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Edoardo Maria Acabbi[1] and Andrea Alati[2]

Abstract

This study employs Italian administrative data to investigate how the use of permanent and fixed-term labor contracts influences the transmission of aggregate shocks to firms' fundamentals. We explore how firms strategically manage their labor-induced operating leverage by adjusting the composition of contracts in their workforce. Our findings reveal two key insights. First, a higher labor share is associated with increased volatility in cash flows following unexpected real shocks, indicating the presence of operating leverage through labor costs. Second, firms with a greater proportion of temporary contracts exhibit lower variability in cash flows and profits. This smoothing effect is more pronounced in firms with a higher labor share attributed to the permanent workforce. We complement our analysis by examining the 2001 labor market reform that lifted restrictions on the creation of temporary contracts. Our results demonstrate that firms, following the staggered implementation of the reform, increased their utilization of temporary contracts while reducing average labor compensation. Furthermore, we find that, only among firms with an ex-ante more rigid labor cost structure and in more concentrated labor markets, the earlier transition to a more flexible workforce composition led to a sizable increase in profit margins and a decrease in the cross-sectional standard deviation of profits.

Key words: Leverage, labor share, dual labor markets, liquidity, event-study.

JEL classification: G12, E23, J23.

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1 Introduction

Rigidities in firms' payroll structures increase the transmission of shocks to firms' cash flows and profitability (Acabbi, Panetti and Sforza, 2022, Favilukis, Lin and Zhao, 2020). Despite a recent declining trend in aggregate labor shares across all developed countries (Karabarbounis and Neiman, 2014), labor costs still constitute a sizable fraction of firms' cost structure. Nonetheless, they are often overlooked as a source of financial risk, and most macroeconomic models assume that labor is a flexible input in production.

Given wage rigidities and adjustment costs, labor costs can become a source of operating leverage. At the same time, firms might have access to contractual regimes that differ in the degree of flexibility imposed on the work relationship. In light of these differences, the choice over the mix of contractual arrangements to offer to their own workforce has thus important implications for firms' liquidity management. In almost all advanced economies an increasing fraction of employment relationships is regulated by temporary contracts.[1] Temporary contracts allow firms to avoid paying any severance cost at a pre-defined expiration date. Their use can thus help firms reduce their labor-induced operating leverage, and provides them with an additional tool to help smoothing the effects of unexpected shocks.[2]

By using Italian administrative data on the universe of workers careers and firms' balance sheets, we study how the use of different contract structures affects firms' pass-through of exogenous shocks. We provide novel evidence on the role of temporary employment contracts as a margin of adjustment to "defuse" firms' exposure to labor-induced operating leverage. Importantly, we also document how labor market structure influenced how firms reacted to the reform. We show that these channels are important not only for firms' development and overall profitability but also for their liquidity management.

Our study is organized in two parts. In the first part, we focus on a comprehensive panel data covering non-financial firms balance sheets and workers' careers for a period from 1998 to 2018. The objective is to analyze the variability of firm level outcomes in response to exogenous shocks, for which we use aggregate business cycle fluctuations, in relation to firm-level cost structure and with particular reference to labor costs variation. In order to proxy for exposure to more rigid workforce costs, and thus labor-induced operating leverage, we focus on firms long-term average labor share, and in particular the portion of it determined by permanent workers. As permanent contracts relationships tend to be sticky in the data, and labor costs related to permanent workers constitute a slowly moving variable, permanent workers' labor share is a natural choice to indirectly proxy for operating leverage. We verify that the volatility of profits, cash-flows and employment in reaction to business cycle fluctuations is increasing in this measure of labor rigidity. In a similar way, we also verify that firms appear to use their share of temporary workers as a

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[1]The *OECD Labour Force Statistics* (OECD, 2020) indicate that in 2019 approximately 12% of dependent employment in OECD economies is covered by temporary contracts. In Italy, the country we use for our analysis, the same measure has grown from approximately 5% in 1990 to 17% in 2019.

[2]Caggese and Cuñat (2008) show that more financially constrained firms rely more on fixed-term contracts to avoid incurring in potential firing-costs.

smoothing device of external shocks: when firms increase their share of temporary workers, the volatility of their profits or cash-flows in response to shocks is dampened, while on the contrary the volatility of employment is increased.

Most importantly, we show that the dampening effect through the share of temporary contracts varies across labor leverage exposure. Highly leveraged firms, in the top one-third of the labor share distribution, benefit more from having a higher share of temporary contracts, and the effect monotonically decreases at lower labor shares. The choice over the menu of differently flexible contracts for workers thus plausibly alters the trade-off between short term profitability and financial stability. The choice arguably implies different incentives depending on firms exposure to operating leverage and cost rigidity, as determined by production processes and workforce development over time. This also indicates that firms' choices regarding the optimal mix of labor contracts is likely endogenous to a host of firm characteristic that we would ideally like to control for when assessing how labor contracts influence the response of firms' fundamentals to aggregate shocks.

In the second part, therefore, we complement our results by providing causal evidence on how firms responded to the liberalization of temporary contracts' use that took place in Italy in 2001. Our identification is based on the staggered implementation of the reform across different collective bargaining agreements, which allows us to compare plausibly as-good-as-random early adopters to late adopters of the reform (Daruich, Saggio and Di Addario, 2020). In our analysis, we focus particularly on the relationship between the use of temporary contracts and firm level outcomes. Importantly, we find heterogeneous effects of this relationship based on firms' ex-ante exposure to labor leverage.

