible staff arrangements and firms competitive performance.

To go more on deep on this point, Panel C of Table 4 reports the quantile estimates for equation (3), when the dependent variable is measured by the row difference between (log of) labor productivity and (log of) labor costs per employee. In this case, note that coefficients associated with the share of FT contracts are positive and increasing (in magnitude) across the distribution of profits, ranging from 0.09 at 10th quantile to 0.19 at 90th quantile. This result seems to suggest that a major use of fixed term employment at the firm level leads to higher profits as much as the negative impact on labour productivity is compensated by a reduction in labour costs. Among firms registering higher profits, a further increase in the share of fixed-term employees increases profits[5].

[Table 4 here]

Fixed effects

Table 5 reports the quantile fixed effect estimates of the equations (1)-(2) and (3) obtained with the two-step procedure proposed by Canay (2011).

To begin with, Panel A of Table 5 clearly indicates that the magnitude of the estimated coefficients decreases across the distribution of the labour productivity confirming the pattern already found in Table 1: the negative sign associated with the share of FT is equal to -0,38 at 10th, -0,28 at 25th, -0,21 at the median and -0,14 at 75th quantile of the labour productivity distribution, while a non-significant correlation is detected at the 90th quantile. That is, in high-productive firms (at the 90th quantile), the detrimental effect of temporary employment on labour productivity does not emerge. This result can be partly explained by the composition of the workforce in high-productive firms. Even controlling for occupations, it is likely to expect that high-productive firms employ high-productive workers and temporary employees are highly qualified. A further explanation concerns the kind of short-term contracts applied in high-productive firms, more similar to "port of entry" of temporary employees into

---

[5] It worth to underling that results displayed in Table 1 are obtained by including in equations (1)-(2)-(3) a rich set of explanatory variables. For example we find firm size is positively related with productivity in the lower part of the corresponding distribution while it . In high productive firms, size is not associated with labour productivity highlighting that firm dimension is a crucial feature for low productive firms. As expected, physical assets by employee are positively related to labour productivity both for high and low productive firms. We also include a set of controls related to workers' characteristics such as share of female workers, share of executives, white and blue collar. We also consider a set of controls related to firm features – firms' age, sector of activity, location, being part of a multinational – and firms' performance in terms of introduction of both product/process innovations. The estimates related to these controls variables are not included in the text to save space. However they are available upon request

permanent employment instead of stepping stones (Berton et al., 2011). If this is the case, a short-term contract on the one hand does not affect workers' motivation lowering labour productivity, on the other hand does not change firms' training programs. Therefore, it is likely that an increase in the share of temporary employment in very high-productive firms does not reduce labour productivity confirming our first hypothesis that temporary employment has a different impact on high and low productive firms.

Analogously, Panel B of Table 5 shows that the effect of fixed term contracts continues to reduce the (log of) labour cost with decreasing magnitudes across the correspondent distribution. More specifically, it emerges that the share of fixed-term employees reduces firms' average wage by almost 0.5% in low-paying firms and by 0.13% in high-paying ones. In low-paying firms an increasing share of short-term employees lowers firms' average wages more than in high-paying firms. Then the picture emerging from Panel B of Table 4 seems to support the hypothesis 2 stating that temporary employees are paid less than permanent ones in both high and low paying firms. In low-paying firms temporary employees are paid comparatively less than temporary employees in high-paying firms.

Finally, Panel C of Table 5 reveals that the positive coefficients associated with the share of FT contracts reveal a sort of U shape pattern across the distribution of profits when the firms unobserved heterogeneity is taken into account, indicating the highest values at the top (90th quantile) and at the bottom (10th and 25th) of the correspondent distribution.

Combining results from Panel C with those stemming from Panel A and B of Table 4, two kind of firm strategies seems to emerge. On the one hand, the use of fixed-term employment reduces labour productivity in low productive firms but also it is used to sustain profits lowering average wages. On the other hand, high productive firm can employ fixed-term employees without reducing productivity and compressing labour costs. In these firms, short-term employment is associated with higher profits.

Low productive and low paying firms seem to use fixed-term contracts as a strategy to make profits without pushing on labour productivity, while high productive firms employ workers under short-term contractual arrangements to foster labour productivity without decreasing average pays.

In other words, these analyses seem to reflect the duality of Italian firms with low paying and low productive firms employing fixed-term employees having a detrimental impact on labour productivity and compressing average wages and, on the other hand, high-productive and high paying firms where an incremental use of fixed-term workers only marginally affects wages without reducing average labour productivity. This picture of a polarized labor market seems to confirm the existence of a two-kind temporary work which is employed according to different strategies in low and high productive/paying firms. While the first ones use short-term contracts to sustain profits compressing labour costs, the second ones apply temporary contracts without reducing labour productivity. Focusing on the productivity-wage gap, it emerges that an increasing share of fixed-term employment is associated with higher profits in high-profits firms and lower profits at the bottom of the distribution. However, while low-profits firms have to decrease average labour costs to sustain profits and compensate labour productivity; in high-profits firms temporary employment does not reduce labour productivity and only marginally affect labour costs.

[Table 5 here]

4.2. Small firms

In this section, we replicate previuos analysis for the subsample of small firms with less than 50 employees which, being characterized by specific features, deserves a special focus.

Table 6 reports the pooled quantile estimates for equation (1)-(2) and (3).

Panel A of Table 6 shows that an increasing share of fixed-term employment decreases firm average productivity along the whole distribution, even in highly productive firms – differently from what emerges from table 4 at the 90th quantile. However, even in small firms the negative effect associated with the share of temporary contracts is stronger in low-productive firms than in high-productive ones.

