Skilled but Precarious: Wage Effects of Liberalization in Skill-Enhancing Contracts

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Abstract

With the growing focus on skills, dual contracts such as internships and apprenticeships are being promoted as hybrid training-working opportunities for young workers to enter the labor market. Workers, however, also have a preference for job stability and do not value these training contracts equally. In this paper, I focus on the effect of the expansion of more precarious opportunities, such as internships, on the wage of more stable long-term contracts, such as apprenticeships. I develop a simple model whereby two effects can be simultaneously at play when new legislation increases the share of precarious contracts that can be activated: 1) a selection effect increases the aver- age wage of permanent contracts since the most productive workers are offered a permanent contract; 2) a dumping effect decreases the average wage since entrant workers are willing to bargain lower wages in exchange for the stability of a permanent contract. Using the latest legislative change to internships in Italy, I am able to exploit interregional variation and estimate the overall effect on apprenticeship wages, revealing that the dumping effect is prevalent.

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1 Introduction

In March 2025, the European Commission has launched the sa-called "Union of Skills", an ambitious plan to invest in the training and education of individuals to boost productivity and the quality of learning in the EU. Skills are becoming increasingly relevant in policymaking as they are a key tool to face the so-called "twin transitions": the green and digital transitions are ubiquitously being referenced as carriers of drastic changes to production modes. Many labour commentators have been foreseeing drastic changes in labour markets, underlining how the policy response to address these changes requires enhancing the skills of the labour force.

In addition to improving the quality of education and providing lifelong learning opportunities, great emphasis is placed on integrating training into job contracts. For young people in particular, contractual opportunities that merge education and work are being highly incentivized ("European Commission Directorate-General for Employment and Inclusion", 2023). To a young worker, however, these contracts are not necessarily equivalent, as job insecurity – reflected in the precariousness of the contract – can be an important drawback.

The literature has long shown that aggregate insecurity upon entry into the labour market have a long-term impact on a series of outcomes for young individuals: unemployment, skill mismatch, and lower earnings to cite a few (e.g. Gregg and Tominey (2005); (Liu et al., 2016); Rothstein (2021)). This makes young individuals one of the demographics most severely impacted by recessions and labour-market crises, such as the recent ones due to the Covid-19 pandemic or the conflict in Ukraine. Part of the reason for this higher cost paid by young labour market entrants is the often temporary nature of their contracts: as firms are hit by a negative shock or are more uncertain about future economic outcomes, they respond to losses by rescinding temporary contracts and reducing permanent hires, disproportionately affecting young workers.

The analysis of training-based contracts among the youth, therefore, becomes of particular relevance for policymakers wishing to address the skill-dependent transitions and at the same time the economic and social effects of labour market changes. The present paper moves in this direction by exploring the dynamics of precarious entry into the labor market. In particular, I focus on internships and apprenticeships, as they are the main entry-level opportunities for young workers and therefore two of the core instruments advocated by the EU to increase skill provision to the youth.

Recently, internships and apprenticeships have also been at the heart of a lively political debate in Italy. In the Italian legislation, the post-graduate internship (*tirocinio extracurriculare*), is intended as a training-work experience hybrid and in theory does not qualify as a job contract. However, its use as an active labour market policy has made it a very common hiring format for many entry-level jobs, increasing noticeably turnover among short-term positions. Recently, for the first time, in Italy internships have surpassed the number of apprenticeships, which are meant to be the main dual contract and represents a stable form of employment (ANPAL data). As Albanese et al. (2021) show, apprenticeships in Italy have been at the center of legislative incentives aimed at strengthening dual learning-working opportunities, which improve job turnover and enhance productivity.

Although they are different institutions, internships and apprenticeships are similarly distributed across sectors and education levels (as shown in the Appendix), so some degree of substitutability between the two contracts does exist. Institutional changes to these labor contracts, therefore, by changing the bargaining relationship between employer and employee, lead to important effects not only on the share of contracts offered of one type versus another, but also on the wage structure of these contracts. While some research has been conducted on the effects of more flexible contracts on the wages of temporary workers (Albanese and Gallo, 2020, Bosio, 2014), little research exists on the effects of institutional

changes to the availability of these very short-term contracts on the wages of permanent workers.

Temporary contracts broadly have been the subject of a vast body of economic research (Dolado et al., 2002), following their dramatic rise in the past few decades in many European countries as a result of many institutional reforms. Consequently, many models have tried to describe key features of increasingly dual labour markets, with different approaches as to the coexistence of permanent and temporary contracts. For instance, Cahuc and Postel-Vinay (2002) used a standard search and matching model, simply adding an exogenous fraction of new matches as temporary contracts. Faccini (2014) postulates that all contracts begin as temporary and a share of them must be transformed into permanent contracts. Blanchard and Landier (2002) and Garibaldi and Violante (2005) endogenize the conversion into open-ended contract.

Instead, Garibaldi (2006) and Cao et al. (2010) assume that FTCs have a lower expected duration, but abstract from heterogeneity in workers' ability. Cahuc et al. (2016) show that permanent and temporary contracts coexist in a search market with random matching and wage bargaining, while Berton and Garibaldi (2012) show that temporary and permanent contracts can coexist as long as the job filling rate for permanent contracts is higher. Boeri and Garibaldi (2007) have shown that the attractiveness of temporary contracts takes over most new vacancies and can lead to bursts of sudden job growth. Other papers (Franceschin, 2021) allow for heterogeneous ability of workers and link the coexistence of both types of contract to on-the-job search.

There is consistent evidence showing that young individuals are one of the main demographics employed through temporary contracts Booth et al. (2002), which makes sense as temporary contracts are sometimes used as a "stepping stone" towards a permanent contract. Yet even within young individuals there are trends of differential sorting into temporary and permanent contracts: Portugal

and Varejao (2022) show that high-skilled workers are more likely to be employed with a permanent contract, since that worker's ability can be more easily signaled and the firms on average invest more heavily on those workers.

As young individuals enter into the labour market, they often can be hired through an apprenticeship or through a fixed-term internship, as these are the contracts designed to accompany the school-to-work transition. While there is some literature that has focused on internships or on apprenticeship, to my knowledge these two opportunities for young people to enter into the labour market have not been linked in a joint analysis. This is where the present paper comes into effect to prove a broader look into the dynamics of internships and apprenticeships from a contractual bargaining perspective.

Since my goal is to focus on the wage dynamics for young workers, I take different elements from these papers to build a simple model that provides an intuitive theoretical framework to understand the choices that young individuals face. Crucially, in this model workers are heterogeneous in ability, and there is an exogenous probability of a negative shock that causes a loss to the job value for the firm. Due to the short and flexible nature of internships, the employer can terminate it very easily in case of adverse shock and thus only suffers the cost of the shock in the case of the permanent contract.

As workers and employers bargain on the wage and the contractual position of new employees, the increase of temporary work could have two opposite effects on the wages: on the one hand, purely by a selection effect, permanent contracts are offered to the better skilled workers, thus resulting in a higher average permanent-contract wage; on the other hand, workers are willing to compromise on wages in order to achieve more contractual stability. This latter effect can be thought of as a form of wage dumping.

It is an interesting question to determine which of these two effects prevails, especially in light of the growing efforts placed by the European Union on helping

young NEETs (i.e. individuals below the age of 30 who are Not in Education, Employment or Training) enter the labour market and obtain high-quality jobs. In particular, internships were the subject of significant institutional changes that occurred in Italy in 2017, as they were expanded to a much wider set of workers. Taking advantage of a staggered regional implementation of the 2017 regulation, I use INAPP's PLUS survey data to estimate the effect that a higher proportion of internships has on apprenticeship wages, in order to determine the direction of the overall effect of increased job instability on stable jobs.

The Italian case is an interesting one to study. In Italy the share of temporary contracts has reached an all-time high (according to Istat monthly occupational data), and Scherer (2005) shows that Italy presents a longer spell of instability before young individuals can find a stable job, compared to other EU countries. Using a difference-in-differences setup as well as a triple difference estimation, I find that the increase in the share of internships that employers can offer has a negative effect on the wages of apprenticeships, despite a selection effect at play which I disentangle using the distribution of earnings for treated Regions. The effect is robust despite a rise in the number of apprenticeships across the board, which is however more pronounced in Regions where internships are liberalized. There is a slight wage premium on internships, yet the most significant effect is on permanent contracts.

