AN ANALYSIS OF LABOUR COST POLICIES THROUGH STATISTICAL REGISTERS[1]

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Abstract. The RACLI Register, now being included in the Labour Register, with information on employment, hours, wages and social contributions at job level for the subpopulation of jobs in the private non-agricultural sectors' enterprises is a useful tool for the monitoring and evaluation of the labour market policies. This micro level employer employee longitudinal database allows deep analyses in particular for the evaluation of contributions reduction' measures thanks to the recent estimation of social contributions (total and distinguished by employer and employee social contributions) and the track of all related cost items at job level. These analyses are reliable thanks to a metadata driven process based on an integrated dynamic metadata system designed and implemented to achieve the dual purpose of interfacing with the administrative sources and their continuous changing over time and with the system of statistical production (surveys and registers). This paper aims to illustrate the potential of the register as a suitable instrument for conducting studies on the implementation and effects of labour market policies and to explore the impact on wages in addition to those linked to employment. First results, according to the characteristics of jobs, workers and employers, for the reference years 2016–2020 are presented.

1. Introduction

The evolution of the statistical register and, among them, of the register on wages, hours and labour costs (RACLI[2]) on the employees of enterprises in the private non-agricultural sectors allows deepened analyses on the labour market also related to the monitoring of the expected or actual impact of targeted policies. This

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[1] Authors' opinions do not necessarily reflect Istat's official policy. The paragraphs are attributed as following: 1 and 54 to Silvia Pacini; 2, 3 and 4 to Sara Gigante.

[2] The RACLI register is the forerunner of the Labour Register for the subpopulation of dependent jobs in the enterprises of the private non-agricoltural sectors and release information since the reference years 2014. In the recent years the Labour Register development is in progress and the RACLI register will be embedded in it (Baldi *et al*., 2018).

is possible thanks to the RACLI register's statistical unit, the job, defined as the connection between an employee and an employer starting with an activation date and ending with a closing date, whose longitudinal coherence from the year 2014 has been granted through a control and correction treatment process. At this level of detail, the information available are related to different measurements of labour input, as employment stocks and flows and hours paid and worked, as well as variables on wages and, recently since the reference year 2016, also on labour cost. In the last years, indeed, a complex estimation methodology of social contributions, separately charge to employer and employee, have been implemented throughout the reconstruction of the statistical information starting from very detailed administrative micro codes. As illustrated in paragraph 2, this successful operation has been requiring the design, implementation - still in progress -, and recurring updating of a complex metadata system. It covers and connects the input sources metadata to the statistical output metadata through the process metadata, making possible the estimation of target statistical variables and the profiling of policies aimed at the labour cost's reduction, respecting data confidentiality that is a building blocks of the process itself. Paragraph 3 describes a brief introduction to the experimental analysis of the impact of the labour policies based on a reduction in employer social contributions, while the methodology and the results are described in paragraph 4. Some conclusions are briefly summarized in paragraph 5.

2. What makes the RACLI register a useful tool for studying labour policies?

The purpose of this article is to demonstrate the register's potential as a useful tool for doing research on the implementation and effects of labor market. According to the literature, the availability of an adequate information base is required: good information systems, mostly powered by administrative archives, are a critical support (Trivellato, 2009). To begin, it is necessary to emphasize the register's census-like aspect as well as the availability of reliable information at the job-individual-firm level referring to multiple dimensions. Indeed, the register's goal is to provide a relational system as well as a standardized technological and methodological foundation, allowing for a multidimensional and consistent picture of the private labour market and organizing the outputs in a dynamic, performing, controlled, and documented structure from which micro-data and aggregate statistics can be obtained. What is more, because social systems are complex (Marchesi *et al*., 2011) it is challenging to identify the processes that led to the results (the