Similarly, Panel B of Table 6 indicates that an increasing use of fixed-term employment reduces firm level average wage mostly in low paying firms confirming the general pattern detected in the whole sample. In terms of labour productivity-wage gap, Panel C confirms again that the use of fixed-term employment increases profits mostly in high-profits firms and marginally at the bottom of the profit distribution as found in the general sample.

These findings are substantially confirmed if quantile FE estimates are performed, as it emerges from Table7 .

[Table 6 here]

[Table 7 here]

Overall, it emerges that the main dynamics detected for the whole sample characterize also small firms with two main differences. First, the use of temporary employment negatively affect labour productivity also in small highly productive firms. Second, the positive effect stemming from the use of fixed-term employment on profits is less stronger already at the 25th quantile of the profit distribution suggesting a leftwing shift of the profit distribution for small firms compared to the whole sample of firms including also medium and medium large firms.

5. A step forward causality

As a final step, the issue of potential endogeneity is taken into account. As discussed before, it may be argued that an high use of flexible staff arrangements may be related to low-quality personnel policies and is more likely to be affordable for low-performing firms. Thus, low-productivity/low wage firms may have a higher probability of hiring with fixed term contracts.

At this aim, we exploit the longitudinal component of the RIL-AIDA sample to build a potential instrument for the use of fixed term contracts: the past volatility (standard deviation) of hires calculated for each 2 digit sector, i.e a proxy for uncertainty. That is our instrument is expected to

randomly affect sample firms and to influence their use of fixed term contracts. The rationale behind this receives support in the Italian case, where temporary contracts are widely adopted as a strategy for facing uncertain economic pressures. On the other hand, we argue that using more than a one-year lag for this instrument, it is plausible to assume that it is orthogonal to labour productivity and wages, observed some years later.

In particular to address endogeneity via treatment effect techniques in a quantile regression framework, we rely on a binary indicator variable which is equal to 1 if the sectorial volatility of hires is higher than its median value found for the economy on the whole, 0 otherwise. As well, we transform the share of fixed term contracts into a binary variable which is equal 1 if the share of fixed term contracts used by firm is higher than its median value found for the economy on the whole, 0 otherwise.

Then, performing the Quantile Treatment Effect Estimator of Abadie et al. (2002) (IVQR_AAI) to estimate equations (1)-(2) and (3), we compared the performance of both treated firms (firms using an high share of fixed term contracts) and the control group (firms adopting a low share of fixed term contracts) to undertake a counterfactual analysis[6].

Table A1 in Appendix supports previous evidence that an high use of temporary contracts causes a negative and decreasing effect across the distribution of labour productivity. As well, the IVQR_AAI reported in Panel B of table A1 confirms negative impact of fixed term contracts over the wage distributions, even though these effects are not statistically significant. However further analysis is needed on this point.

6. Conclusion

In the last decade the implementation of labour market reforms in the Italian labour market was aimed to increase labour flexibility with the aim to spur labour productivity facilitating allocative efficiency (Scarpetta and Martin, 2012). On this line, Bugamelli et al. (2018) highlight that the two recent Italian reforms have significantly changed the labor market functioning increasing its allocative efficiency. However, a detrimental effect stemming from the diffusion of fixed-term contracts on productivity can emerge due to weaker incentives by both the employer and the employee to invest in firm-specific skills (Lotti and Viviano, 2012). Few studies have explicitly taken into account firms' heterogeneity. Indeed Italy is characterized by strong differences between local labour markets

---

[6] Indeed, the IVQR_AAI estimator, which allows us to examine the impact of fixed term contracts throughout the distribution of our dependent variables by dealing with endogeneity issues, reveals some specific characteristics. The estimator is based on a binary endogenous variable and a binary instrument. Thus, we transformed the past hires' volatility calculated at secoral level (ateco 2 digit classification) into a dummy variable that equals 1 when the firm experienced a volatility above the median volatility and 0 otherwise. The Abadie et al. (2002) conditional quantile treatment effects estimator (IVQR_AAI) can be applied only if both the endogenous variable and the instrument are binary variables. Furthermore, the causal effect is identified only for the sub-population of compliers. In our case, the compliers are firms whose estimated probability of adopting an high share of fixed term contracts is correlated with a higher estimated probability of operating in sector which have experienced past volatility of hires above the median.

conditions and between firms' productivity levels requiring a deep understanding of the relationships between temporary employment, productivity and wages shedding lights on firms heterogeneity and allowing for the existence of multiple dynamics in small and large firms. In this light, an accurate understanding of the different repercussions of temporary employment contracts is required. This paper estimates the effect of temporary employment on productivity, wages and productivity-wage gaps contributing to the existent literature in different ways. First, we examine how the benefits or losses of fixed-term contracts are shared between workers and firms. Second, we investigate this relationship across both small and medium-large firms shedding lights on different dynamics between temporary employment and productivity that can coexist across different groups of firms. Third, we explicitly consider firms heterogeneity in terms of both productivity and labour costs though a quantile regression approach.