These results are consistent with the existing wage-premium literature: Albanese and Gallo (2020) notably find a wage premium on temporary contracts for new hires, after controlling for observable characteristics; at the same time this confirms descriptively the inequality documented in the wage distribution literature (Bosio, 2014), supporting the notion that employers tend to offer permanent contracts to the most skilled workers, but at the same time suggesting that at the margin there is a stability-wage bargaining mechanism at play.

The framework used in this paper provides an analytical intuition of the main

mechanisms at play, which could be extended to provide intuition about other short-term outcomes. For instance, job precariousness can have implications on social variables such as fertility and likelihood of leaving the parents' home, as well as other fatures of young individuals economic and social independence which could be explored empirically. Important precedents of this kind exist: Krahn et al. (2015) find that early employment instability was linked to lower income at age 32 and, among Canadian men, to lower occupational status and career satisfaction. Bertolini and Goglio (2019) find that these dynamics have a crucial impact on living independence from parents. Similarly, Virtanen et al. (2005) find higher likelihood of mental health issues among temporary workers.

A careful use of temporary contracts for labour-market entrants, therefore, is of crucial importance, and policymakers should make use of these insights to make sure that entry-level contracts represent a true opportunity for young individuals to achieve independence rather than a source of increased precariousness. The rest of the paper is structured as follows: Section 2 presents the model and its main implications, while Section 3 describes the Italian institutional setup and explores the effects of the 2017 reform of internships. Section 4 tests the robustness of the results and finally Section 5 concludes and suggests avenues to expand the current research.

2 Theoretical Model

In this section, I present a simple model which builds upon the traditional search and matching framework, allowing for the coexistence of both temporary and permanent contracts. I focus on the firms' preferences and the workers' preferences, finding the room in both agents' value functions for wage bargaining and for the response to an increase in the share of temporary contracts that can be offered. I present some key comparative statics analysis and make a set of predictions that

result in two opposing effects on the wage of permanent contracts, which can be then tested in the estimation.

2.1 General Setup

I model a simple economy in a search and matching framework, characterized by workers who all participate in the labour force and identical firms that only use labour as an input. All parties are risk-neutral.

Workers are heterogeneous in skill, with an idiosyncratic productivity α that is distributed according to the cumulative distribution $F(\alpha)$. A worker's productivity is fully known ex-ante by all agents, and the wage reflects this productivity. Furthermore, the firm uses a constant-returns-to-scale technology to produce output y, which is also increasing in the productivity and always larger than the wage for a given level of ability:

$$\frac{\partial y}{\partial \alpha} > \frac{\partial w}{\partial \alpha} > 0 \tag{1}$$

This way the firm is always making an operational profit on a worker, and the profit is also an increasing function of productivity α. Two types of contracts exist in the economy: temporary contracts and permanent contracts. I allow for the possibility that, for a given level of productivity, the wage of a permanent contract $w_p(\alpha)$ and the wage of a temporary contract $w_t(\alpha)$ might differ, thus allowing for the possibility of a wage premium as described in the literature recalled above. Employed workers are subject to natural turnover and separate from their existing job with a Poisson process characterized by an arrival rate that differs across temporary and permanent contracts: the separation rate for temporary contracts s_t, due to their shorter duration, is larger than the separation rate for permanent contracts s_p.

The contracts differ additionally to the employer because with an instantaneous probability λ the firm undergoes an adverse shock which causes a loss κ to the employer. In the case of the temporary contract the employer can terminate without any cost the contract or, due to its short duration (i.e. a high separation rate), can simply wait for the contract to expire without replacing it with a new worker. Thus, in case of the shock λ, the cost κ is only paid for permanent contracts.

Firms create jobs by posting costly vacancies and can freely decide to offer either temporary or permanent jobs to a worker of observed productivity α. Keeping open a vacancy, regardless of the type of contract, involves a flow cost equal to c. For simplicity, I assume that the vacancy cost is identical for both contracts. The meeting of unemployed workers and vacant firms is described by a matching function m with constant returns to scale, which reflects matching frictions. Let $m(u, v)$ be the flow of new matches, where u denotes the measure of unemployed workers that are searching and can fill vacancies v posted by the firms. As standard, assume that m is concave and homogeneous of degree one in (u, v) with continuous derivatives. Consequently define $m(u, v)/v = q(\theta)$ as the arrival rate of workers for a vacancy and $h = m(u, v)/u = m(1, \theta) = h(\theta)$ as the transition rate from unemployment to employment, where $\theta = v/u$ is the labour market tightness.

To simplify the model, and square it with the high the levels of unemployment which often give employers high bargaining power, I assume that after matching the choice of contract is in the hands of the employer. Based on the worker's productivity α, the employer will offer a contract either permanent or temporary. Call $h_t(\theta, \alpha)$ (henceforth $h_t(\alpha)$ for simplicity) the probability that a worker of ability α receives a temporary job offer and $h_p(\theta, \alpha)$ (simplified as $h_p(\alpha)$) the probability that she receives the offer for a permanent one, such that $h_t(\alpha) + h_p(\alpha) = h(\alpha)$ for all values of α. Once the offer is received, the worker can either

refuse it, accept it as it is or suggest a change in the kind of contract that is offered. At that point the employer will accept the counter-offer only if it as convenient as or more convenient than the initial proposal. The wage agreed upon in this process is fixed for the entire employment relationship without ex-post renegotiation. Any wage within the parties' bargaining set can be supported as an equilibrium.

The equilibrium of the model is characterized by free entry of firms, which drives the flow value of vacancies to zero. Additionally, if workers are out of work, they actively search for a job and enjoy a fixed exogenous benefit $b > 0$ as an outside option.

2.2 The Firm's Decision

The firm maximizes profits, by posting vacancies that have a cost c, assuming that the process is equally costly for a temporary and a permanent job. The Bellman equation describing the present discounted value of a vacancy to the firm is:

$$rV = -c + q(\theta)[\mathbb{E}(J_k(\alpha)) - V]$$

where $k \in \{t, p\}$ for, respectively, temporary and permanent contracts and $\mathbb{E}(J_k(\alpha))$ is the expected continuation value from a new match given the distribution of α, which is known to the firm. Once a match is formed, the firm observes the value of α of the matched worker and chooses the type of contract accordingly to its preferences described below. The value of a job instead differs across the two types of contract. The value of a temporary job is the following:

$$rJ_t(\alpha) = y(\alpha) - w_t(\alpha) + s_t[V - J_t(\alpha)]$$

Instead the value of a permanent job is the following:

$$rJ_p(\alpha) = y(\alpha) - w_p(\alpha) + s_p[V - J_p(\alpha)] - \lambda\kappa$$

where κ is the cost of a negative shock to the value of a permanent job that occurs with probability $\lambda \in (0,1)$. Therefore, to a worker of given α, a firm would strictly prefer to offer a temporary contract if $J_t(\alpha) > J_p(\alpha)$, which means:

$$\lambda\kappa > \underbrace{w_t(\alpha) - w_p(\alpha)}_{\text{wage premium}} + \underbrace{s_p[V - J_p(\alpha)] - s_t[V - J_t(\alpha)]}_{\text{relative separation cost}} \tag{2}$$

i.e. the firm will offer a temporary contract if the risk associated with the permanent contract is greater than the wage premium to be paid to the temporary worker and the relative cost of separation for a worker of productivity α in a temporary contract relative to a permanent one. This condition is important as, given the set of parameters β and the growing profits 1, it shows that there exists a value of productivity $\tilde{\alpha}$ above which the firm is willing to offer a permanent contract, as the cost of losing that worker due to the greater separation rate of a temporary contract (the relative separation cost) would be greater than the possible cost associated to the adverse shock in a permanent contract. Below this threshold productivity value, the firm prefers to offer a temporary contract. Additionally, it shows that there is some wiggle room for workers to negotiate on the wage premium.

Suppose, however, as it is the case in reality, that there is a legislative requirement setting a cap on temporary contracts τ, with τ being such that $F(\tilde{\alpha}) > \tau$, then the constraint is binding, and the firm will offer a temporary contracts to all workers with a productivity $\alpha \leq F^{-1}(\tau)$.