We show that the liberalization of temporary employment in Italy had a significant impact on firms and workers alike. Following the reform, Italian firms significantly increased the share of temporary contracts in their workforce and, in parallel, reduced both their total labor costs and the average wage paid to employees. The reform caused an average increase in firms' profit margins without boosting firms' size and with none of the positive employment benefit the reform intended to achieve. Consistently with our descriptive analysis, the event study results suggest that temporary contracts enable firms to transfer part of their risk to workers.

In addition, the reform did not alter the protection of incumbent workers, thus strengthening a *duality* in the labor market, with effects concentrated on the youngest cohorts, more likely to be in temporary employment.[3]

When looking at the heterogeneity of these effects conditional on firms' permanent workers labor share we also uncover profound differences across firms. In particular, we

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[3]The pervasiveness of temporary contracts among young workers has spurred a large number of studies aimed at quantifying the influence of these employment relationships for firm choices, workers careers and labor market frictions(Bentolila and Bertola, 1990, Cappellari, Dell'Aringa and Leonardi, 2012, Cingano et al., 2016). Our works is based on Daruich, Saggio and Di Addario 2020, who conduct an empirical exercise analogous to ours, but with a special emphasis on worker-level outcomes. We remand the reader to that study for a detailed analysis of the effects of the reform on incumbent (permanent) workers as opposed to younger workers.

see that the reform had a particularly beneficial effect only for firms characterized by an ex-ante high permanent workers' labor share. We observe that the average positive effect on profit margins is entirely driven by these firms. This happens despite the fact that firms increase their use of fixed-term contracts or reduce labor labor costs similarly, regardless of their labor share characteristics. Following the intuition from the panel regressions, we then estimate the effects of the reform on the measured standard deviation of profits, measured within a province (a local labor market in Italy) among firms with the same collective bargaining agreement. We discover that, even in this case, firms with greater ex-ante exposure to labor leverage experienced a significant (cross-sectional) *reduction* in profit variability, whereas less exposed firms experienced no significant change.

To put the magnitude of these effects into context, our event study indicates that an earlier transition to a more flexible workforce composition for high labor-leverage firms led to a 1.5 percentage point increase in profit margins (against a -1.6pp average variation around the event) and a 5 percent decrease in the cross-sectional standard deviation of profits. These effects are magnified for firms that, on top of being highly exposed to labor induced operating leverage, operate in highly concentrated labor markets.

We interpret these heterogeneous effects on firm profitability and real outcomes as evidence of the existence of a possible trade-off between the stabilization benefits of temporary employment and the higher costs associated with workers' churning, startup costs, and the likely within-firm contrasts and fairness concerns regarding unequal treatment of permanent versus temporary workers (an insiders versus outsiders condition per Lindbeck and Snower 1989, 2001). It is apparent from our results that the smoothing benefits of transitioning to a more flexible workforce are sufficiently high only for firms that are highly exposed to labor leverage to start with. For firms that are less exposed to labor leverage, instead, these benefits are likely off-set by the implicit costs associated with higher employment volatility.

Related literature.   This paper contributes to five main strands of academic literature.

First, we contribute to a literature in corporate finance analyzing capital structure determination in connection with financial frictions, and especially the growing literature focusing on the financial frictions that might emerge in relationship to labor composition and financing.[4] Specifically, we follow Donangelo et al. (2019), Favilukis, Lin and Zhao (2020) and Acabbi, Panetti and Sforza (2022), in highlighting the importance of labor expenditures for firms' financial stability. We contribute to these studies by exploring the role of labor contracts as an additional margin that affects firms' labor-induced leverage and that can be actively used to manage it.

Second, we contribute to the related literature regarding the labor financing. Labor possesses characteristics that can make it akin to a quasi-fixed factor in production and an investment good from the firm's standpoint, which should in turn require long-term

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[4]Also see among others, Danthine and Donaldson (2002), Caggese and Cuñat (2008), Schoefer (2022), Xiaolan (2014), Simintzi, Vig and Volpin (2015), Serfling (2016), Favilukis and Lin (2016), Ellul and Pagano (2019), Favilukis, Lin and Zhao (2020), Bai, Fairhurst and Serfling (2020), Donangelo (2021).

financing (Oi, 1962, Hamermesh, 1989, Hamermesh and Pfann, 1996, Benmelech, Bergman and Seru, 2015, Benmelech, Frydman and Papanikolaou, 2019). From this perspective, we highlight how the presence of worker-related costs, such as hiring, search or training costs, generates a trade-off between optimal liquidity management and workers' performance improvement.

Third, we show that the contractual composition of firms' workforce can be an important element in explaining the pass-through of shocks to firm-balance sheets. Although the firm-dynamics literature has not often focused on this specific margin of adjustment,[5] it is likely that the availability of labor contracts subject to different employment protection legislation can have important implications on how companies respond to shocks using the labor market (e.g. Giroud and Mueller 2015, Cestone et al. 2020, Caggese, Metzger and Cunat 2019, Faia and Pezone 2020) and on how firms compete for and allocate workers, which can have repercussions also on the dynamics of between-firm competition (e.g. Gouin-Bonenfant 2020) and thus generate spillovers from labor to product markets.

Structure of the paper. The paper is structured as follows: Section 2 briefly discusses the mechanisms linking labor leverage to temporary contracts; Section 3 provides an overview of the main administrative data used in the study; Section 4 discusses the role of the labor share and temporary employment contracts for the pass-through of aggregate shocks to firms using panel regressions; Section 5 presents our causally identified event-study; finally, Section 6 concludes.