Using both the pooled quantile technique (Santos Sileva technique) and the quantile fixed effect approach (Canay technique), we found a strong and negative relationship between the share of temporary employees at the firm level and both labour productivity and wages. It emerges that the lower productivity of temporary employment is compensated by lower labour costs, so that profits – here productivity-wage gaps – remain unchanged. This general relationship changes according to average firm productivity and average firm costs. Indeed, an increasing share of temporary employment is more detrimental in low productive firms than in high-productive ones on labour productivity. In the most productive firms – at the 90th quantile -, an increase in the share of temporary employment does not reduce average labour productivity, while at the 10th and 25th quantiles a small increase of temporary employment in the workforce strongly negative reduce firm productivity. Focusing on wages, we shown that temporary employment is associated with lower labour costs, and this is stronger in low-paying firms more than in high-paying ones. Combining results from labour productivity and wages, we draw some conclusions on the productivity-wage gaps that have been estimated as differences between labour productivity and wages. In both low-profits and high-profits firms, an increase in the share of temporary employment pushes profits up. However, this clearly holds for high-profits firms where an increasing use of short-term contracts, on the one hand, is not associated with productivity slowdown, while reduces by a small amount firm labour costs. In low-profits firms, we detect a positive effect of short-term contracts on average firms profits, because in low-profits firms it is likely that the increasing use of temporary employment compresses labour productivity and, consequently, average labour costs in order to guarantee firm profitability.

Finally we focused on small firms – with less than 50 employees -, most relationships are confirmed. A variation in the workforce composition toward temporary employment impacts on labour productivity even in the most productive small firms, reducing labour productivity. From this point of view, comparing small and medium-large high productive firms, it emerges that the use of temporary employment compresses labour productivity only in small firms.

References

Addison, J. T., & Surfield, C. J. (2009). Atypical work and employment continuity. Industrial Relations: A Journal of Economy and Society, 48(4), pp. 655-683.

Alba-Ramirez, A. (1994). Formal training, temporary contracts, productivity and wages in Spain. Oxford bulletin of Economics and Statistics, 56(2), pp. 151-170.

Albert, C., Garcia-Serrano, C. and Hernanz, V. (2005). Firm-provided training and temporary contracts. Spanish Economic Review, 7(1), pp. 67-88.

Albert, C., Garcìa-Serrano, C. and Hernanz, V. (2010). On-the-job training in Europe: Determinants and wage returns. International Labour Review, 149(3), pp. 315-341.

Altuzarra, A. and Serrano, F. (2010). Firms' innovation activity and numerical flexibility. ILR Review, 63(2), pp. 327-339.

Amuedo-Dorantes, C. (2000). Work transitions into and out of involuntary temporary employment in a segmented market: evidence from Spain. ILR Review, 53(2), pp. 309-325.

Amuedo-Dorantes, C. and Serrano-Padial, R. (2007). Wage growth implications of fixed-term employment: An analysis by contract duration and job mobility. Labour Economics, 14(5), pp. 829-847.

Arulampalam, W. and Booth, A. (1998). Training and labour market flexibility: Is there a trade off? British Journal of Industrial Relations, 36 (4), pp. 521-536.

Arulampalam, W., Booth, A-L and Bryan, M-L. (2003). Training in Europe. Journal of the European Economic Association, 2 (2-3), pp. 346-360.

Arulampalam, W., Booth, A. L., & Bryan, M. L. (2004). Training in Europe. Journal of the European Economic Association, 2(2-3), pp. 346-360.

Arvanitis, S. (2005). Modes of Labor Flexibility at Firm Level: Are There any Implications for Performance and Innovation? Evidence for the Swiss Economy. Industrial and Corporate Change, 14(6), pp. 993–1016.

Auer, P., Berg, J. and Coulibaly, I. (2005). Is a stable workforce good for productivity?. International Labour Review, 144(3), pp. 319-343.

Autor, D. H. (2001). Why Do Temporary Help Firms Provide Free General Skills Training? The Quarterly Journal of Economics, Oxford University Press, vol. 116(4), pp. 1409-1448.

Bartelsman, E. J. and Doms, M. (2000). Understanding productivity: Lessons from longitudinal microdata. Journal of Economic literature, 38(3), pp. 569-594.

Barzel, Y. (1973). The Determination of Daily Hours and Wages. Quarterly Journal of Economics, 87(2), pp. 220–238.

Becker, G. S. (2009). Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. University of Chicago Press, 2009.

Bentolila, S. and Saint-Paul, G. (1992). The macroeconomic impact of flexible labor contracts, with an application to Spain. European Economic Review, 36(5), pp. 1013-1047.

Berton, F., Devicienti, F. and Pacelli, L. (2011) Are temporary jobs a port of entry into permanent employment? Evidence from matched employer-employee. *International Journal of Manpower*, 32(8), pp. 879-899.

Boeri, T. and Garibaldi, P. (2007). Two tier reforms of employment protection: A honeymoon effect? The Economic Journal, 117 (521).

Boockmann, B. and Hagen, T. (2008). Fixed-term contracts as sorting mechanisms: Evidence from job durations in West Germany. Labour Economics, 15, issue 5, pp. 984-1005.

Booth, A. L., Francesconi, M., & Frank, J. (2002). Temporary jobs: stepping stones or dead ends? The economic journal, 112(480).

Bosio, G. (2009). Temporary employment and wage gap with permanent jobs: Evidence from quantile regression", MPRA Paper, No. 16055, Munich.

Bosio, G. (2014) The Implications of Temporary Jobs on the Distribution of Wages in Italy: An Unconditional IVQTE Approach. Labour, 28, issue 1, pp. 64-86.

Bottazzi, G., Cefis, E., Dosi, G., & Secchi, A. (2007). Invariances and diversities in the patterns of industrial evolution: Some evidence from Italian manufacturing industries. Small Business Economics, 29(1-2), pp. 137-159.

Brewster, C., Hegewisch, A. and Mayne, L. (1994). Flexible Working Practices: The Controversy and the Evidence. Policy and Practice in European Human Resource Management, pp. 35–49. In C. Brewster and A. Hegewisch, editors, Routledge Publications, 1994.

Brown, S., & Sessions, J. G. (2003). Earnings, Education, and Fixed-Term Contracts. Scottish Journal of Political Economy, 50(4), pp. 492-506.