As a result, the probabilities of receiving a temporary and permanent job offer h, for a worker of a given productivity α, depend also on the legislative limit τ, and are influenced by it in opposite ways:

$$\frac{\partial h_t(\alpha,\tau)}{\partial \tau} > 0 \text{ and } \frac{\partial h_p(\alpha,\tau)}{\partial \tau} < 0 \tag{3}$$

Additionally, the separation rate for permanent contracts must be a function of τ as well. In fact, when companies are forced to offer permanent contracts to some workers whom they would like to only keep temporarily, they will be more likely to terminate those contracts early. In the case of the apprenticeship, it means that firms will be more likely to exercise the termination option at the end of the training period. Thus we also have that:

$$\frac{\partial s_p(\tau)}{\partial \tau} < 0 \tag{4}$$

The separation rate for temporary contracts s_t, instead, will not be affected by this change, since the maximum duration of temporary contracts is fixed legislatively, in Italy at a maximum value of 12 months, 24 in special circumstances. This limit is left untouched by a legislative change to the share of temporary contracts that a firm can activate.

As free entry drives the value of vacancies to zero ($V = 0$), we can plug in the equilibrium values of temporary and permanent jobs into 2 to get the value of the permanent contract wage that makes the firm indifferent between a temporary and a permanent contract:

$$w_p(\alpha)^f_{max} = \frac{r + s_p}{r + s_t} w_t(\alpha) + \frac{s_t - s_p}{r + s_t} y(\alpha) - \frac{1 - s_p}{r} \lambda \kappa$$

This represents the maximum value of $w_p(\alpha)$, given an initial offer for a temporary contract with wage $w_t(\alpha)$, above which the firm prefers to maintain a temporary contract and below which it is willing to switch to a permanent con-

tract. From this we can derive the value of the wage premium at which the firm is indifferent between temporary and permanent contract, which is:

$$w_t(\alpha) - w_p(\alpha) = \frac{1 - s_p}{r}\lambda\kappa - \frac{s_t - s_p}{r + s_t}[y(\alpha) - w_t(\alpha)]$$

This shows that there exists a measure of workers with productivity $\alpha \in [\underline{\alpha'}, \overline{\alpha'}]$ for whom the firm would prefer to offer a temporary contract if $w_p(\alpha) \geq w_t(\alpha)$; but is willing to agree to a permanent contract if there is wage premium large enough between temporary and permanent contract wages. Such a wage premium must compensate for the difference between the adverse shock risk associated with permanent contracts and the loss of profit that the firms suffers because of the higher separation rate of a temporary contract. Since firm's profits are increasing in the worker's α due to 1, the above expression shows that the wage premium that a firm requires in order to agree on a permanent contract is decreasing in α. Therefore, above the threshold level of ability $\tilde{\alpha}$ the firm will require no wage premium and would spontaneously be willing to offer a permanent contract to all workers with $\alpha > \tilde{\alpha}$.

2.3 The Worker's Decision

On the worker's side, the Bellman equations for the expected value of a job offer, if accepted, is:

$$rE_k(\alpha) = w_k(\alpha) + s_k[U - E_k(\alpha)]$$

where $k \in \{t, s\}$ depending on whether the contract is temporary or permanent. The expected value of unemployment, instead, is:

$$rU = b + h_t(\alpha, \tau)[E_t(\alpha) - U] + h_p(\alpha, \tau)[E_p(\alpha) - U]$$

where due to equations 1 and 2, we can say that:

$$\frac{\partial h_t(\alpha,\tau)}{\partial \alpha} < 0 \text{ and } \frac{\partial h_p(\alpha,\tau)}{\partial \alpha} > 0$$

Given that $s_p > s_t$ and that market viability requires $E_k > U$, in the absence of a wage premium (i.e. if $w_t(\alpha) = w_p(\alpha)$) any worker prefers a permanent contract. Specifically, the worker would prefer the permanent contract as long as $E_p(\alpha) > E_t(\alpha)$, i.e. as long as:

$$w_p(\alpha) + s_p(\tau)[U - E_p(\alpha)] > w_t(\alpha) + s_t[U - E_t(\alpha)] \tag{5}$$

The value of the permanent contract wage that would make the worker indifferent between a permanent and a temporary contract is:

$$w_p(\alpha) = \frac{r + s_p(\tau)}{r + s_t}[w_t(\alpha) + s_p(\tau)U] - s_p(\tau)U \tag{6}$$

A reduction in the value of unemployment, therefore, caused by an increasing precariousness in the labour market with a lower share of valuable permanent contracts, will have a negative effect on the permanent contract's wage:

$$\frac{\partial w_p(\alpha)}{\partial U} = s_t \frac{r + s_p(\tau)}{r + s_t} - s_p(\tau) > 0$$

where the above condition and its positive value stems from the fact that $s_t > s_p$.

More precisely, by substituting the value for temporary and permanent contracts into the expression for the value of unemployment, the value of the permanent wage at which the worker is indifferent between a permanent and a temporary

contract can be calculated as:

$$w_p(\alpha)^w_{min} = \frac{r + s_p(\tau) + h_t(\alpha,\tau) + h_p(\alpha,\tau)}{r + s_t + h_t(\alpha,\tau) + h_p(\alpha,\tau)} w_t(\alpha) + \frac{s_t - s_p(\tau)}{r + s_t + h_t(\alpha,\tau) + h_p(\alpha,\tau)} b \tag{7}$$

The previous condition shows how the worker's attitude towards a temporary versus a permanent contract substantially depends on the relationship between the wages of the two contracts, mediated by the separation rates and the outside option b. If the separation rates were equal, then the two wages would naturally coincide, i.e. there would be no difference between temporary and permanent contracts. If instead the separation rates are indeed much lower for permanent contracts, $s_p < s_t$, then the worker would be willing to accept a lower wage for a permanent contract, which is just a fraction of the temporary-contract wage plus a fraction of the outside option that is recuperated by temporary workers in the more likely case of unemployment spells.

So the maximum value of the wage premium for a worker will be:

$$w_t(\alpha) - w_p(\alpha) = \frac{s_t - s_p(\tau)}{r + s_t + h_t(\alpha,\tau) + h_p(\alpha,\tau)} [w_t(\alpha) - b]$$

In other words, the maximum wage premium for the worker is a function of the difference between the temporary contract wage and the outside option, which is the value that would be lost in the case of unemployment following a likely separation from a temporary worker. And in fact, this difference is mediated by the difference between the separation rates, i.e. the additional likelihood that indeed the worker would face unemployment by accepting a temporary contract instead of a permanent one.

2.4 Equilibrium and Comparative Statics

The matching process thus is the following: if a worker of a given productivity α is matched with a firm, and the value of α is such that 2 holds, then the worker will be offered a temporary contract with wage $w_t(\alpha)_{offer}$. If however, there exists a value (or set of values) $w_p(\alpha)_{counter}$ low enough to break equation 2 but at the same time high enough such that $w_p(\alpha)_{counter} > w_p(\alpha)^w_{min}$, then the worker will counter-offer a permanent contract with a lower wage $w_p(\alpha)_{counter}$ and the employer will accept. In other words, the switch from temporary to permanent occurs if $w_p(\alpha)^f_{max} > w_p(\alpha)^w_{min}$. This mechanism, therefore, gives rise to the wage premium of temporary-contract wages with respect to permanent-contract wages.

Having derived the job creation and worker preference conditions, we can define the equilibrium in this model as the set of conditions where:

1. the matching function $m(u, v)$ is verified;

2. free entry drives the value of vacancies to zero, so that:

$$\frac{c}{q(\theta)} = \mathbb{E}(J_k(\alpha))$$

3. firms and workers maximize their value functions;

4. wages and contracts are bargained to the wage premia conditions identified;

5. the share of temporary contracts in each firm is at most τ.

How is this process affected by a change in the legislatively imposed maximum share τ of temporary contracts that a firm can offer? As described above, due to conditions 3 and 4, an increase in the firm's share of temporary contracts is reflected in three variables: 1) an increase in the job offer rate for temporary contracts; 2) a decrease in the job offer rate for permanent contracts; and 3) a decrease in the separation rate of permanent contracts s_t.

The effect of these three changes on 7 is ambiguous, as it depends on the relationship between h_p and h_t. However, we do know that it will be certainly positive if $\frac{\partial^2 h_t}{\partial \tau^2} < \frac{\partial^2 h_p}{\partial \tau^2}$, which is not an unreasonable assumption. For workers at the margin, the arrival of temporary contract offers is likely already high, as that is the firm's preferred contract. Thus it is reasonable to think that a larger share of temporary contracts reduces the likelihood of receiving a permanent contract offer by more than it raises the likelihood of receiving a temporary contract offer.