program is a "black box"[3]). The RACLI register, reflecting the nature of the topic to which it refers, is capable of naturally representing a complex system, especially when placed in a system of interactions with other registers (the interactions between items generate information, and the whole is greater than the sum of its parts). First of all, the register is not a static structure but rather a complex organization in constant motion, susceptible to continuous stressful events arising both from the suppliers' side (administrative data flows and socioeconomic realities) and from the users' side (different research scopes and goals that are not totally programmed). Change is not an incidental aspect but rather a necessary component of the process that has to be appropriately incorporated into the architecture. It continuously needs to collect and update information, potentially providing researchers with valuable insights into employment trends and the effectiveness of various labour market interventions. It can also provide a valuable tool in computational Social Science and Social Cognition, as it allows for the analysis of complex systems and their interactions. By studying the relationships between different registers, researchers can gain a deeper understanding of the underlying processes that contribute to the observed results and uncover hidden patterns and dynamics that may not be apparent when studying individual components in isolation. This approach may help shed light on the "black box" nature of certain programs and provide insights into how they operate. To achieve these goals, the register must equip itself with suitable technological and organizational tools adaptable to the register's and the theme's complexity by: (a) making the Register's fundamental structure both stable and flexible; (b) ensuring underlying consistency across all processes; (c) activating economies of scale and facilitating resource transversal usage; and (d) serving data quality and data management.

The dynamic integrated system of metadata designed and partially created in the register, in particular, is at the heart of the employment information system, acting as the pivot on which the Register's different functions rely. It is intended to serve two functions: (a) interaction with the changing external environment (administrative information flows and, more broadly, the socioeconomic environment); and (b) communication with the internal statistical production system (surveys and registers). The system aids in data protection, tracking administrative sources, and process quality control. It ensures accurate interpretation of estimates and enables contextual and automated modifications to procedures and information systems (a metadata-driven process), responding to the dynamic nature of the input. Operationally, the procedures "read" from the metadata system both the extraction path of the different information needed for the process as well as their

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[3] In mathematical models, the system is a black box, i.e. it is not known a priori either what it contains or how it behaves. It is possible to study its behaviour solely by analysing the responses it produces in the face of the demands it receives.

usage, and return the estimates and associated quality indicators (process and output). The metadata creation process involves horizontal integration of available input metadata, vertical integration of administrative sources, and information transformation. The theoretical unit of the system (item) is defined as the combination of period, source, variable, and modality. Horizontal metadata integration involves combining several types of information to provide a complete representation of each item. Vertical integration of administrative sources requires combining and harmonising metadata from several inputs. Transforming information requires making metadata actionable and accessible by converting it from passive to active for metadata-driven activities. The meta-information pertaining to the input, process, and output metadata must be connected in a cohesive way, allowing all processes to refer to this single information source. It is critical to emphasise that, due to the system's complexity, updates cannot be fully automated; instead, theme experts must process them. In addition, it is necessary to maintain margins of flexibility that can absorb shocks through semi-structured parts of the system. Furthermore, leveraging the entire system allows for the derivation of complicated variables (e.g., compensation of employees - D.1 definition of the System of National Account), the extraction of data and metadata for insights (e.g., evaluation of youthful recruiting policies, recourse to social shock absorbers, short-time work schemes), and the extraction of subpopulations of interest (e.g., disadvantaged workers). The system is designed, built, and functioning in its fundamental elements, but experimentation and innovation are ongoing, necessitating continuous learning and improvement.

3. Introduction to the exploratory study on labour cost reduction measures

Both social progress and full employment are goals shared by the European Union (European Union, 2012). To encourage a renewed process of convergence towards improved living and working conditions, the European Pillar of Social Rights, which was established in April 2018, specifically lays out 20 fundamental principles and rights that fall into three main categories: (a) equal opportunities and access to the labour market; (b) fair working conditions; and (c) social protection and inclusion. Governments can mediate on the labour market through labour market institutions (e.g., minimum wages, employment protection legislation, etc.), aggregate fiscal policy (changes in public expenditure and taxation), particular labour market policies, and social protection programs. In particular, European and national labour policies are increasingly focusing on a broader variety of people who face disadvantages and hurdles to entering or re-entering the labour force. Young people, over-50 workers, female workers, non-EU workers, and those seeking