2 The link between contract composition and firm labor leverage

Labor payments are still a large fraction of GDP in all major economies.[6] A characteristic feature of labor payments is their smoothness relative to firms' cash-flows and operating profits. In fact, as highlighted in the corporate finance literature (e.g. Donangelo et al. 2019, Favilukis, Lin and Zhao 2020) and as shown in Figure 1, firms' labor expenditures exhibit a significantly lower volatility compared to firms' operating surplus. This decoupling is the source of an operating leverage that, contrary to the financial leverage commonly studied in the corporate finance literature, has its roots in firms' commitments to labor payments. Firms are more exposed to this specific form of leverage the higher their labor share is, i.e. the higher payments accruing to labor inputs are. Similarly to financial leverage, labor leverage is a source of amplification of real shocks and therefore an element of financial risk that is not captured by classic indicators used in the literature (e.g. financial leverage itself, or indexes such as in Whited and Wu 2006.). As it is a source of amplification of real shocks, intuitively we should expect firms more exposed to the labor leverage channel,

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[5]A notable recent exception is Pérez (2020), which, using Chilean data, shows that temporary employment constitutes a valuable margin of adjustments for firms facing a strict regulatory framework.

[6]In Italy in 2017 52.2% of GDP went to wages and salaries on aggregate. In the same period, in the Euro Area and the EU27 the share was 58.3% and 57.7% respectively according to the Penn World Tables 9.1 (Feenstra, Inklaar and Timmer, 2015). For a reference regarding recent global trends in the aggregate labor share see Karabarbounis and Neiman (2014).

i.e. with a higher ex-ante average labor share, respond more to external shocks than firms that devote a lower share of their value added to labor compensation. The smoothness of

Figure 1. Relationship between the variabilities of firms' wage payments and operating surpluses

Notes: The figure plots the relationship between the standard deviations of the cyclical component of gross operating surplus and the cyclical component of wage payments for firms in 27 EU countries plus the UK and Norway. The dotted line is the 45° line. Data are log-transformed and filtered using an HP-filter (smoothing 6.25). *Source:* Eurostat, "Annual enterprise statistics for special aggregates of activities (NACE Rev. 2)", time period: 2009-2018.

labor payments can be justified by different factors, from the insurance role of firms (e.g. Guiso, Pistaferri and Schivardi 2005, Balke and Lamadon 2022, Acabbi, Alati and Mazzone 2023) to the regulatory framework on wage minima, employment protection legislation and contract types (permanent versus temporary). Wage minima or the options in the menu of legal labor contracts introduce a direct source of downward rigidity on firm labor payments (e.g. Card, Devicienti and Maida 2014, Fanfani 2019, Faia and Pezone 2020) firms have no *direct* control on. The *choice over* the menu contract types, on the other hand, is part of firm optimization and provides an additional margin of flexibility at the extensive margin through shifting the contractual composition of firms' employment over time.

The possibility of employing a fraction of workers under temporary contracts implies that firms are able to exploit this margin of adjustment to economize on firing and separation costs and, at the same time, smooth fluctuations in their revenues.[7] By construction, workers under temporary contracts do not benefit from the guarantees associated to permanent contracts, and separation from them is thus not subject to onerous severance payments. Because of this feature, temporary contracts were conceived to ease the employment of seasonal workers, or workers filling temporary positions (substitutions of sick workers or maternity leaves, for instance), or as stepping stones (screening devices) for young, inexperienced workers. However, temporary contracts can also generally be used by firms to control more easily the extensive margin of their labor expenditures. The intuition for this rests on the observation that a firm routinely employing a larger share of temporary workers would be able to react more quickly to an unexpected drop in its

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[7]For a reference on alternative, non-wage related adjustments in labor costs, such as fringe benefits' reductions, bonus pay adjustments or production reorganization see also Babecký et al. (2012).

cash-flows, for example by not renewing part of its temporary workers, compared to a similar firm facing an analogous shock but relying more on permanent workers.

The consequence of these considerations is that firms with a high share of temporary workers should exhibit a lower pass-through of exogenous shocks to their balance sheets and, at the same time, experience a higher volatility of their employment. This is because they can make extensive margin adjustments more easily and adjust the number of employees without incurring in the large firing costs associated to permanent contracts, which also makes labor hoarding less useful for liquidity management.

The greater flexibility in extensive margin adjustments, however, can be subject to a broad range of set-up costs (e.g. search, training etc.) that might make the smoothing benefits of temporary contracts viable only for specific firms. By the same token, if temporary contracts are utilized as a smoothing device they are more likely *not* to be upgraded to permanent positions within the firm. This increases in turn the churn of workers, likely hampering workers' training, on-the-job human capital accumulation, and increasing within-firm inequality and contrasts between insiders (protected incumbents) and outsiders (young temporary hires). Therefore, from the firms' perspective, the use of this type of contracts is likely subject to a smoothing-churning trade-off. Given their higher relative susceptibility to exogenous shocks by virtue of their greater exposure to labor leverage, firms with a high labor share devoted to permanent workers are natural candidates for being on the positive side of this trade-off and enjoying larger benefits from the use of temporary contracts.

In light of these considerations, we check whether the smoothing benefits of employing temporary contracts is higher for firms characterized by a high permanent workers labor share. Specifically, we analyze whether featuring a larger share of temporary contracts, for these firms, is associated with an increase in their profitability and a stabilization of their profits.