On top of this reasoning, in fact, we can focus on the effect of the rise in s_t, which can be summarized with a simple comparative static of the form:

$$\frac{\partial w_p(\alpha)}{\partial s_p} = \frac{w_t(\alpha) - b}{r + s_t + h_t(\alpha) + h_p(\alpha)} > 0 \tag{8}$$

where the sign of the previous is positive for all workers who consider the offer, i.e. for all those who are offered a wage higher than the outside option. Thus, as the separation rate of permanent contracts decreases further away from that of temporary contracts, the worker is willing to reduce even further the wage for a permanent contract relative to the temporary one, in exchange for the increased stability of a permanent job.

The combination of these considerations leads to a negative overall effect on permanent-contract wages of the rise in the share of temporary contracts τ. This creates – or exacerbates of already present – the wage premium, representing a key prediction of the model which can be tested in the data.

2.5 Model Predictions

From the implications of the simple model outlined above, we can make a few key inferences. We can predict that, if a legislative liberalization allows employers to increase the share of workers that they can hire through temporary contracts (i.e. an increase in τ, reflected in a decrease in s_p), then we will observe that:

- the number of permanent contracts decreases;
- the number of temporary contracts increases;
- the types of contracts that shift from permanent to temporary are mainly the ones located in the lower end of the productivity (and thus wage) distribution;
- the minimum level of wage for a permanent contract that a worker is willing to accept decreases;
- the individual wage premium, conditional on observables, widens.

The phrasing of the last two predictions is of particular importance. First of all it is important to note that, by symmetry, the concept of wage premium could arise also due to firms wishing to bargain more for temporary contracts and offering higher wages for temporary contracts in exchange. However, I consider this less important in the context of the present paper for two reasons: firstly, the legislative limit on temporary contracts likely squeezes firms very close to the threshold and, especially if the constraint is binding, does not allow firms to offer additional temporary contracts. In Italy, a legislative limit of this kind was introduced to limit the ratio of fixed-term contracts over permanent-contracts to 20% for each employer.[1] Istat data suggests that in January of 2018, the total number of fixed-term workers over the number of permanent workers was about 19.8%, while in January 2022 it hovers at 20.3%.

Secondly, a rise in the share of allowed temporary contracts, in an environment where workers prefer permanent contracts, gives more bargaining power to the employers and less to the workers. Thus a widening in the wage gap in the legislative case considered in this paper is much more likely to be due to workers

[1]There are some exceptions and specific sector-wise implementation differences, which make in practice this limit not exactly 20% for all firms, but at the aggregate level very close to it. Additionally, there are some kinds of non-permanent contracts that do not fall under this limit, for instance seasonal work.

giving up some of their surplus in exchange for a permanent contract than to workers giving up their share of surplus to offer a high-wage temporary contract. While I don't exclude this latter option as a possibility, and test for it in the estimation section, I consider it secondary and focus on the effect on the wage of permanent contracts.

Additionally, the phrasing of the last two predictions is carefully tailored around individual effects. Thus far, the model has focused on the effects of a given worker of productivity α. When shifting the focus from the dynamics of a single contract's bargaining process towards an analysis at the aggregate level, as the estimation will do, interesting additional effects emerge. In particular, the third prediction suggests that jobs at the low end of the permanent-contract wage distribution are the main ones to make the switch from permanent to temporary contracts for new hires. This results in a selection effect that puts upward pressure on the average wage of new permanent contracts.

Therefore, following a rise in the share of temporary contracts, the overall effect on the average wage of permanent contracts is ex-ante ambiguous. It could be driven by one of two opposing effects:

1. a **selection effect**, which suggests that only the most productive workers are offered a permanent contract, thus increasing the average permanent-contract wage;

2. a **dumping effect**, which suggests that workers are willing to lower their wage in order to secure a permanent contract, thus reducing the average permanent-contract wage.

In the following estimation section, I take to the data to determine which of these two effects has prevailed in the Italian empirical experience.

3 Empirical Assessment: Internships vs. Apprenticeships

In this section I test the predictions of Section 2 on the Italian context, where the two main learning-working opportunities for young individuals entering the labour market are internships and apprenticeships. First I present some background on the Italian institutional setup, then I show the effect of the 2017 reform that liberalized internships, both on the average earnings from internships and from apprenticeships, as well as on the distribution of apprenticeship earnings, and present a counterfactual analysis to disentangle the main effects at play.

3.1 The Institutional Setup

In Italy, the standard labour contract is the open-ended contract (*contratto a tempo indeterminato*). There are then fixed-term contracts (*a tempo determinato*), seasonal contracts and on-call contracts to name a few temporary alternatives. However, there exist two specific contracts for young individuals designed to facilitate the matching between a young worker and an employer, including a component of training in the contract to reduce the skill mismatch.

The main one of these is the apprenticeship contract. Formally, apprenticeships are open-ended contracts characterized by an initial dual training-working period that can last anytime from six months to three years – up to five years for specific artisan crafts. At the end of the training period, if the worker has not successfully acquired the desired skill, the employer has the option to rescind the contract without any penalty. The apprenticeship is a long-standing tradition of the Italian labour market, which has therefore been revisited several times to better align it with the developments in the world of work. Currently, the apprenticeship is regulated by the Legislative Decree n. 81 of 2015, which deeply

revised the Italian labour legislation and includes a comprehensive set of baseline requirements. It is then up to collective bargaining agreements to further and more specifically discipline apprenticeships, so that each sector and job has tailor-made apprenticeship features – including duration, amount of external vs. internal training, tasks, etc.

In addition, Legislative Decree 81/2015 includes substantial incentives – both in terms of salary and social security contributions – for employers who use apprenticeships, intended to increase the reliance on this kind of open-ended contract. Since 2015, therefore, the number of apprenticeships has been increasing in Italy.

At the same time, another instrument that has seen a dramatic increase is the extracurricular internship (in Italian *tirocinio extracurriculare*, sometimes also referred to as *stage*). [2] Designed to help young individuals get closer to the labour market and make useful experiences by learning a profession, the internship does not qualify as a work contract. It is instead a training contract where firm and worker commit to a learning on the job setup. This makes it much faster to activate and easy to manage, as it is free from all the requirements that are typical of a job contract – including collective bargaining and severance payments. Thus employers can easily terminate the internship or, given its short duration, simply not hire the worker at the end of the internship. This flexibility and the low labour costs associated with it make the internship a very attractive tool for employers. In many firms, therefore, entry-level positions have been increasingly filled by internships.

Since formally it is configured as a training opportunity rather than a job, the internship in Italy is constitutionally a matter of Regional regulation. The national Government and the 21 Regions and autonomous Provinces lay out periodically

[2]Internships are formally divided into two kinds: curricular, if it takes place as part of the curriculum for a formal educational qualification; and extracurricular, or post-graduate, otherwise. In this paper, I only focus on the extracurricular kind, as it is the most common one and more frequently used as a *de facto* entry-level job contract.

common guidelines that form the basis for internship regulation, which then have to be implemented by regional law in each Region or autonomous Province [3]. With a set of guidelines issued in 2013, Regions had agreed on several baseline features of the internship, including the limit to use the extracurricular internship mainly for those who had just graduated or for disadvantaged groups.

In 2017, a new set of guidelines was agreed to by the Regions and the Government. These new guidelines mainly liberalized the use of the internship, most notably removing the limit restricting its use mainly for recent-graduates. Specifically, the 2017 guidelines stated that beneficiaries of internships could be, among other categories, all workers who were unemployed or even "at risk of unemployment". Since no further clarification was provided concerning what exactly qualifies as risk of unemployment, the effect was that anyone could effectively be offered an internship. This novelty increased considerably the share of potential workers – particularly young ones – whom a firm could "hire" through an internship. Additionally, *Garanzia Giovani*, the Italian Youth Guarantee scheme, i.e. a set of EU funding aimed at reducing youth unemployment and inactivity rates, greatly contributed to the rise of internship use; in fact, Regions would pay some of the remuneration of the internship alongside the firm, thus reducing further the effective cost of internships for employers.