Brown, S. and Sessions, J. G. (2005). Employee attitudes, earnings and fixed-term contracts: International evidence. Review of World Economics, 141(2), pp. 296-317.

Buchele, R., & Christiansen, J. (1999). Employment and productivity growth in Europe and North America: the impact of labor market institutions. International Review of Applied Economics, 13(3), pp. 313-332.

Bugamelli, M., Lotti, F., Amici, M., Ciapanna, E., Colonna, F., D'Amuri, F. and Scoccianti, F. (2018). Productivity growth in Italy: a tale of a slow-motion change.

Cappellari, L., Dell'Aringa, C. and Leonardi, M. (2010). Flexible employment, job flows and labour productivity. Università cattolica del sacro Cuore.

Cappellari, L., Dell'Aringa, C. and Leonardi, L. (2012). Temporary employment, job flows, and productivity: A tale of two reforms. Economic Journal, 122 (562), pp. 188-215.

Cazes, S., & Tonin, M. (2010). Employment protection legislation and job stability: A European cross-country analysis. International Labour Review, 149(3), pp. 261-285.

Cetrulo, A., Cirillo, V. and Guarascio, D. (2018). Weaker jobs, weaker innovation. Exploring the temporary employment-product innovation nexus (No. 0032).

Chadwick, C., & Cappelli, P. (2002). Functional or numerical flexibility? Which pays off for organizations?. Management Department, The Wharton School, University of Pennsylvania, mimeo.

Cirillo, V. and Guarascio, D. (2015). Jobs and competitiveness in a polarised Europe. Intereconomics, 50(3), pp.156-160.

Comi, S. and Grasseni, M. (2012). Are temporary workers discriminated against? Evidence from Europe. Manchester School, 80 (1), pp. 28-50.

Cowling, M. (2001). Fixed wages or productivity pay: Evidence from 15 EU countries. Small Business Economics, 16(3), pp. 191-204.

Damiani, M. and Pompei, F. (2010). Labour protection and productivity in EU economies: 1995-2005. European Journal of Comparative Economics, 7 (2), pp. 373-411.

Damiani, M., Pompei, F. and Ricci, A. (2011). Temporary job protection and productivity growth in EU economies, MPRA Paper N. 29698, Munich Personal RePEc Archive.

da Silva, A. D. and Turrini, A. (2015). Precarious and less well-paid? Wage differences between permanent and fixed-term contracts across the EU countries (No. 544). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

De la Rica, S. (2004). Wage gaps between workers with indefinite and fixed-term contracts: The impact of firm and occupational segregation. Moneda y Crédito, 219, pp. 43-69.

Devicienti, F., Grinza, E., & Vannoni, D. (2015). The impact of part-time work on firm total factor productivity: evidence from Italy.

Dolado, J.J. and Stucchi, R. (2008). Do temporary contracts affect total factor productivity? Evidence from Spanish manufacturing firms. CEPR Discussion Papers, 7055.

Dosi, G., Faillo, M. and Marengo, L. (2008). Organizational capabilities, patterns of knowledge accumulation and governance structures in business firms: an introduction. Organization Studies, 29, pp. 1165-1185.

Dosi, G., Grazzi, M., Tomasi, C., & Zeli, A. (2012). Turbulence underneath the big calm? The micro-evidence behind Italian productivity dynamics. Small Business Economics, 39(4), pp. 1043-1067.

Dosi, G. and Nelson, R. R. (2016). Technological paradigms and technological trajectories. The Palgrave Encyclopedia of Strategic Management, pp. 1-12.

Dunne, T., Roberts, M. J. and Samuelson, L. (1988). Patterns of firm entry and exit in US manufacturing industries. The RAND journal of Economics, 495-515.

Dunne, T., Roberts, M. J. and Samuelson, L. (1989). The growth and failure of US manufacturing plants. The Quarterly Journal of Economics, 104(4), pp. 671-698.

Eichhorst, W., Marx, P. and Tobsch, V. (2015). Non-standard employment across occupations in Germany: the role of replaceability and labour market flexibility. Non-Standard Employment in Post-Industrial Labour Markets, Cheltenham: Edward Elgar Publishing, pp. 29-51.

Engellandt, A. and Riphahn, R. (2005). Temporary contracts and employee effort. Labour Economics, 12 (3), pp. 281-299.

Hagen, T. (2003). Do fixed-term contracts increase the long-term employment opportunities of the unemployed? (No. 03-49). ZEW Discussion Papers.

Haltiwanger, J. C., Lane, J. I. and Spletzer, J. (1999). Productivity differences across employers: The roles of employer size, age, and human capital. American Economic Review, 89(2), pp. 94-98.

Hirsch, B. and Mueller, S. (2012). The productivity effect of temporary agency work: Evidence from German panel data. The Economic Journal, 122 (562).

Houseman, S. (2001). Why employers use flexible staffing arrangements: Evidence from an establishment survey. Industrial and Labor Relations Review, 55 (1), pp. 149-170.

Jimeno, J. and Toharia, L. (1993). The effects of fixed-term employment on wages: Theory and evidence from Spain. Investigaciones Economicas, 17 (3), pp. 475-494.

Kahn, L. M. (2012). Temporary jobs and job search effort in Europe. Labour Economics, 19(1), pp. 113-128. Kahn, L. M. (2016). The structure of the permanent job wage premium: Evidence from Europe. Industrial Relations: A Journal of Economy and Society, 55(1), pp. 149-178.

Kalleberg, AL. (2000). Nonstandard employment relations: Part-time, temporary and contract Work. Annual review of sociology, 26, pp. 341-365.

Kleinknecht, A. (1998). Is labour market flexibility harmful to innovation?. Cambridge Journal of Economics, 22(3), pp. 387-396.