We put forward five hypotheses that we then test in the data:

> **H1**. *Firms more exposed to labor leverage (proxied by permanent workers labor share) exhibit more volatile fundamentals.*

> **H2**. *Featuring a greater share of temporary workers in the workforce is associated with a lower variability of firms' real fundamentals (cash-flow, profits).*

> **H3**. *The smoothing benefits from employing temporary workers are stronger the higher firms' exposure to labor leverage.*

> **H4**. *The benefits of increasing the use of temporary contracts on profitability dynamics are concentrated in firms highly exposed to labor leverage.*

> **H5**. *On the contrary, firms with relatively low labor share are likely to benefit less from increasing the employment of temporary workers, and might actually incur in increased costs associated with higher workers' churn.*

3 Data

Our analysis relies on administrative data provided by the Italian National Social Security Institute (INPS)[8]. We complement these data with detailed information on the pattern of renewals for national labor contracts (CCNL).[9]

In particular, we rely on three main data sources: i) firm-level balance sheet data for incorporated firms in Italy from 1998 to 2018 from *Cerved*; ii) anonymized data on the universe of employment relationships in Italy from 1998 to 2018 available through the VisitINPS program (the *Uniemens* database); and iii) data on national collective bargain agreements reporting the renewal dates of national labor contracts (CCNL).[10]

With these data, we conduct a panel level analysis of the relationship between labor leverage, flexible contracts usage and firms real activity (Section 4 and a causally identified event study based on the approval of the Decree 368/2001 liberalizing the use of temporary contracts in Italy (Section 5). The data used for the panel regression analysis span the years between 2000 and 2018, whereas the event study only comprehends, by design, firms active before 2002 up to 4 years after the reform approval. Apart from this, we adopt analogous criteria for sample selections across the two empirical analyses. [11]

3.1 Sample selection and summary statistics

We use worker-level data to select the main employment relationship for each worker in each year of our sample and collect the relevant information on the prevalent type of CCNL used. The contract-level data allows to identify job spells at the monthly level. For each worker we observe information on demographics, sector of operation (*Ateco* 2007 classification), earnings, working days, contract type (temporary or permanent), and the working time arrangement (part-time or full-time). Given the nature of the data, we are able to compute firm size and relative contractual composition of firms' workforce from the employer-employee records. In order to have a consistent number of firms in our panel analysis and event study analysis, we select firms with non-missing values for employment, total assets, net income, and for which contract types within firms are correctly specified in INPS data. Given that these criteria are contingent on merging firm level balance sheets to the matched employer-employee dataset, only workers belonging to firms present in *Cerved* are included.[12]

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[8]Data access was granted trought the VisitINPS program.

[9]We thank in this regard Raffaele Saggio and Vincenzo Pezone for separately sharing their own scraped data with us.

[10]The *Uniemens* database provides administrative information on the CCNL associated with each job. The *Centro Nazionale dell'Economia e del Lavoro* (CNEL) provides a digital archive of all CCNLs signed in Italy, from which information can be obtained on the renewal years. We referf the reader to Daruich, Saggio and Di Addario (2020) for details regarding the collection process for this database.

[11]Appendix C reports in detail the cleaning and sample selection.

[12]The *Cerved* dataset is based on standardized reports filed annually by firms with the local Chamber of Commerce. It does not include private partnerships and sole proprietorships, which are in general means of incorporation adopted by much smaller firms.

For the causally identified event study, we exploit information on the relevant national labor contract for each spell. We are able to identify the prevalent CCNL for each firm in each year (and thus before the enactment of the 2001 reform), and thanks to the data on CCNLs renewals we are able to recover the year of the first renewal for each CCNL after 2001. This is important as it allows us to correctly time the implementation of the 2001 labor market reform at the firm level.[13]

We combine detailed employment and salaries data from *Uniemens* with firm level balance sheet data from *Cerved*. We calculate permanent workers' labor share, our measure of exposure to labor leverage, as the ratio of permanent workers salaries to value added. We calculate profit margins as the ratio between net income over sales. In the analysis, we also consider an aggregate measure of labor costs which comprehends other labor-related administrative costs but which, by its nature, cannot be easily split between or apportioned to permanent and temporary workers.

Table 1a reports aggregate descriptive statistics for our main sample of analysis at the firm level. After data cleaning, our final panel sample consists of approximately six-hundred-thousands firms spanning the whole size distribution. Given that our data, conditional on the required matching, cover potentially the universe of the Italian labor market, we can keep track in our study of firms of all sizes, including the very small ones. Average firm size, as measured by headcount employment, is 11.5 and the distribution is positively skewed as common in firm-level data, with the median firm in our sample reporting six employees and the presence in the sample of a right tail of very big firms (with thousands of workers). Importantly for the purpose of this paper, our sample contains firms with a large heterogeneity in the labor share of permanent workers. The average and median firm in the sample report both a permanent workers labor share of 40%, indicating a symmetric distribution for our primary measure of exposure to labor leverage. An important feature of our data is that our sample covers all incorporated firms in Italy while many studies in the finance literature rely mainly on listed firms. Table 1b reports descriptive statistics for the cross-section of firms in selected years, before and after the implementation of the 2001 reform. On average, Italian firms employed approximately 7% of their workers under temporary contracts before 2001, a measure that has significantly increased in the years after the reform, reaching 14% in 2018. It is worth noticing that the distribution of temporary contracts is also highly positively skewed with firms in the top 10% of the distribution reporting between a quarter and half of temporary contracts in their workforce.