The new guidelines, however, in order to become effective needed to be implemented by each Region through a regional law or regional government decree. This happened in a staggered fashion, thus creating the perfect setup for a quasi-experimental approach. 10 Regions implemented the new guidelines already in 2017, just a few months after the agreement: these are Piemonte, Val d'Aosta, Liguria, Trentino, Veneto, Marche, Lazio, Basilicata, Calabria, Sicilia. 5 Regions

[3]Italy is formally divided into 20 Regions, however the region Trentino-Alto Adige has a special status whereby it is divided into two autonomous Provinces. Thus in matters of governmental coordination, rather than 20 Regions there are 19 Regions and 2 autonomous Provinces. For the sake of brevity, henceforth I shall refer to them as simply "the Regions"

implemented the new guidelines throughout 2018: Lombardia, Friuli Venezia Giulia, Toscana, Abruzzo, Campania. 5 Regions implemented the new guidelines in 2019 or did not implement them at all (it is the case of Puglia, who decided to keep its legislation tied to the 2013 guidelines).

3.2 Data and Estimation

The staggered approach with which the Regions implemented the 2017 guidelines on internships allows to define two groups: a set of Regions that were treated in 2017, i.e. Regions in which in 2018 internships were available for any worker regardless of their academic background and timing; and a set of Regions in which in 2018 the reference legislation was still reflective of the 2013 guidelines and thus had stricter application rules. In the main specification, I consider the regions that implemented the new guidelines in 2018 as not treated, since throughout 2018 most of their legislation was still based on the 2013 guidelines, the new legislation came into effect towards the end of the year and only affected new activations, so that most sampled internships had been activated under the previous legislation. However, in Section 4 I check the robustness of the estimation under this assumption by excluding the Regions that implemented the guidelines in 2018, only leaving as control group the Regions that implemented them in 2019 or did not implement them at all.

This legislative set up yields a treated set of Regions and a control group made up of untreated Regions. This makes it a perfect setting to test for a pre/post reform treatment effect. A good dataset for this purpose is constructed by the *Istituto Nazionale di Analisi delle Politiche Pubbliche* (INAPP) and it is called the "Participation, Labour, Unemployment Survey" (PLUS for short). It is a recurring interview-based survey that focuses on labour-market outcomes for workers, and it includes key information for my intended analysis – such as age, earnings, type of

contract, education level, region of residence, etc. What is particularly convenient of this dataset is that its two most recent waves were carried out precisely in 2016 and 2018, thus one year before and after the new guidelines on extracurricular internships.

Using these surveys, therefore, I can construct a dataset that only focuses on respondents doing an internship and respondents doing an apprenticeship (as well as those with an open-ended contract for the robustness checks in Section 4) in 2016 and 2018. The resulting dataset is made up of 1130 observations; it represents only a small fraction of the young individuals actually involved in apprenticeships and internships in those two years, yet it is useful to provide some key insights. Additionally, INAPP goes to great lengths to ensure the representativeness of its sample, and more information about the sampling procedure can be found on their website. Of course a larger sample, or better yet the use of administrative data, would greatly improve the reliability of the estimation – however, the training nature of internships (which are not subject to social security contributions) makes it difficult to gather the necessary data in one database and would require multiple sources of data to be accessed. This is a daunting task given current Italian privacy laws, and I leave it to future research to improve the level of detail about internship data. To my knowledge, the PLUS survey is the only reliable micro-level source of income data for internships in Italy.

A final necessary clarification is that the setting explored in this section is not a closed system: internships and apprenticeships are not the only two types of contract that can be offered to young individuals entering the labour market and thus do not cover the entirety of young workers, so flows from one contract do not necessarily go to the other. There are other contracts available: nothing prevents an employer from hiring a young worker, say, directly through a regular open-ended contract or through a seasonal contract. However, these are the only two contracts that explicitly include training and that are specifically geared at

young individuals, and for this reason also significantly lower the cost of labour for employers compared to other contracts. Thus they are much closer substitutes to each other than to other contracts.

Given the national incentives on apprenticeships and the Garanzia Giovani funding on internships, both these contracts have grown in numbers in the 2016-2018 time frame (data from the Italian Ministry of Labour and Social Policies and ANPAL, the national Agency for active labour market policies). However, there are important differences across regions. Between 2016 and 2018, Regions that adopted the new internship guidelines in 2017 had an average growth rate of internships that is 65% greater than the late-adopters; the late adopters, on the other hand, in the same time period had an average apprenticeship growth rate 48% larger than 2017-adopters. There is therefore reason to believe that, while both contracts grew in the 2016-2018 time frame, the liberalization of internships caused a shift of a considerable share of new contracts from the apprenticeship towards the internship.

Thus the first prediction of the model, which is that temporary contracts should grow at the expense of permanent ones, finds substantiation. The next question, at the heart of the paper, concerns the effect on the wages of apprenticeships.

3.3 Effect on Apprenticeships

With the necessary clarifications of the previous paragraphs, I proceed to test the effect of the 2017 internship reform, which through the new guidelines liberalized the use of extracurricular internships. First and foremost, I explore the effect on the wages of apprenticeships. As shown in the model, the two effects at play are a selection effect and a dumping effect: the former should bring up the average wage for apprenticeships, the latter should bring it down.

To estimate which effect is prevalent, I first focus on the subset of the PLUS

data of only those working through an apprenticeship and I run a difference-in-differences estimation of the form:

$$W_{i,r,t} = \delta_t + \beta(\mathbb{1}_{treat}[r] \times \delta_t) + \phi_r + \epsilon_{i,r,t}$$

where $W_{i,r,t}$ is the earnings of individual i in region r in year t, $\mathbb{1}_{treat}[r]$ is a dummy variable taking a value of 1 if the region is in the treated group and 0 otherwise, and δ_t is an indicator taking value of 0 for 2016 observations and 1 for 2018 observations. In some estimations I also control for regional fixed effects, in which case I will include ϕ_r as a set of regional fixed-effects and not include a constant term. The coefficient of interest is β, which identifies the effect on the year-treatment interaction variable, thus estimating the average change in earnings in 2018 for regions where the internship reform was implemented.

Table 1 shows the results of this estimation. As is apparent from the results, from 2016 to 2018 there is an increase in the earnings of all apprenticeships of around 4500 euros per year, however this change is not distributed evenly across Regions: in Regions where the internship reform was implemented early (i.e. 2017-adopters), the average earnings are lower by about 2500 euros than the other Regions (the late-adopters). Column I of the table is conducted without Region fixed-effects and thus contains a "treated" variable, i.e. the variable γ_r in the equation above. Column II instead includes Region-specific fixed-effects and thus I drop γ_r from the estimation. In both columns, however, the effect has the same negative direction and a similar magnitude, in both cases above 2000 euros.

This gives reason to believe that indeed there might be a dumping mechanism at play, where, faced with a more likely prospect of a precarious contract such an internship, workers are willing to accept a permanent contract albeit at a lower wage. A selection effect might or might not be present, either way the dumping effect is prevalent. In the coming sections I will also attempt to disentangle these

Table 1: Effect on apprenticeship earnings

	Apprenticeship earnings I	Apprenticeship earnings II
Treated	1,572.24**	
	(770.68)	
Year2018	4,494.32***	4,532.18***
	(744.27)	(750.47)
Treated*Year2018	-2,318.87**	-2,506.06**
	(1,153.61)	(1175.38)
Intercept	14,837.07***	
	(507.87)	
Region-FE	No	Yes
R-squared	0.0528	0.0767
R-squared Adj.	0.0491	0.0523
F-statistic	14.365	3.142
N. of Observations	777	777

Difference-in-differences estimation of the impact of internship reform on the earnings of apprenticeships. Treatment is defined as belonging to the set of regions that implemented the reform, taking a value of 1 if the reform was implemented in 2017, and 0 otherwise. Column I does not control for regional fixed effects, while column II does. The data is taken from INAPP's PLUS survey, waves 2016 and 2018. Standard errors are in parentheses. Stars indicate p-values according to: * p¡0.1, ** p¡0.05, ***p¡0.01

two effects for a more precise picture.

3.4 Effect on Internships

Next, although not the main purpose of this paper, it is reasonable to question whether the wage premium might arise also from a symmetrical reasoning on the temporary-contract side – i.e. if some firms might "compensate" workers by offering a higher wage in exchange for the flexibility of a temporary arrangement. To verify this, I run a similar procedure as the one described above, however with only respondents who reported being employed through an internship. The results are listed in Table 2.