Kleinknecht, A., Oostendorp, R. M., Pradhan, M. P. and Naastepad, C. W. M. (2006). Flexible labour, firm performance and the Dutch job creation miracle. International Review of Applied Economics, 20(2), pp. 171-187.

Garnero, S. Kampelmann, and F. Rycx. (2014) Part-Time Work, Wages, and Productivity: Evidence from Belgian Matched Panel Data. Industrial & Labor Relations Review, 67(3), pp. 926–954, 2014.

Garnero, A., R. Giuliano, B. Mahy and F. Rycx (2016). Productivity, Wages, and Profits among Belgian Firms: Do Fixed-Term Contracts Matter? International Journal of Manpower, Vol. 37(2), pp. 303-322.

Garz, M. (2013). Labour Market Segmentation: Standard and Non-Standard Employment in Germany. German Economic Review, 14(3), pp. 349-371.

Gash, V. (2008). Bridge or trap? Temporary workers' transitions to unemployment and to the standard employment contract. European Sociological Review, 24(5), pp. 651-668.

Gerfin, M., Lechner, M. and Steiger, H. (2005). Does subsidised temporary employment get the unemployed back to work? Aneconometric analysis of two different schemes. Labour Economics, 12(6), pp. 807-835.

Ichino, A. and Riphahn, R. T. (2005) The effect of employment protection on worker effort: Absenteeism during and after probation. Journal of the European Economic Association, 3(1), pp. 120-143.

Lewis, S. (2003). Flexible Working Arrangements: Implementation, Outcomes, and Management. International Review of Industrial and Organizational Psychology, 18, pp. 1–28, 2003.

Lindbeck, A. and Snower, J. (1986) Wage setting, unemployment and insider-outsider relations. American Economic Review, 76 (2), pp. 235-239.

Lisi, D. (2013). The impact of temporary employment and employment protection on labour productivity: evidence from an industry-level panel of EU countries. Journal for Labour Market Research, 46(2), pp. 119-144.

Lisi, D., & Malo, M. A. (2017) The impact of temporary employment on productivityAuswirkungen befristeter Beschäftigung auf die Produktivität. Journal for Labour Market Research, 50(1), pp. 91-112.

Lotti, F. and Viviano, E. (2012) Why hiring temporary workers. Rome: Banca d'Italia.

Lucidi, F. and Kleinknecht, A. (2009) Little innovation, many jobs: An econometric analysis of the Italian labour productivity crisis. Cambridge Journal of Economics, 34(3), pp. 525-546.

MacLeod, W. B., & Nakavachara, V. (2007). Can wrongful discharge law enhance employment?. The Economic Journal, 117(521).

Malo, M. A. and Sánchez-Sánchez, N. (2014) The legal form of labour conflicts and their time persistence: an empirical analysis with a large firms' panel. European Journal of Law and Economics, 38(3), pp. 513-533.

Martin, J. P. and Scarpetta, S. (2012) Setting it right: Employment protection, labour reallocation and productivity. *De Economist*, *160*(2), 89-116.

McGinnity, F., Mertens, A. and Gundert, S. (2005). A bad start? Fixed-term contracts and the transition from education to work in West Germany. European Sociological Review, 21(4), pp. 359-374.

Mertens, A. and McGinnity, F. (2004). Wages and Wage Growth of Fixed-Term Workers in East and West Germany. Applied Economics Quarterly, 50(2), pp. 139–163. Mertens, A., Gash, V. and McGinnity, F. (2007). The Cost of Flexibility at the Margin. Comparing the Wage Penalty for Fixed-Term Contracts in Germany and Spain using Quantile Regression. Labour, 21 (4-5), pp. 637-666.

Pages, C. and Micco, A. (2006). The economic effects of employment protection laws. In IZA/the World Bank conference on employment and development (pp. 25-27).

Michie, J. and Sheehan, M. (1999). HRM practices, R&D expenditure and innovative investment: evidence from the UK's 1990 workplace industrial relations survey (WIRS). Industrial and Corporate Change, 8(2), pp. 211-234.

Michie, J. and Sheehan‑Quinn, M. (2001). Labour market flexibility, human resource management and corporate performance. British journal of management, 12(4), pp. 287-306.

Naastepad, C. W. M., & Storm, S. (2006). The innovating firm in a societal context: labour-management relations and labour productivity. Managing Technology and Innovation. Routledge: London, pp. 170-191.

Nielen, S. and Schiersch, A. (2012). Productivity in German manufacturing firms: Does fixed-term employment matter? Schumpeter Discussion Paper No. 4, University of Wuppertal, Germany.

Nunziata, L. and Staffoli, S. (2007). Short-term contracts regulations and dynamic labour demand: Theory and evidence. Scottish Journal of Political Economy, 54 (1), pp. 72-104.

Ortega, B., & Marchante, A. J. (2010). Temporary contracts and labour productivity in Spain: a sectoral analysis. Journal of Productivity Analysis, 34(3), pp. 199-212.

Owen, J. D. (1978). Working Hours: An Economic Analysis. Lexington, 1978.

Perotin, V., Robinson, A., & Loundes, J. (2003). Equal opportunities practices and enterprise performance: A comparative investigation on Australian and British data. International Labour Review, 142(4), pp. 471-505.

Picchio, M. (2008). Temporary contracts and transitions to stable jobs in Italy. Labour, 22(s1), pp. 147-174.

Picchio, M. (2006). Wage differentials between temporary and permanent workers in Italy. Università Politecnica delle Marche.

Piore, M. (1978). Dualism in the labour market: A response to uncertainty and flux, the case of France. Revue économique, 19 (1), pp. 26-37.