employment are targeted, including those without secondary education or equivalent qualifications. They may be in specific situations, travel across EU Member States, or seek employment after long periods of unemployment. In Italy, the social contribution reduction, offered to firms with specified features for workers belonging to categories judged deserving of special protection and/or to ensure job stability, plays a particular function in the labour market policy. In particular, hiring incentive schemes aim to reduce labour costs for employers and increase job opportunities for workers. Classified among the active labour market policies (ALMPs)[4], hiring incentives have non-excludable stated goals to encourage labour demand and shift from insecure to more secure contractual forms; they can result in significant inert costs if they support employment that would have been created anyway, as well as travel expenses if they eliminate jobs elsewhere. Additionally, workers hired with a short-term hiring subsidy may be replaced by new subsidised hires after the subsidy expires, causing job turnover rates to increase without adding to employment (the "revolving door" effect) (Brown *et al.*, 2011). Considering that the RACLI register has already been used in research on the minimum wage (Istat, 2023) and employment quality (Gigante *et al.*, 2019), this paper also intends to explore the effect on salary aspects in addition to those linked to employment. Hence, in this exercise, the impact is measured in terms of job length and other quality indicators (in terms of the features of the employment relationship relevant to the year of activation and future years). The study that follows examines the impact of labour cost reduction measures in Italy between 2016 and 2020 on newly activated jobs and includes a counterfactual analysis. The census availability of economic and social information on domain units, the ability to precisely identify individuals who have benefited from a policy and the longitudinal structure of the information allows for a counterfactual approach; in order to "avoid (..) conceptual misconceptions, it is crucial to adopt the definition of effect according to the counterfactual logic, now affirmed in the social sciences" (Trivellato, 2008). According to counterfactual paradigm (Morgan *et al,* 2007), the effect of an intervention is defined as the difference between what is seen in the presence of the intervention and what would have been observed if the intervention had not been there. since it is impossible to witness the effect of an intervention at the individual level by definition, the study extracted a group of non-beneficiaries who were the most similar to the beneficiaries, essentially emulating the value that the outcome variable would have had if the treated group had not been included. The goal of this exercise is to investigate the

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[4] That are publicly funded interventions aimed at improving the functioning of the labour market by inducing changes in labour supply and demand, as well as their matching process. The Organisation for Economic Coordination and Development database classifies ALMPs into six broad categories: (i) training; (ii) employment incentives; (iii) direct job creation; (iv) start-up incentives; (v) public employment services and administration; (vi) sheltered and supported employment and rehabilitation.

overall impact of the policies on labour market enacted through a reduction in employer social contributions[5]. The main Italian labour policies (in terms of number of workers involved) based on reduction of social contributions in the period 2016–2020 are the *Jobs Act* (since 2014)[6], the structural incentive for youth employment[7], reduced labour costs for apprenticeships[8], incentives for hiring over 50s[9], contribution relief for employment in disadvantaged areas[10].

Table 1 – *Main professional/individual features of jobs with or without a reduction in employer social contributions. Years 2016-2020, absolute and percentage values.*

Year	Reduction	N. jobs (th)	Part time	Fixed term	Women	At least graduates	<30 years	Employer contribution*
2016	No	14,041	29.3	32.9	40.6	13.2	17.4	47.9
2016	Yes	3,318	37.4	12.6	41.4	13.7	37.9	24.9
2017	No	15,630	30.7	38.7	40.7	13.1	19.6	48.1
2017	Yes	3,138	36.6	13.7	42.8	14.8	38.5	25.6
2018	No	16,617	31.3	40.0	40.6	13.3	19.7	48.2
2018	Yes	2,923	36.1	15.5	43.2	14.8	42.6	28.3
2019	No	17,842	31.8	35.7	40.7	13.8	19.2	48.1
2019	Yes	1,848	35.4	22.9	44.7	14.3	61.4	26.6
2020	No	14,670	30.6	33.1	40.8	14.5	17.9	47.4
2020	Yes	3,594	36.8	21.8	39.1	14.7	36.2	41.2

   *Calculated as percentage of gross wages.

4. A non-parametric observational strategy for a counterfactual analysis

As a starting point, a descriptive study of the implementation of labour cost reduction measures between 2016 and 2020 indicates that beneficiaries[11] have a

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[5] Theoretically, once the integrated metadata system is fully updated, the availability of information on required contribution items at the job level allows for the precise identification of each policy intervention

[6] L. 183/2014 (Job Act) contains two main measures: the introduction of the contract with increasing protections for new permanent employees and a contribution deduction for permanent employee.

[7] L.205/2017 (budget low) introduces a reduction of social security contributions charged to private employers for hiring with permanent employment contracts from January 2018 under certain age limits.

[8] The social contributions charged to employers for apprentices is equal to 10% of the gross wages.

[9] L. 92/2012 recognizes an incentive to employer for hiring individuals aged 50 or over who have been unemployed for over twelve months.

[10] In accordance with DL.104/2020, employers in the private sector in regions with a per capita GDP not surpassing 90% of the average of the 27 nations now comprising the European Union and an employment rate below the national average would have their payments reduced.