4   Labor share, contracts and the variability of firm-level outcomes

In this section, we conduct an analysis of firm-level pass-through of aggregate shocks into real activity as in Schoefer (2022) and Donangelo et al. (2019). Ideally, we would want to explore the relationship between aggregate fluctuations and firms' labor expenditures

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[13]The reform was effectively incorporated in Italian labor market regulations at the time of the first renewal of each CCNL after the decree 368/2001 was signed into law (September 6, 2001). We discuss more in details the institutional setting in Section 5.

Table 1. Descriptive statistics

(a) Aggregate sample

	Mean	SD	p25	p50	p75	p90	# firms	N
Employees	11.53	30.60	3.00	6.00	12.00	24.00	648290	4,171,203
Total assets	2054.82	3021.13	367.12	900.08	2296.66	5376.44	644323	4,145,829
Total sales	2158.81	3096.91	395.04	973.43	2472.41	5653.94	640347	4,090,730
Perm. w. labor share	0.40	0.25	0.28	0.40	0.52	0.65	634,293	4,008,774
Profit margin	-0.01	0.12	-0.00	0.01	0.03	0.07	634,569	4,046,495

(b) Descriptive statistics for selected years

	Mean	SD	p25	p50	p75	p90	# firms
1999							
Employees	13.01	26.35	3.00	6.00	14.00	29.00	135,164
Total assets	2504.25	3579.48	475.70	1145.61	2833.10	6498.17	134,386
Total sales	2831.54	3799.93	563.83	1381.24	3354.56	7342.24	132,559
Perm. w. labor share	0.29	0.24	0.20	0.30	0.40	0.51	129,802
% temp. w.	0.07	0.15	0.00	0.00	0.09	0.25	135,164
Profit margin	-0.00	0.08	-0.01	0.00	0.02	0.05	130,840
2006							
Employees	11.77	30.73	3.00	6.00	12.00	25.00	204,004
Total assets	2197.94	3138.47	404.90	992.69	2511.06	5730.70	202,634
Total sales	2467.09	3421.82	465.86	1150.28	2909.06	6436.97	200,256
Perm. w. labor share	0.36	0.20	0.26	0.36	0.46	0.56	196,567
% temp. w.	0.09	0.17	0.00	0.00	0.11	0.30	204,004
Profit margin	-0.01	0.10	-0.00	0.00	0.02	0.06	198,409
2013							
Employees	10.17	25.45	2.00	5.00	11.00	21.00	249,684
Total assets	1751.09	2620.21	313.92	752.42	1919.41	4563.33	248,491
Total sales	1676.98	2480.12	302.96	727.50	1858.62	4414.84	244,620
Perm. w. labor share	0.45	0.28	0.32	0.46	0.58	0.71	238,813
% temp. w.	0.10	0.20	0.00	0.00	0.13	0.36	249,684
Profit margin	-0.02	0.15	-0.01	0.00	0.02	0.06	241,586
2018							
Employees	12.41	36.41	3.00	6.00	13.00	26.00	223,354
Total assets	1945.01	2807.90	344.79	852.74	2181.38	5207.26	220,820
Total sales	2083.14	2895.47	401.12	962.49	2397.97	5494.25	218,149
Perm. w. labor share	0.44	0.22	0.31	0.45	0.57	0.68	215,911
% temp. w.	0.14	0.21	0.00	0.00	0.20	0.45	223,354
Profit margin	0.02	0.09	0.00	0.01	0.05	0.10	217,622

Note: The table reports the summary statistics aggregate and by year for the main sample of analysis.

assigning different degrees of wage rigidity to otherwise identical firms. In practice, however, correctly measuring wage rigidity and its cyclicality is challenging, especially at the firm level.[14] Therefore, we proxy firms' exposures to labor leverage using a persistent an slowly-adjusting measure, their permanent workers labor share, instead of relying on cyclical properties of firms' labor expenditures. In fact, as noted also by Donangelo et al. (2019), the labor share is a central element of the labor leverage channel, with high labor

[14]For example, as noted by Schoefer (2022), the realized cyclical variation in wage rigidities can be biased by other factors such as product or even firm-specific demand shocks.

share amplifying any labor-induced leverage and operating profits volatility. In order to avoid simultaneity bias and capture a persistent component in labor share, we construct our proxy measure by taking the three-years lagged MA(3) of the labor share, measured as payroll over value added, of permanent workers.[15]

We show three main facts on the relationship between firms' workforce and their financial outcomes. First, we provide evidence of the existence of a labor induced operating leverage. In particular, we show that firms' financial outcomes and real activity (net income, employment, cash flow) are more correlated to cyclical aggregate fluctuations for high labor share firms. Second, we explore the potential benefit of employing temporary contracts as a smoothing device for real activity fluctuations by showing that a higher share of temporary contracts is associated with lower variation of cash-flows and profits in response to aggregate shocks. Finally, we combine the first two facts to show that the smoothing effect of temporary contracts seems to be stronger the higher firms' labor share, i.e. the higher firms' exposure to labor leverage. All specifications discussed in this section are robust to the inclusion of firm-level controls such as leverage, financial constraint index (Whited and Wu, 2006) and labor productivity. In all specifications we cluster the standard errors at the two-digits sector by province level and we weight the regression by lagged total assets to make sure that possible latent heterogeneity in the firm size distribution is not confounding our measure. For all specifications, results are qualitatively unchanged when weighting by lagged sales, employment or if regressions are unweighted.