Rebitzer, J. B., & Taylor, L. J. (1991). A model of dual labor markets when product demand is uncertain. The Quarterly Journal of Economics, 106(4), pp. 1373-1383.

Rosen, S. (1986). The theory of equalizing differences. Handbook of labor economics, 1, pp. 641-692.

Sattinger, M. (1977). Compensating wage differences. Journal of economic theory, 16(2), pp. 496-503.

Specchia, G. L. and Vandenberghe, V. (2013). Is part-time employment a boon or bane for firm productivity? Unpublished Paper, Université de Louvain.

Stancanelli, E. G. (2002). Do temporary jobs pay? Wages and career perspectives of temporary workers. Labour, 16(4), pp. 667-705.

Zwick, T. (2006). The impact of training intensity on establishment productivity. Industrial relations: a journal of economy and society, 45(1), pp. 26-46.

Van Ours, J. and Stoeldraijer, L. (2011). Age, wage and productivity in Dutch manufacturing. De Economist, 159 (2), pp. 113-137.

Vandenberghe, V. (2013). Are firms willing to employ a greying and feminizing workforce? Labour Economics, 22, pp. 30-46.

Vergeer, R., & Kleinknecht, A. (2012). Do flexible labor markets indeed reduce unemployment? A robustness check. Review of Social Economy, 70(4), pp. 451-467.

Vergeer, R., & Kleinknecht, A. (2014). Do labour market reforms reduce labour productivity growth? A panel data analysis of 20 OECD countries (1960–2004). International Labour Review, 153(3), pp. 365-393.

Vidal, M., & Tigges, L. M. (2009). Temporary employment and strategic staffing in the manufacturing sector. Industrial Relations: A Journal of Economy and Society, 48(1), pp. 55-72.

Walwei, U. (2014). Times of change: what drives the growth of work arrangements in Germany? Journal for Labour Market Research, 47(3), pp. 183-204.

Wang, R. and Weiss, A. (1998) Probation, Layoffs, and Wage-tenure profiles: A Sorting Explanation. Labour Economics, 5(3), pp. 359-383.

Wasmer, E. (2006). General versus specific skills in labor markets with search frictions and firing costs. American Economic Review, 96(3), pp. 811-831.

Winter, S. G. (1987). Knowledge and competence as strategic assets. In D. J. Teece (Ed.), The competitive challenge. Cambridge, MA: Ballinger.

Table 1: Distribution of productivity, wages and profits. **Whole sample**

	Mean	q10	q25	q50	q75	q90
Panel A: Productivity						
2007	10.81	10.17	10.48	10.81	11.15	11.52
2010	10.72	10.04	10.40	10.71	11.00	11.43
2014	10.56	9.85	10.22	10.60	10.95	11.31
Total	10.69	9.95	10.33	10.70	11.03	11.44
Panel B: Wages						
2007	10.27	9.71	10.06	10.32	10.55	10.74
2010	10.28	9.67	10.07	10.33	10.56	10.77
2014	10.16	9.48	9.97	10.33	10.58	10.83
Total	10.23	9.63	10.04	10.33	10.57	10.78
Panel C: Profits						
2007	0.539	0.139	0.267	0.466	0.764	1.048
2010	0.444	0.029	0.180	0.355	0.653	1.003
2014	0.398	-0.131	0.097	0.282	0.561	1.117
Total	0.458	0.024	0.175	0.368	0.668	1.062

Source RIL-INAPP 2007-2010-2014. Sampling weights applied.

Table 2: Distribution of productivity, wages and profits. **Small firms**

	Mean	q10	q25	q50	q75	q90
Panel A: Productivity						
2007	10.79	10.15	10.47	10.79	11.14	11.52
2010	10.71	10.02	10.39	10.70	10.99	11.43
2014	10.55	9.85	10.21	10.60	10.94	11.30
Total	10.68	9.95	10.32	10.69	11.03	11.43
Panel B: Wages						
2007	10.25	9.69	10.03	10.30	10.53	10.72
2010	10.26	9.67	10.06	10.32	10.55	10.75
2014	10.15	9.48	9.97	10.33	10.57	10.82
Total	10.22	9.62	10.03	10.32	10.55	10.77
Panel C: Profits						
2007	0.54	0.14	0.27	0.47	0.77	1.06
2010	0.45	0.03	0.18	0.36	0.66	1.01
2014	0.40	-0.13	0.09	0.28	0.56	1.12
Total	0.46	0.02	0.17	0.37	0.67	1.07

Source RIL-INAPP 2007-2010-2014. Sampling weights applied.

Table 3: Share of temporary employment by quantile

	2007		2010		2014	
	mean	sd	mean	sd	mean	sd
Labor productivity						
1 quantile	0.139	0.215	0.155	0.206	0.101	0.198
2 quantile	0.083	0.132	0.099	0.131	0.051	0.115
3 quantile	0.077	0.127	0.083	0.150	0.042	0.087
4 quantile	0.059	0.105	0.056	0.100	0.054	0.116
Labour costs						
1 quantile	0.159	0.229	0.196	0.224	0.116	0.204
2 quantile	0.079	0.118	0.083	0.108	0.067	0.131
3 quantile	0.066	0.109	0.067	0.122	0.032	0.078
4 quantile	0.054	0.097	0.046	0.082	0.034	0.078

Source RIL-INAPP 2007-2010-2014. Sampling weights applied.