[11] The worker characteristics (gender, age and education level) are from the Istat Population Register.

lower frequency of fixed-term contracts and a larger incidence of part-time positions. They are concentrated in all years among employees under the age of 30 and with at least a university degree, and among women up to 2019. The median reduction in labour cost is greater than 21 percentage points until 2019, then drops to 6.2 percentage points in 2020.

Monthly employment fluctuations (Figure 1) were more contained in firms that benefited from labour cost reduction plans for at least one job between 2016 and 2020 (1.3 million) than in firms that did not (853 thousand).

Figure 1 – *Monthly jobs' number changes in firms having or not at least one job with a reduction in employer social contributions. Years 2016-2020, percentage values.*
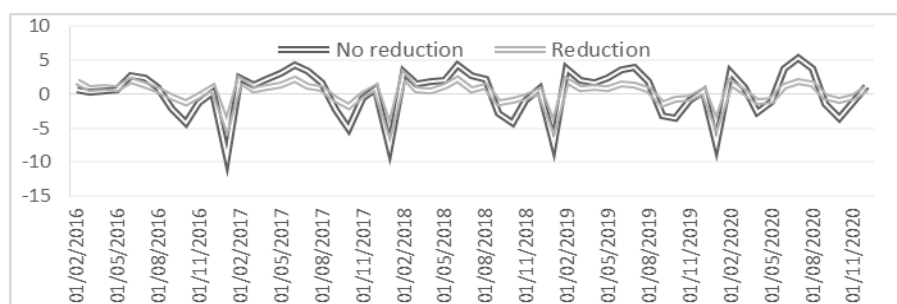
It is crucial to remember that, in the absence of appropriate treatment, these basic descriptive statistics on the group of beneficiaries and non-beneficiaries may be impacted by: (a) selection bias: the two groups may not be equal; and (b) distortion from spontaneous dynamics: the outcome variable may vary independently of public intervention. In order to "avoid these conceptual misconceptions, it is crucial to adopt the definition of effect according to the counterfactual logic, now affirmed in the social sciences", the counterfactual analysis is performed using a non-experimental design and a non-parametric approach. The procedure is divided into four steps:

1. *Identifying outcome variables:* 1a. In the year of activation, differences in various job quality indicators (percentage closure incidence, hourly wage, labour cost per hour paid, percentage incidence of fixed term and part time); 1b. Differences in hourly and annual wages after 12, 24, 36, and 48 months; 1c. Differences in the number of jobs persisted after 12, 24, 36, and 48 months.
2. *Identification of the beneficiaries:* the availability of information on mandatory contribution items at the job level, with the assistance of the integrated dynamic metadata system, enables the precise identification of the jobs for which the employer requests to take advantage of a contribution relief policy.

3. *Variables for matching:* the pre-treatment variables (X) on which the matching strata were generated are related to the worker and the characteristics of any previous employee jobs. The following were specifically considered: X_1 Territory (province of work); X_2 Age (in 10-year classes); X_3 Educational Level (in 5 classes); X_4 Gender (females vs. males); X_5 Country of Birth (Italy vs. abroad); X_6 Presence of a previously dependent job (a dummy variable in the private sector); X_7 Hourly wage of previously dependent jobs (in 3 classes). With these attributes held constant, a random match between the two groups was formed.

4. *Statistical matching procedure*: it is based on a highly severe profiling (1:1 coupling) and starts from the total number of activated jobs with a reduction every year (Table 2).

Table 2 – *Activated job beneficiaries and matched non-beneficiaries composition according to the matching covariates. Years 2016-2020. Percentage values.*

Dimension	Activated jobs with reduction	Matched jobs	Dimension	Activated jobs with reduction	Matched jobs
Year			Geographic area		
2016	23.1	24.7	North East	19.7	21.0
2017	17.6	18.4	North West	19.4	20.8
2018	18.5	19.6	Center	17.3	18.4
2019	17.3	18.5	Islands	12.6	11.6
2020	23.6	18.8	South	31.0	28.1
Country of birth			Age		
Italy	82.9	82.7	15-29	50.4	52.5
Abroad	17.0	17.3	30-49	33.5	32.4
NA	0.0	0.0	50 and +	16.1	15.2
Sex			Previous jobs' hourly wage		
Female	43.2	43.7	1 Quantile	13.0	10.3
Male	56.8	56.3	5 Quantile	1.5	1.7
Previous jobs			Education		
At Least One	71.6	72.5	Primary	39.6	39.6
			Secondary	40.3	40.4
			Tertiary	11.4	11.3
None	28.4	27.5	N/A	8.7	8.7