4.1 The role of labor share for labor leverage amplification

In this section we test the following hypothesis:

H1. *Firms more exposed to labor leverage (proxied by permanent workers labor share) exhibit more volatile fundamentals.*

To quantify the role of labor leverage amplification for the transmission of aggregate shocks to firms' outcomes we use the following specification: for a firm f we measure

$$\Delta y_{f,t} = \alpha_f + \sum_{\tau=1}^{3} \beta_\tau D_{f,\tau} \times Y_t + \phi_t + \epsilon_{f,t}, \tag{1}$$

where α_f is a firm-fixed effect; $D_{f,\tau}$ is a dummy variable that equals one if firm f belongs to the τ labor share tercile, computed using the three-years lagged MA(3) average of the labor share of permanent workers; Y_t is the cyclical component of real GDP (Hamilton filtered, with two leads and one lag) and ϕ_t is a year fixed-effect. [16] As dependent variable, $\Delta y_{f,t}$, we consider the first-difference of various firm-level outcomes.

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[15]Taking lagged averages over time helps mitigating both the concerns about simultaneity and the possibility that labor share is predominantly driven by productivity swings. *All* the reported specifications in this paper, however, are robust to controlling directly for the (time-varying) effect of firms' labor productivity. Results available on request.

[16]All results are robust to adding additional controls, such as firm size and age bins, among the fixed effects.

Figure 2. Labor share specific sensitivity to aggregate shocks

(a) Cash-flows   **(b)** Employment   **(c)** Profits

Notes: The figure plots the interaction terms between labor share terciles and the cyclical component of real GDP as in Equation (1). Labor share terciles are defined on the three-years lagged MA(3) average of permanent workers' labor share. Cyclical GDP is measured using an Hamilton filter with two leads and one lag. Standard errors are clustered at the sector by province level and the regressions are weighted by lagged total assets. Error bands are 95% confidence intervals.

The main parameters of interest are the set of coefficients linked to the interaction term between the labor share terciles dummies and the cyclical component of GDP, $\{\beta_\tau\}_{\tau=1}^3$. These interactions capture how changes to aggregate fluctuations in the economy are reflected in firms' fundamentals conditional on firms' labor leverage exposure.

4.1.1 Results

Equation (1) estimates the correlation between the business cycle and yearly variation of three firm-level outcomes: i) Cash-flows, ii) Employment and iii) Profits (net income). We report the interaction terms between the labor share dummies and the cyclical component of GDP in Figure 2.[17]

Cash-flows. If labor is a quasi-fixed input in production and there are frictions to labor cost adjustment, one should expect labor costs to be a persistent drain on firms' cash-flows. This would in turn imply that operating leverage through labor costs should make the response of firms cash-flows (and net income) to real shocks relatively more volatile. We thus expect cash-flow sensitivities to real shock to be higher the greater our measure of labor leverage, permanent workers' labor share. Figure 2a plots the interaction terms between the labor share terciles and the cyclical component of GDP from Equation (1) using the first-difference of firms' cash-flow as dependent variable. As shown in the figure, the coefficients are positive and increasing in labor share terciles, indicating that firms characterized by an higher labor share are associated with higher variability in their cash-flows.

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[17]To account for negative values in cash-flows and profits we take the inverse hyperbolic sine of both variables before computing the first-difference. Employment variation is the yearly log-difference. The inverse hyperbolic sine is concave transformation similar to the logarithm (in the sense that it limits the influence of scale and outliers in empirical specifications) and has the additional benefit of being defined for null and negative values.

This result is a telling sign of labor induced operating leverage. Since labor payments are smoother than firms' revenues, they act as a pre-committed financial expenditure. Figure 2a shows that a higher labor share acts as an amplifier of aggregate fluctuations, an effect that is similar in nature to the more classic financial leverage but rooted in firms' labor expenditures.

Employment.   If labor leverage constrains firms' ability to freely dispose of operating and net income of the firm, one would also expect hiring (and firing) cyclicalities to be impacted and amplified by it. In this sense firms more exposed to fixity in incumbents labor costs would be less able to optimize investment in workers as investment opportunities arise, and would thus forced to adopt a more procyclical hiring policy.[18]

We use the first-difference of total employment as the dependent variable in Equation (1) and report the labor share specific sensitivity to aggregate shocks for employment in Figure 2b.

Similarly to the cash-flow case, the interaction coefficients are positive and increasing, indicating that an higher labor share induces a larger pass-through of aggregate shocks also on firms sizes.

Profits.   Following an analogous logic to the previous section, Figure 2c plots the effect of high labor share for the pass-trough of aggregate shocks on firm profits. The amplification effects of labor leverage is broadly confirmed also in this case. The point estimates across terciles are not in this case monotonically decreasing, but the second and third tercile estimates are evidently higher (and statistically significantly different) from the lowest quartile estimate.