Table 4: pooled quantile estimates (santos Silva technique). Whole sample

	q10	q25	q50	q75	q90
Panel A: Lab productivity					
share of FT contracts	-0.590***	-0.419***	-0.282***	-0.125***	-0.107
	[0.109]	[0.072]	[0.042]	[0.047]	[0.078]
other controls	yes	yes	yes	yes	yes
constant	9.352***	9.511***	9.531***	9.691***	10.732***
	[0.113]	[0.142]	[0.140]	[0.316]	[0.151]
N of Obs	8228	8228	8228	8228	8228
R2	0.231	0.259	0.274	0.255	0.229
Panel B: Wages					
share of FT contracts	-0.695***	-0.577***	-0.457***	-0.338***	-0.196***
	[0.094]	[0.044]	[0.036]	[0.034]	[0.064]
other controls	yes	yes	yes	yes	yes
constant	9.525***	9.800***	10.120***	10.654***	11.425***
	[0.124	[0.108	[0.088	[0.083	[0.308
N of Obs	8278	8278	8278	8278	8278
R2	0.271	0.3	0.307	0.274	0.212
Panel C: Profits					
share of FT contracts	0.091***	0.091***	0.125***	0.145***	0.191**
	[0.021]	[0.021]	[0.032]	[0.042]	[0.078]
other controls	yes	yes	yes	yes	yes
constant	-0.246***	-0.246***	-0.269***	-0.254***	-0.085
	[0.059]	[0.059]	[0.077]	[0.088]	[0.315]
N of Obs	8202	8202	8202	8202	8202
R2	0.123	0.123	0.13	0.127	0.117

Source: RIL-INAPP 2010-2015. Note: Other control variables: employment composition (gender, executives, blue collar, white collar, trained, hirings, immigrants), vacancy, product innovation, process innovation, mergers & acquisitions, firms' age, sector of activity, macro-region, ecc), employers' membership, performance related pay. Robust (boostrapped) standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 5: FE quantile estimates (Canay technique). Whole sample

	q10	q25	q50	q75	q90
Panel A: Lab productivity					
share of FT contracts	-0.386***	-0.284***	-0.217***	-0.149***	-0.068
	[0.037]	[0.023]	[0.012]	[0.023]	[0.043]
other controls	yes	yes	yes	yes	yes
constant	-0.403	-0.381***	-0.366***	-0.260*	-0.387
	[0.293]	[0.141]	[0.093]	[0.152]	[0.249]
N of Obs	8228	8228	8228	8228	8228
R2	0.809	0.817	0.818	0.816	0.810
Panel B: Wages					
share of FT contracts	-0.482***	-0.371***	-0.306***	-0.219***	-0.138***
	[0.038]	[0.019]	[0.008]	[0.017]	[0.025]
other controls	yes	yes	yes	yes	yes
constant	10.741***	10.884***	10.958***	11.180***	11.381***
	[0.046]	[0.033]	[0.056]	[0.034]	[0.166]
N of Obs	8278	8278	8278	8278	8278
R2	0.876	0.884	0.885	0.882	0.876
Panel C: Profits					
share of FT contracts	0.063**	0.063***	0.055***	0.062***	0.114***
	[0.031]	[0.013]	[0.009]	[0.016]	[0.028]
other controls	yes	yes	yes	yes	yes
constant	-0.104**	-0.111	-0.038	0.014	0.013
	[0.044]	[0.069]	[0.046]	[0.057]	[0.032]
N of Obs	8202	8202	8202	8202	8202
R2	0.335	0.363	0.367	0.36	0.332

Source: RIL-INAPP 2010-2015. Note: Other control variables: employment composition (gender, executives, blue collar, white collar, trained, hirings, immigrants), vacancy, product innovation, process innovation, mergers & acquisitions, firms' age, sector of activity, macro-region, ecc), employers' memebrship, performance related pay. Robust (boostrapped) standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 6: Pooled quantile estimates. Firms with less than 50 employees

	q10	q25	q50	q75	q90
Panel A: Lab productivity					
share of FT contracts	-0.695***	-0.512***	-0.346***	-0.238***	-0.163*
	[0.104]	[0.083]	[0.043]	[0.059]	[0.086]
other controls	yes	yes	yes	yes	yes
constant	9.495***	9.458***	9.673***	9.947***	10.707***
	[0.174]	[0.114]	[0.392]	[0.308]	[0.121]
N of Obs	6443	6443	6443	6443	6443
R2	0.16	0.215	0.236	0.221	0.191
Panel B: Wages					
share of FT contracts	-0.812***	-0.650***	-0.512***	-0.400***	-0.248***
	[0.095]	[0.049]	[0.037]	[0.042]	[0.049]
other controls	yes	yes	yes	yes	yes
constant	8.733***	9.551***	9.882***	10.188***	10.482***
	[2.689]	[0.165]	[0.129]	[0.336]	[0.080]
N of Obs	6487	6487	6487	6487	6487
R2	0.208	0.241	0.255	0.227	0.16
Panel C: Profits					
share of FT contracts	0.077***	0.077***	0.121***	0.137***	0.158**
	[0.020]	[0.020]	[0.032]	[0.037]	[0.071]
other controls	yes	yes	yes	yes	yes
constant	-0.161**	-0.161**	-0.159	-0.157	0.105
	[0.067]	[0.067]	[0.312]	[0.098]	[0.108]
N of Obs	6424	6424	6424	6424	6424
R2	0.124	0.124	0.131	0.128	0.116