As the table shows, the general rise in earnings between 2016 and 2018 is about the same for internships as it was for apprenticeships, however in this case the effect of the reform is much less clear. Although there seems to be a rise in internship earnings for young workers in Regions that implemented the reform in 2017, the effect is not significant and therefore the hypothesis of a wage premium driven by the rise in precarious contracts' wages does not find sufficient substantiation. A possible reason for this is that the internship reform mostly benefits firms by relaxing a constraint on their preferences, employers gain bargaining power, therefore there is not as much need for them to offer some of their surplus share in exchange for their preferred contract. A small selection effect, which should also put upward pressure on internship wages, might be at play, however again the lack of significance of the coefficient does not provide much clarity on this. Part of the reason for it might be the smaller sample of internship respondents in the PLUS survey compared to the apprenticeship, so perhaps the use of administrative data will be able to identify a more precise effect.

Table 2: Effect on internship earnings

	Internship earnings I	Internship earnings II
Treated	200.30	
	(974.28)	
Year2018	4,707.96***	4,717.77***
	(1,304.79)	(1,316.84)
Treated*Year2018	850.62	1,158.92
	(1,796.20)	(1,860.87)
Intercept	6,602.17***	
	(731.75)	
Region-FE	No	Yes
R-squared	0.1096	0.1469
R-squared Adj.	0.0998	0.0940
F-statistic	11.125	2.776
N. of Observations	275	275

Difference-in-differences estimation of the impact of internship reform on the earnings of internships. Treatment is defined as belonging to the set of regions that implemented the reform, taking a value of 1 if the reform was implemented in 2017, and 0 otherwise. Column I does not control for regional fixed effects, while column II does. The data is taken from INAPP's PLUS survey, waves 2016 and 2018. Standard errors are in parentheses. Stars indicate p-values according to: * p¡0.1, ** p¡0.05, ***p¡0.01

3.5 Triple difference

Next, I focus more specifically on the rise in average earnings from 2016 to 2018. Such a high rise in wages might seem suspicious at first. Certainly those were years in which the economy was growing and inflation was rising, all coupled with a series of renewals of collective contracts, which often include wage rises for workers – including apprentices. However, it is worth questioning whether some other apprenticeship-specific mechanism might be driving the rise in average earnings from 2016 to 2018 and therefore bias the estimation.

To do this, I take advantage of PLUS's variety of respondents and detail of information. Thus far I have only used in the regressions respondents involved in internships and apprenticeships, who represent a small fraction of the sample. To test for an overall economy-wide change in earnings, I include in the estimation also workers hired through regular open-ended contracts, i.e. without the training component of the apprenticeship. This could raise the issue of substantial worker difference: internships and apprenticeships concern young workers, while open-ended contracts include all age groups, who might experience very different earnings trends. Therefore, I restrict the sample to young workers in open-ended contracts, below the age of 30.

Therefore, focusing on the subsample of open-ended contracts aged 16-30 and on apprenticeships, I can run a triple-difference estimation. I control not only for the year and the residence in a treated Region, but also for the type of contract used and the related interactions. The resulting estimation is the following:

$$\begin{aligned} W_{i,r,t} =& \delta_t + \phi_r + \kappa_s + \beta_1(\mathbb{1}_{treat}[r] \times \delta_t) + \beta_2(\kappa_s \times \delta_t) + \beta_3(\mathbb{1}_{treat}[r] \times \kappa_s) \\ &+ \beta_4(\mathbb{1}_{treat}[r] \times \delta_t \times \kappa_s) + \epsilon_{i,r,t} \end{aligned}$$

where κ_s represents a dummy for the type of contract employed, which takes

a value of 1 if the contract is an apprenticeship and a value of 0 if it is a simple open-ended contract. The coefficient of the triple interaction β_4 is the focus of the estimation now as it captures the effect of the reform on apprenticeships in treated Regions.

Table 3 shows the coefficients resulting from the estimation. As before, column I does not contain Region fixed-effects and therefore includes a dummy variable for the treatment or control group; column II instead uses Region fixed-effects, thus the treatment variable is omitted due to collinearity with the time-unvarying fixed-effects.

The Table shows a few interesting results. First of all, the average earnings increase from 2016 to 2018 for all contracts, including open-ended contracts. Thus there is nothing unique to apprenticeships driving the coefficient on "year2018", which has about the same magnitude as in the previous estimations. There is also no significant difference in the way that earnings change for apprenticeships versus open-ended contracts, as the coefficient on the interaction term "apprenticeship*year2018" is not significant. There is a slightly larger rise in earnings, for all contracts, in treated Regions (2017-adopters) rather than untreated ones. Additionally, as it would be expected, apprenticeships pay a bit less on average than regular open-ended contracts; and this effect is not particularly different across treated and untreated Regions.

Most importantly, the coefficient on the triple interaction term, describing the effect of treatment on the earnings of apprenticeships only in the treated Regions, is negative and significant at the 5% level. Additionally, it is very similar to the previous estimations which only included apprentices in the sample. Therefore, this triple difference exercise, allowing to compare the effect of the reform on apprenticeships against the larger backdrop of all open-ended contracts, confirms that there is a rather large overall earnings rise between 2016 and 2018. It is true for all contracts, but the impact of the internship reform affects apprenticeship

Table 3: Triple Difference Estimation

	Earnings I	Earnings II
Treated	-749.29	
	(548.04)	
Year2018	4,698.86***	4,548.92***
	(513.39)	(509.72)
Apprenticeship	-2,768.19***	-2,863.31***
	(772.26)	(768.32)
Treated*Year2018	1,692.31**	1,885.72**
	(809.07)	(805.61)
Treated*Apprenticeship	1,909.24*	1,762.70
	(1,152.01)	(1,145.16)
Apprenticeship*Year2018	-168.15	147.27
	(1,132.85)	(1,126.758)
Treated*Apprenticeship*Year2018	-3,988.457**	-4,290.36**
	(1,732.25)	(1,720.61)
Intercept	17,964.78***	
	(351.97)	
Region-FE	No	Yes
R-squared	0.0838	0.1088
R-squared Adj.	0.0815	0.1012
F-statistic	36.716	14.215
N. of Observations	2819	2819

Triple difference estimation of the impact of internship reform on the earnings of apprenticeships. The dependent variable is the earnings of all workers included in the estimation, who are respondents with apprenticeships and open-ended contracts (*tempo indeterminato*) aged 16-30. Treatment is defined as belonging to the set of regions that implemented the reform, taking a value of 1 if the reform was implemented in 2017, and 0 otherwise. Column I does not control for regional fixed effects, while column II does. The data is taken from INAPP's PLUS survey, waves 2016 and 2018. Standard errors are in parentheses. Stars indicate p-values according to: * p¡0.1, ** p¡0.05, ***p¡0.01

earnings negatively even more strongly than the baseline estimation suggester.

3.6 Disentangling Selection and Dumping Effects

So far the estimation has identified a significantly negative overall effect: the reform that extends the use of internships reduces the wages of apprenticeships. What we can deduce from this, however, is simply that the dumping effect is larger than the selection effect, which instead would push the apprenticeship wage upwards. The magnitudes of these two effects are so far unknown, so I now attempt to disentangle the two and estimate their approximate magnitudes.

First of all it is worth questioning whether the selection effect is at all present. Figure 1 displays the frequency histograms showing the distribution of earnings for respondents in apprenticeships in 2016 and again in 2018, in the Regions that have adopted the new internship guidelines in 2017. As the comparison between the two pictures suggests, in the change from 2016 to 2018 the distribution has become less skewed and more symmetrically centered around the median. The contracts located at the lower end of the 2016 distribution seem to have indeed been the main ones to be removed in the shift to 2018. This gives reason to believe that indeed a selection effect might be at play.

With this premise, substantiating the presence of a selection effect, I can design a counterfactual scenario in which only the selection effect were present. I simulate the distribution of earnings under a normal probability density function, with moments reflecting the actual 2016 distribution: a mean of 16474.91 euros and a standard deviation of 7467.40 euros.