The matching technique identified 'twins' for 99% of the jobs in 2016 (on 1.1 million beneficiaries) and 2019 (on 869 thousand), 98% in 2018 (on 927 thousand), 97% in 2017 (on 883 thousand), and 74% in 2020 (on 1.2 million). In the year of activation, the group hired with a reduction had a lower number of jobs closed within the same year (-18 percentage points), lower hourly wages (nearly less than 1 €/hour

and equal to -0.20 €/hour excluding apprentices[12]), a lower frequency of part time and fixed term contracts. They are mostly employed in the service sector and in small firms (+8.8 percentage points).

Table 3 – *Differences between beneficiaries and not beneficiaries in the year of activation in various indicators. Years 2016-2020, absolute and percentage values.*

Reduc tion	% Closures	Median hourly wage	Median hourly wage – excluding apprentice	Median hourly labour cost	% Permanent	% Part time	% in firms<=10
Yes	42.4	9.3	9.8	11.3	58.9	35.1	46.8
No	60.5	10.0	10.0	14.0	19.8	41.2	38.0
Diff	-18.1	-0.7	-0.2	-2.8	+39.1	-6.1	+8.8

The labour cost reduction policies implemented between 2016 and 2020 had the effect of steadying jobs activated by the reduction. After one year, between 48% (for positions activated in 2017) and 61% (for positions activated in 2016) of all jobs activated with a labour cost reduction are still active, representing a difference of +12 percentage points and +26 percentage points, respectively, compared to non-beneficiaries (Figure 2). With time, the incidence of jobs without reductions appears to approach that of jobs activated with reductions that are no longer active in the year. The incidence of jobs with reduction active (which is directly tied to the length of the various measures) falls after two (2017) or more years.

Figure 2 – *Jobs with or without reduction per benefit active in the year, year of activation and after 12, 24, 36 and 48 months. Years 2016-2020, percentage values.*
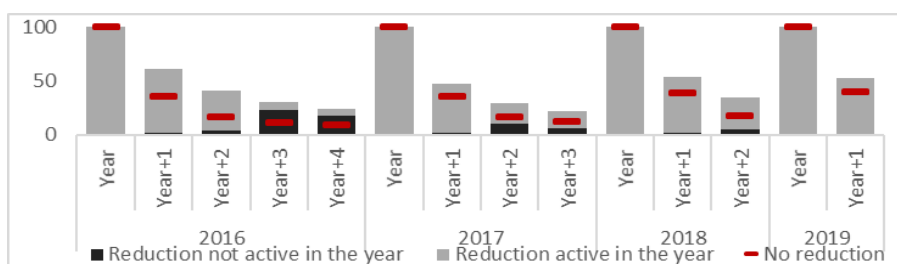
The difference in hourly wage follows a different pattern: beneficiaries' hourly wages are lower even 48 months after being hired compared to jobs activated without

[12] The apprenticeship is a youth employment and training contract established by Legislative Decree No. 81/2015 with the goal of bridging the gap between education and the labor market. Apprentice salaries are lower than those of other contracts since the employer has to provide also training.

benefits, and the gap widens over time (Table 4). In terms of yearly wages, observing a panel of jobs always active from hiring to 2020 will prevent the difference in annual wages between the two groups from being skewed by the variance in duration associated with the introduction of the policy.

Table 4 – *Differences between beneficiaries and not beneficiaries in hourly and annual wages per activation year and after 12, 24, 36 and 48 months. Years 2016 - 2020, absolute values.*

| ACTIVATION YEAR	YEAR	YEAR+1	YEAR+2	YEAR+3	YEAR+4
Hourly wage – excluding apprentices					
2016	-0.39	-0.55	-0.67	-0.79	-0.87
2017	-0.27	-0.62	-0.89	-0.97	
2018	-0.20	-0.41	-0.53		
2019	-0.19	-0.36			
2020	0.04				
Yearly wages– excluding apprentices - only always active jobs					
2016	-447	-1,980	-2,059	-2,048	-2,733
2017	-167	-3,080	-3,414	-3,739	
2018	517	-1,315	-1,366		
2019	2,058	2,026			
2016	1,733				

The hourly wages in the two categories might also be compared throughout the whole distribution (Figure 3). As a result, positions with reduced labour input and/or lower hourly compensation appear to endure for the beneficiaries. Excluding apprentices, the group of beneficiaries obtains higher hourly wages only in the first tenth (+1% at the 5th percentile) and a lower wage for the remainder of the distribution (-2.2% in the median and -14% at the 95th percentile) in the year of activation.