4.2   The role of temporary contracts

In this section we test the following hypothesis:

> **H2**. *Featuring a greater share of temporary workers in the workforce is associated with a lower variability of firms' real fundamentals (cash-flow, profits).*

As discussed in the previous section, labor induced operating leverage, proxied by the permanent workers labor share, has a significant impact on the variability of important firm-level outcomes. In this section we turn to the analysis of the potentially strategic use of workforce contracts' composition as a liquidity management device for firms. The use of different mixes of contract types, temporary and permanent, can influence the sensitivity of firm-level outcomes to exogenous shocks, as more flexible contractual

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[18]One might object that firms should be able to smooth exogenous shock through credit. First, this is unlikely to be true with respect to aggregate risk determined by cyclical fluctuations. Secondly, it has been shown that firms more exposed to labor leverage tend to rely predominantly on short-term credit, plausibly due to the *un-pledgeability* of labor human capital as collateral **?**. This necessarily implies that (short-term) credit supply is more salient for these firms, another factor which increases their overall riskiness.

arrangements can be used by firms to smooth the impact of shocks. In other words, firms may be willing to employ a fraction of their workers with temporary contracts to benefit from the inherent flexibility of these employment relationships. From this perspective, firms with a higher share of temporary contracts have the possibility of exploiting the flexibility of their contractual arrangements to adjust their workforce on the extensive margin as needed to stabilize their cash-flows and real activity. In this sense, firms might be willing to incur in greater procyclicality of employment to achieve lower procyclicality of cash-flows and profits, and thus limit downside risk in bad times.

To investigate if the contractual composition of firms' workforce has a bearing on the variability of firm outcomes, we use the following specification:

$$\Delta y_{f,t} = \alpha_f + \beta Y_t + \gamma FX_{f,t-2} + \delta Y_t \times FX_{f,t-2} + \epsilon_{f,t}, \tag{2}$$

where α_f is a firm fixed-effect, allowing us to exploit within-firm variations as the main source of identification for the correlation of interest; $FX_{f,t-2}$ is the two-years lagged MA(3) share of fixed-term workers, as we want to avoid simultaneity bias and capture average reliance on flexible workers in previous years; and Y_t is the cyclical component of real GDP. The dependent variables are constructed analogously as in Equation (1). Clustering is done at the 2 digits sector by province level and regressions are weighted by lagged total assets to ensure that the distribution of firm sizes does not affect our results.

4.2.1 Results

Table 2 reports the estimated parameters from Equation (2). The main coefficient of interest, the interaction term between the cycle component of GDP and the lagged share of temporary contracts is significantly negative for the specification with variation in profits and cash-flows as dependent variable. It is on the other hand significant and positive for employment, as predicted by our hypothesis.

The negative coefficient for financial outcomes indicate that the pass-through of aggregate shocks to firms' profits and cash flows is attenuated for firms with a larger share of temporary contracts. The reader should also keep in mind that, by virtue of the inclusion of firms fixed effects in the specifications, the results is *entirely* driven by within-firm variation. Firms experience lower procyclicality of profits and cash-flows when they feature a more flexible workforce, as opposed to when their own workforce composition veers towards having more permanent workers.

The positive and significant coefficient on the volatility of employment, instead, confirms that firms respond more to aggregate shocks by adjusting their workforce at the extensive margin when their share of temporary contracts is greater, as it is cheaper to separate from temporary workers (or even hire them).

Taken together, these correlations indicate that managing the composition of labor contracts plausibly helps firms smooth the effects and attenuate the transmission of aggregate shocks for liquidity management and income variability.

Table 2. Sensitivity to aggregate shocks and role of temporary contracts

Dep. Variable Δ	Cash-flows	Employment	Profits
GDP	3.207	0.369	5.116
	(0.099)	(0.012)	(0.165)
Temp. Share	-0.126	-0.276	-0.298
	(0.018)	(0.006)	(0.033)
GDP × Temp. Share	-3.099	0.684	-4.499
	(0.443)	(0.079)	(0.715)
Firm FE	Yes	Yes	Yes
R^2	0.168	0.189	0.121
N	2,490,015	2,490,015	2,490,015

Notes: The table reports the main coefficients of interests from the specification in Equation (2). Standard errors in parenthesis, clustered at sector by province level. All regressions weighted by lagged total assets. *GDP* is the cyclical component of real log-GDP, Hamilton filtered. *Temp. Share* is the two-years lagged MA(3) share of temporary workers. Outcome variables are the first-differences of the inverse hyperbolic sine for *Cash-flows* and *Profits* and the first-difference of log-employment for *Employment*.

4.3 Labor leverage and contract composition

In this section we test the following hypothesis:

> **H3**. *The smoothing benefits from employing temporary workers are stronger the higher firms' exposure to labor leverage.*

Given the results of previous sections, one would expect that the potential beneficial effects of adopting a more flexible workforce for a firm would be particularly pronounced for firms relatively more exposed to labor leverage, and symmetrically less relevant fore relatively unconstrained firms. This hypothesis is precisely what we aim to test in this section, where we combine the insights and specifications from previous results.

We measure these interaction effects using the following specification at the firm level:

$$\Delta y_{f,t} = \alpha_f + \sum_{\tau=1}^{3} \left[\beta_\tau D_{f,\tau} \times Y_t + \gamma_\tau D_{f,\tau} \times FX_{f,t-2} + \delta_\tau D_{f,\tau} \times FX_{f,t-2} \times Y_t \right] + \phi_\tau + \epsilon_{f,t}, \quad (3)$$

where α_f is a firm fixed-effect; $FX_{j,t-2}$ is the two-years lagged MA(3) share of fixed-term workers; $D_{j,\tau}$ is a dummy variable that equals one if firm j belongs to the τ labor share terciles, measured as in Equation (1); Y_t is the cyclical component of real GDP. We again cluster standard errors at the 2 digits sector by province level and we weight the regression by lagged total assets.

4.3.1 Results

Figure 3 reports the main coefficients of interests from Equation (3). In particular, we are interested in two components of the regression. First, we look at the interaction terms between the labor share tercile dummies and the cyclical component of GDP, $\{\beta_\tau\}_{\tau=1}^{3}$.