Then, as mentioned at the beginning of this section, I focus on the differential growth in apprenticeship numbers among Regions that adopted the internship reform in 2017 and the late adopter Regions. If the 2017-adopters had witnessed the same growth rate of apprenticeships as late-adopters, they would have seen a

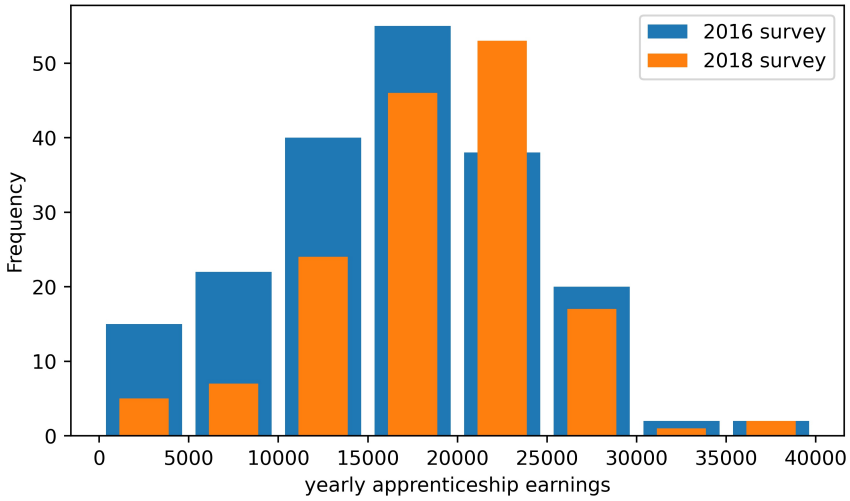

Figure 1: Distribution of yearly earnings in treated Regions for individuals working under an apprenticeship contract in 2016 and 2018. 2016 observations are represented in the blue wider columns, while 2018 observations are represented in the orange narrower columns. Data: INAPP's PLUS survey.

further rise in apprenticeships of about 5.8% the 2016 value. Thus, for the sake of the counterfactual, I assume that 5.8% is the share of apprenticeships that were "lost" to internships due to the reform.

As the selection effect suggests and the previous figures confirm, I assume that the apprenticeships lost are indeed those located in the left tail of the distribution. Thus, from the probability density function constructed, I remove the bottom 5.8% and, focusing only on the remaining apprenticeship contracts, I calculate the resulting mean earnings. This would be the counterfactual value of the average apprenticeship earnings if only selection effects were present.

Figure 2 shows this exercise graphically. The blue solid line shows the probability density function and the blue vertical dashed line shows the actual 2016 mean earnings of 16474.91 euros. The orange shaded area, instead, represents the bottom 5.8% of the distribution that is lost to internships and, focusing only on the area under the curve to the right of the shaded area, I calculate a counterfactual average earnings of 17574.95 euros, represented as the orange dotted vertical line.

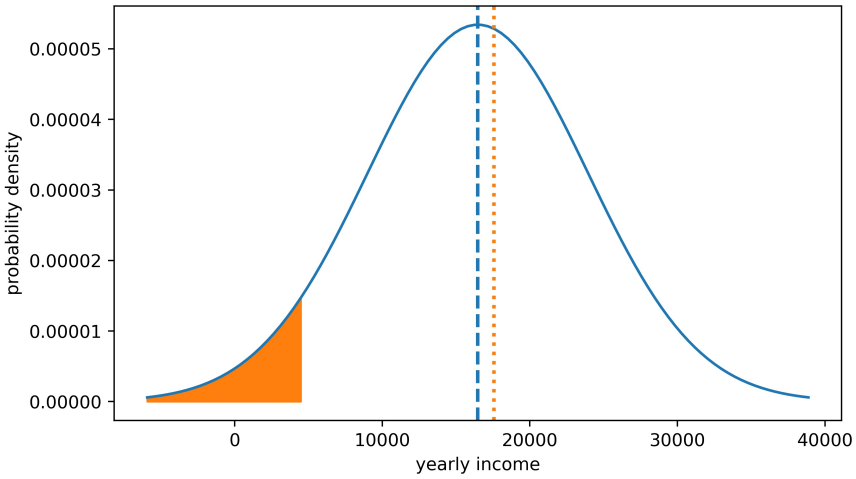

Figure 2: Probability density function showing the impact of the selection effect. The blue density function shows the normal distribution of earnings using the mean and standard deviation of the 2016 earnings distribution for apprenticeships. The blue dashed vertical line shows the actual mean earnings. The orange colored area shows the contracts that are lost if the bottom 5.8% of contracts are removed. The orange dotted vertical line shows the resulting mean of the remaining contracts after the orange area is removed.

Thus, I can calculate that the selection effect has a magnitude of 1100.04, i.e. if no dumping were present then as a result of the reform the average apprenticeship wage should increase by approximately 1100 euros.

From this, I can indirectly calculate the magnitude of the dumping effect. A quick way to do it would be to rely on the estimation result, which suggests a total effect of -2506 euros. Thus the dumping effect would be the estimated treatment effect plus the 1100 euros of the selection effect: $-2506 - 1100 = -3506$ euros. This exercise suggests that the dumping effect has a magnitude about three times larger than the selection effect, and that therefore the prevailing force should indeed be the dumping one, as is the case from the estimations.

However, I also can use the calculated magnitude of the selection effect and the average earnings growth to calculate the magnitude of the dumping effect without using the estimated total effect. This way I can use the exercise as a test for the validity of the estimation results. First of all I need to add to the selection effect

the rise in overall earnings between 2016 and 2018, which is 4532.18 euros. This gives a counterfactual average earnings of 22107.13 euros. Then, from this value I subtract the actual observed average earnings in the 2018 survey, which is of 18575.01 euros, and get a resulting dumping effect of magnitude of -3532.12 euros.

Now I can compare this result with the actual total effect estimated previously. By summing up the two effects calculated using the counterfactual (-3532.12 for the dumping effect and 1100.04 for the selection effect), I get a total effect of -2432.08, which is very close to the coefficient -2506.06 estimated in Table 1. This gives some reassurance to the soundness of these exercises, suggesting that the magnitudes of these effects are in the correct ballpark. Thus, following the Italian reform that expanded the use of internships, the dumping effect on apprenticeship earnings has been about three times larger than the selection effect, making the overall result a reduction in the average earnings for apprenticeships.

4 Robustness Checks

In this section, I test the robustness of the results obtained in the previous section, first by reducing the number of Regions in the control group, then by including regular open-ended contracts in the analysis to conduct a triple-difference estimation, and finally by using an alternative specification where the year trend is removed and only dumping and selection changes are at play.

4.1 Excluding Regions treated in 2018

As mentioned in the institutional setup, the implementation of the 2017 guidelines on internships by the various Regions of Italy took a staggered approach. The treated group for the estimation consists of the Regions that implemented the reform in 2017, while the control group consists of the Regions that implemented the reform in 2018 or in 2019, or did not implement it at all. The reason for the

inclusion of 2018 in the control group is that 2018 legislation occurred throughout the year, mostly late in the year, often with a provision to enter into effect at a later date to give workers and firms a chance to adapt to the new regulations. Therefore, most sampled respondents would have been hired under the previous guidelines.

However, a reasonable objection might be raised against the validity of this approach: as long as there is the possibility that some workers in 2018-adopter Regions might have been sampled following the new guidelines, then the estimation might be flawed and suffer from this dampening bias.

As a result, I run the estimation again excluding the workers in the Regions that implemented the new legislation in 2018 from the sample. This way, the control group is made up of only 5 Regions, while the treated group remains made up of the same 10 Regions. The estimation procedure is the same of the previous section, and the results are listed in Table 4.

As the table shows, there is still a negative overall effect of the interaction variable, if anything more strongly negative than in the main specification. However, the overall average earnings change from 2016 to 2018 is also larger in magnitude, so probably the reason for this larger effect is simply a concentration in the remaining control Regions of a more substantial earnings increase. The excluded Regions, who implemented the legislation in 2018, had likely a dampening effect on the overall control group.

Taken at face value, therefore, these results seem to suggest indeed that the presence of the 2018-adopter Regions in the main estimation adds noise to the data, as it reduces the impact of the reform on apprenticeship earnings. Perhaps there are indeed some sampled workers in these regions for whom the effects of the reform were already in place. However, the overall effect is not dramatically different and in any case it confirms the finding of a negative impact of the reform on apprenticeship earnings.