Source: RIL-INAPP 2010-2014. Note: Other control variables: employment composition (gender, executives, blue collar, white collar, trained, hirings, immigrants), vacancy, product innovation, process innovation, mergers & aquisitions, firms' age, sector of activity, macro-region, ecc), employers' association, performance related pay. Robust (boostrapped) standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 7: FE quantile estimates. Firms with less than 50 employees

	q10	q25	q50	q75	q90
Panel A: Lab productivity					
share of FT contracts	-0.372***	-0.269***	-0.195***	-0.133***	-0.051*
	[0.040]	[0.023]	[0.015]	[0.021]	[0.031]
other controls	yes	yes	yes	yes	yes
constant	10.569***	10.781***	10.893***	11.129***	11.174***
	[0.064]	[0.323]	[0.085]	[0.156]	[0.269]
N of Obs	6443	6443	6443	6443	6443
R2	0.647	0.664	0.666	0.661	0.654
Panel B: Wages					
share of FT contracts	-0.482***	-0.368***	-0.297***	-0.203***	-0.135***
	[0.047]	[0.036]	[0.009]	[0.022]	[0.022]
other controls	yes	yes	yes	yes	yes
constant	10.542***	10.698***	10.737***	10.905***	11.416***
	[0.050]	[0.074]	[0.031]	[0.209]	[0.548]
N of Obs	6487	6487	6487	6487	6487
R2	0.756	0.776	0.779	0.773	0.762
Panel C: Profits					
share of FT contracts	0.063**	0.062***	0.051***	0.074***	0.132***
	[0.027]	[0.019]	[0.009]	[0.019]	[0.027]
other controls	yes	yes	yes	yes	yes
constant	0.036	-0.027	0.132*	0.180***	0.140***
	[0.101]	[0.063]	[0.078]	[0.035]	[0.046]
N of Obs	6424	6424	6424	6424	6424
R2	0.213	0.268	0.275	0.262	0.236

Source: RIL-INAPP 2010-2015. Note: Other control variables: employment composition (gender, executives, blue collar, white collar, trained, hirings, immigrants), vacancy, product innovation, process innovation, mergers & acquisitions, firms' age, sector of activity, macro-region, ecc), employers' membership, performance related pay. Robust (boostrapped) standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A1: IV_QR estimates. Whole sample

	q10	q25	q50	q75	q90
Panel A: Lab productivity					
use of FT contracts (0/1)	-0.293*	-0.208**	-0.173*	-0.192*	-0.269
	[0.159]	[0.098]	[0.098]	[0.105]	[0.164]
other controls	Yes	Yes	Yes	Yes	Yes
Constant	9.329***	9.482***	9.690***	9.766***	9.694***
	[0.936]	[0.471]	[0.760]	[0.685]	[1.211]
N of obs	8,228	8,228	8,228	8,228	8,228
Panel B: Wages					
use of FT contracts (0/1)	-0.157	-0.119	-0.104**	-0.079	-0.074
	[0.147]	[0.084]	[0.053]	[0.069]	[0.096]
Constant	9.572***	9.893***	10.133***	10.137***	10.586***
	[0.797]	[0.538]	[0.282]	[0.431]	[0.631]
N of obs	8,260	8,260	8,260	8,260	8,260
Panel C: Profits					
use of FT contracts (0/1)	-0.035	-0.031	-0.042	-0.082	-0.152
	[0.063]	[0.052]	[0.063]	[0.085]	[0.202]
Constant	-0.177	-0.248	-0.24	-0.346	0.252
	[0.278]	[0.280]	[0.347]	[0.439]	[1.210]
N of obs	8,184	8,184	8,184	8,184	8,184

Source: RIL-INAPP 2010-2015. Note: Other control variables: employment composition (gender, executives, blue collar, white collar, trained, hirings, immigrants), vacancy, product innovation, process innovation, mergers & acquisitions, firms' age, sector of activity, macro-region, ecc), employers' membership, performance related pay. Robust (boostrapped) standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table A2: Sample characteristics by year. Longitudinal sample RIL-AIDA

	2007		2010		2015		whole period	
	Mean*	Std dev	Mean*	Std dev	Mean*	Std dev	Mean	Std dev
% FT contracts	10.5	0.21	10.6	0.20	0.07	0.18	9.2	0.20
% executives	3.6	0.11	3.3	0.10	0.05	0.15	4.1	0.12
%withe collar	44.1	0.37	44.8	0.37	0.54	0.37	47.7	0.37
% blue collar	52.1	0.37	51.9	0.38	0.41	0.38	48.2	0.38
% female	37.3	0.33	42.2	0.33	0.44	0.35	41.3	0.34
% trained	19.6	0.35	18.0	0.33	0.28	0.41	22.1	0.37
vacancy	15.4	0.36	6.8	0.25	0.05	0.22	8.9	0.28
ln(n of employees)	1.95	1.19	1.73	1.16	1.55	1.09	1.74	1.16
ln(physical capital pc)	9.82	1.50	9.96	1.73	9.80	1.97	9.86	1.75
process innovation	34.8	0.48	25.6	0.44	0.26	0.44	28.7	0.45
product innovation	54.5	0.50	37.3	0.48	0.33	0.47	41.3	0.49
employers' association	54.0	0.50	49.2	0.50	0.49	0.50	50.5	0.50
merger & acquistion	1.2	0.11	3.9	0.19	0.03	0.16	2.6	0.16
performance related pay	4.1	0.20	4.1	0.20	0.03	0.18	3.9	0.19
foreign ownership	1.0	0.10	0.8	0.09	0.01	0.09	0.9	0.09
North West	35.1	0.48	30.1	0.46	0.39	0.49	35.0	0.48
North East	23.0	0.42	25.7	0.44	0.26	0.44	25.0	0.43
Centre	22.4	0.42	26.3	0.44	0.19	0.39	22.5	0.42
South	19.4	0.40	17.9	0.38	0.16	0.36	17.6	0.38
N of Obs	2,668		2,824		2,697		8,189	

Source RIL-INAPP 2007-2010-2015. Sampling weights applied. * percent values