Figure 3 – *Distribution of hourly wages (right axis) for beneficiaries and not beneficiaries and percentage difference (left axis) in the activation year. Years 2016-2020, absolute and percentage values.*
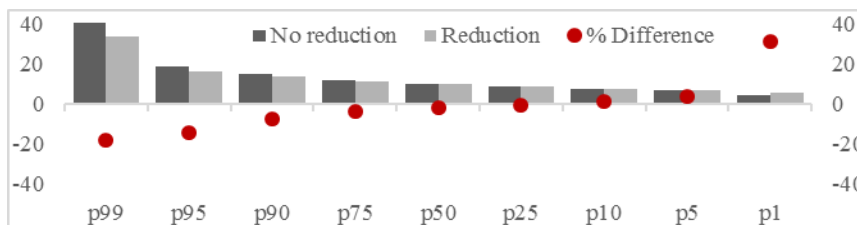
Considering only activations in 2016, for young people under 30, the greater stability of jobs activated with reductions is noticeable in the first 24 months (mostly for males) and diminishes significantly in the subsequent ones, while for people over 30, the advantage in terms of length is lower but more durable over time (Figure 4). During the period, the differences in hourly wages between beneficiaries and non-beneficiaries grew more slowly among women and men under 30 than among men over 30.

Figure 4 - *Differences in the percentage of active jobs (top) and hourly wages (bottom) between activated positions in 2016 with and without reductions by gender and age after 12, 24, 36, and 48 months from the reference years. Years 2016-2020. Absolute values and percentage point*
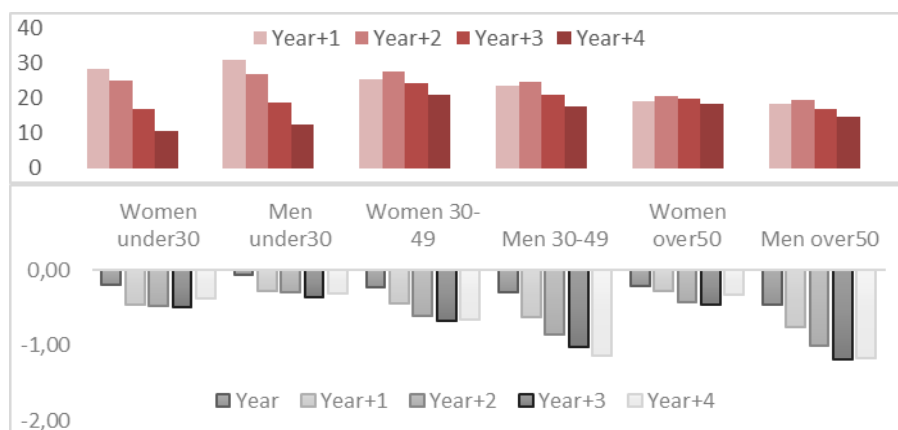
These evidences suggest that the introduction of labour cost reduction may have led to a shift in job opportunities towards lower-paying positions for the beneficiaries. It is important to further investigate the reasons behind this trend and the relationship between the duration of the benefit and the duration of jobs in order to understand the long-term impact of these reductions on job stability and assess its long-term implications for income inequality.

5. Conclusions

Given the relevance of the availability of data to monitor the implementation and the effects of labour market measures, the RACLI data and metadata system has been designed also to follow the implementation of demand-side market measures and to classify them according to different statistical definitions. The analyses shows some evidences of the employer contribution reduction acts between the years 2016 and

2020, and deepened analyses will be possible as soon as a complete classification of administrative interventions and their statistical ongoing will be realized. This ongoing work will be always subject to continuous revisions, integrations and updating as a consequence of its complexity due to different aspects among which the variability of the Italian labour market policies and the way they are applied have a relevant role together with the evolution of administrative sources and statistical products. A further evolution of the register with the estimation of employee social benefits will make it possible other labour policies analyses.

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