Table 4: Excluding 2018-adopter Regions

	Apprenticeship earnings I	Apprenticeship earnings II
Treated	2,138.82**	
	(978.45)	
Year2018	5,066.83***	5,164.90***
	(1,181.05)	(1,214.35)
Treated*Year2018	-2,891.38**	-3,138.78**
	(1,428.08)	(1,470.84)
Intercept	14,270.49***	
	(823.76)	
Region-FE	No	Yes
R-squared	0.0534	0.0673
R-squared Adj.	0.0473	0.0368
F-statistic	8.831	2.204
N. of Observations	474	474

Difference-in-differences estimation of the impact of internship reform on the earnings of apprenticeships. Treatment is defined as belonging to the set of regions that implemented the reform, taking a value of 1 if the reform was implemented in 2017, and 0 otherwise. Differently from the main estimation, this estimation excludes regions that implemented the reform in 2018 from the regression. Column I does not control for regional fixed effects, while column II does. The data is taken from INAPP's PLUS survey, waves 2016 and 2018. Standard errors are in parentheses. Stars indicate p-values according to: * p¡0.1, ** p¡0.05, ***p¡0.01

4.2 Detrended Estimation

Finally, as a further test of the estimation and in particular trying to do away with the confounding trend of rising earnings, I perform an alternative estimation using a simpler specification. To do this, I take out the earnings growth trend using the data on open-ended contracts from the PLUS survey, subtracting the yearly effect from 2018 earnings. Then, I run the regression as in the main estimation, including the "year2018" variable just to make sure that the effect has been correctly removed.

The results of this exercise are shown in Table 5. As the Table shows, the yearly trend is insignificant and therefore has been removed correctly. The coefficient on treated Regions shows slightly higher earnings for apprentices in those Regions. Finally the interaction coefficient, the main one of interest, is similar to the main specifications in the estimation section.

This confirms the robustness of the empirical findings of this paper, and thus suggests that the 2017 reform that expanded the use of internships in Italy indeed did have a significantly negative effect on the wages of the more stable entry-level contract – apprenticeships.

5 Conclusion and Future Research

In the aftermath of the Covid-19 pandemic, the topic of youth employment and contract quality has gained relevance once again, as lockdowns hurt younger workers more heavily and companies face uncertainty in their economic prospects during the recovery, increasing their reliance on temporary contracts. In this paper, I have examined the effect on young individuals' wages and contract quality as firms and workers have different preferences for contracts.

I have developed a simple model of an economy with temporary and permanent contracts, where heterogeneous workers and identical firms bargain on contract

Table 5: Detrended Estimation

	Detrended earnings I	Detrended earnings II
Treated	1,572.24**	
	(689.60)	
Year2018	33.23	62.38
	(665.98)	(670.83)
Treated*Year2018	-2,146.57**	-2,303.28**
	(1,032.25)	(1,050.64)
Intercept	14,837.07***	
	(454.44)	
Region-FE	No	Yes
R-squared	0.0112	0.0382
R-squared Adj.	0.0074	0.0127
F-statistic	2.918	1.500
N. of Observations	777	777

Estimation of the impact of internship reform on the earnings of apprenticeships, using an alternative specification that focuses on relative wage growth. The dependent variable is constructed as the apprenticeship earnings detrended by taking out the yearly trend of open-ended contracts wage growth. Treatment is defined as belonging to the set of regions that implemented the reform, taking a value of 1 if the reform was implemented in 2017, and 0 otherwise. The set of workers considered is only those respondents with apprenticeships, data on open-ended contracts is used only to determine average wage growth before detrending. Column I does not control for regional fixed effects, while column II does. The data is taken from INAPP's PLUS survey, waves 2016 and 2018. Standard errors are in parentheses. Stars indicate p-values according to: * p¡0.1, ** p¡0.05, ***p¡0.01

type and wages in a search and matching environment. As the legislative constraint on the share of temporary contracts is relaxed, the model predicts two competing effects on the wages of permanent contracts: on the one hand, through a selection effect, firms move workers on the lower-end of the permanent-contract distribution towards newly available temporary contracts, thus mechanically increasing the average wage of the remaining permanent contracts; on the other hand, workers will be willing to lower the wage in exchange for a permanent contract, leading to a dumping effect which should lower the average wage of permanent contracts.

I test these predictions using Italian survey data before and after a 2017 reform that liberalized the use of internships, increasing the number of internships that firms can offer to potential new hires. Taking advantage of a staggered implementation schedule by Italian Regions, I am able to estimate an overall effect of the reform on apprenticeship earnings, which is significantly negative in treated Regions compared to untreated ones, suggesting that the dumping effect is prevalent. Using a counterfactual scenario, I estimate that the selection effect has a magnitude of about 1100 euros of yearly earnings, while the dumping effect is about three times larger and of the opposite sign. Thus, the dumping effect is prevalent in the overall impact on average wages.

Despite the simple model and the limitations in the data's size, this paper sheds some light on topical dynamics of labour market entry, for a demographic that is most severely impacted by precariousness. The discussion of whether and how to limit temporary contracts is ongoing in many European countries. Spain, for instance, just passed legislation drastically reducing the possible instances of temporary contract offer, and a few countries are considering tightening their legislation as well. In Italy, many parties leading up to the 2022 election cite labour market precariousness as a top concern of the campaign. Italy additionally has numerous legislative precedents of changes to temporary contract restrictions: from the liberalizations of the so-called "Legge Biagi" in the early 2000s to the

so-called "Decreto Dignità" in the last few years.

In all these instances, ideally using administrative data, a similar analysis to the one conducted in this paper can be performed to estimate the effect of these legislative changes. At the same time, the model can be improved and expanded to make more and better predictions on numerous additional variables, including the wages of temporary workers, the effect on on-the-job search, etc.

The focus of research exploring the impact of precariousness on labour market entry can also be extended to other avenues of research, including long-term effects of early-career insecurity. The literature has analyzed the effects of job instability mainly with respect to its repercussions on productivity, on worker searching behavior, and on other short-term variables. Little attention has been paid to the long-term effect of entering in the labor-market with more precarious contracts, not only on labour market outcomes but also on social aspects such as fertility rates and home independence from parents.

Part of the reason for this absence is the lack of accurate long-term longitudinal data that keeps track of different types of contracts, and in particular of data that concerns internships, which makes it hard to follow individuals as they enter precariously into the labor market. Through an effort to collect and make more readily available for research more and better labour market data, the research of this paper could be extended to hopefully provide some new and useful insights for both researchers and policymakers about the longer-term effects of early career instability.

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Appendices

A Skills and sectors differences

In many countries, the kinds of jobs that are offered in apprenticeships or internships is not quite overlapping: the former is used more in manufacturing or in manual jobs, usually for lower-skilled workers; the latter is used more in the services sector, for higher-skilled workers.

In Italy, however, the situation is less different in the 2010s a large set of new legislation and government incentives was passed with the aim to extend the use of the apprenticeship beyond the more traditional sectors and to all qualification levels. Even for PhDs and other tertiary degrees a special apprenticeship was designed, called third-degree apprenticeship. Following these changes, all collective contracts were urged to include a specific discipline on apprenticeships and as a result most if not all sectors' contracts in Italy include a specific set of rules and incentives for hiring apprentices.

Table A1 shows the difference in the distribution of workers between the internship and the apprenticeship in Italy. The data for sectors is taken from administrative sources, from the Ministry of Labour and the ANPAL agency for active labour market policies. Their monitoring reports include detailed analyses of young individuals in apprenticeships and internships and are released periodically. As they are released separately, however, the aggregation of sectors is not consistent across reports. While all sectors are divided using the Italian classification of Ateco codes, the reports present an aggregation of different Ateco codes, which however are not consistent across reports. For a consistent comparison of the two, therefore, I have to aggregate the data into broader sector categories.

For the education levels of workers in these contracts, instead, the internship report is quite detailed, while no education-level data is published in the apprenticeship report. As a result, in the Table I use the data from INAPP's PLUS survey, using the same samples used in the estimation. The data indicates the highest level of education attained. All values in the Table are expressed in percentage points. Since some observations did not report their education level, totals might not add up to 100 exactly.

Overall, the table shows that the education levels of workers and sectors of employment are mostly comparable across internships and apprenticeships. While they are not exactly the same, they are similar enough to suggest that there might indeed be some degree of substitutability between the two instruments, allowing for the dumping effect highlighted in the estimation section.

Table A1: Education levels and sectors of workers

	Apprenticeship	Internship
Sectors		
Agriculture	NA	1.3
Manufacturing	20.3	18.6
Construction	7.1	3.8
Commerce, service and professionals	61.4	57.8
Other services/Not classified	11.2	18.5
Education levels		
Lower secondary	4.9	1.7
Upper secondary	48.7	42.4
Tertiary	45.1	54.6

Difference is skill levels and sectors between young individuals in apprenticeships and in internships. Data for the skill levels is taken from the INAPP PLUS' sample used in the estimation of this paper. Data for the sectors is taken from ANPAL and Italy's Ministry of Labour monitoring reports of internships and apprenticeships. All values are expressed in percentage points.