This term captures the sensitivity of firm outcomes to cyclical variations in aggregate output, and we want to confirm that in these specifications the positive correlation between labor leverage and real outcomes cyclicalities is maintained. The specification indirectly allows us to check that the relationship previously identified in Section 4.1 is not simply a matter of variation in ex-ante temporary contracts employment. Second, and more importantly, we focus on the triple interactions between the labor share dummies, the share of temporary contracts and cyclical GDP, $\{\delta_\tau\}_{\tau=1}^3$. These coefficients measure how strongly the smoothing effect of using temporary contracts is, conditional on firm exposures to labor leverage. Even in this case, we expect the the absolute values of measured sensitivies to be positively correlated with exposure to labor leverage, as more leveraged firms are hypothesized to be the ones that stand to benefit the most from increasing flexibility in their employment mix. We again analyze the role of temporary contracts for three main outcomes variation: cash-flows, profits and employment.

Cash-flows. Does employing a greater fraction of flexible workers help "defusing" the effect of labor leverage in amplifying the impact of future shocks on cash-flow and profit variation? Our results unambiguously suggest that it does. The left panel of Figure 3a reports the sensitivity of cash-flows to aggregate fluctuations conditional on the labor share. The coefficients are increasing, confirming the presence of labor induced operating leverage regardless of past composition of the workforce. The right panel of Figure 3a reports the coefficients for the triple interactions. Notably, they are negative and monotonically decreasing in the terciles of the labor share, indicating that the smoothing effects on cash-flow variability of employing a greater share of temporary workers are stronger for firms that are highly exposed to labor leverage.

Employment. Figure 3b plots the main coefficient of interest for firm employment. The left panel of the figure shows how a higher labor share is associated with a higher volatility of employment. In this case, the coefficients on the triple interaction, reported in the right panel, are monotonically increasing, indicating that featuring a higher share of temporary contracts is associated to higher employment volatility for firms. We see that the effect is also monotonic, indicating that the use of temporary contracts increases employment variability more for companies that are highly exposed to labor induced operating leverage (i.e. are characterized by a high permanent worker labor share).

Profits. Figure 3c plots the main coefficient of interest for firm profits. Also in this case, a higher labor share is associated with a greater variability of firm profits, as shown by the coefficients in the left panel. Similarly to the results for cash-flows, the effect of an higher share of temporary contracts is stronger the higher the labor share on permanent workers.

Taken together with the effect on cash-flows and employment, this result shows how firms that are characterized by a high labor share and are thus more affected by volatility determined by aggregate risk are more willing to tolerate a greater employment variation.

Figure 3. Labor share and contract specific sensitivity to aggregate shocks

(a) Cash-flows

(b) Employment

(c) Profits

Notes: The figure plots coefficients from the specification in Equation (3) for the three different dependent variables. The reported coefficients are: i. (left panels) the interaction terms between labor share terciles and cyclical GDP (β_τ) and, ii. (right panels) the triple interaction terms between labor share terciles, cyclical GDP and the lagged share of temporary contracts (δ_τ). Standard error are clustered at sector by province level and regressions are weighted by lagged total assets. Error bands are 95% confidence intervals.

At the same time, these firms are also the ones that can benefit the most from the stabilizing effect of employing more flexible workers, which allows them to economize on labor hoarding.[19]

4.3.2 Robustness

We test, and find evidence, for the robustness of our results to the controlling for firms' exit and attrition from the dataset. In our main analysis we run the regressions on a possibly unbalanced panel, and do not control for firms exit or failure. One might be concerned that the shifting composition of firms in the panel matters for the results, or only partially characterize them if the effects of negative shocks leading to firm exit are never correctly measured. For these reasons, we run all our specifications on a sample of firms which do not fail during our time of analysis.[20] Running our specification on the sample of survivor firms introduces a survival selection bias in our results, but is still informative regarding the robustness of our results. Figure B.2-1, Table B.1 and Figure B.2-2 report results ran on the sample of surviving firms. Results are both quantitatively and qualitatively robust in this subsample.

5 Event-study design

In this section we provide causal evidence regarding the fact that, as it is possible to employ flexible contracts arrangements more freely, firms tend to strategically alter their workforce contractual composition to reduce labor leverage and that, importantly, the effectiveness of these changes varies depending on firms' exposure to labor leverage.

As shown in Section 4, firms characterized by a higher labor share are also exposed to a greater pass-trough of aggregate shocks to their balance sheets (labor induced operating leverage). As a consequence, this margin of heterogeneity is particularly interesting as it is revealing of how firms characterized by different degrees of operating leverage adjusted their contractual composition in the aftermath of the reform. A reduction in the implicit cost of temporary contracts, in fact, introduces an additional margin of adjustment that firms can effectively use to smooth the pass-trough of aggregate shocks and that was previously unavailable. The consequence of this incentive structure is that firms more exposed to labor leverage should have benefited more from the reform, and if our hypotheses are correct, by revealed preferences, we should see a stronger adoption of temporary arrangements on their side. We thus now focus on our fourth and fifth hypotheses:

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[19]The lack of information in INPS data on workers' skills for the period of analysis prevents us from analyzing whether, as one would expect, hoarding incentives and the use of temporary contracts meaningfully interact with workers' required skills within the firm. Acabbi, Panetti and Sforza (2022) show that high skill workers, given their lower substitutability for the firm, are likely to be stronger drivers of labor leverage effects.

[20]The virtually complete coverage of all active firms in the economy on the part of INPS allows for a precise identification of exiting firms.

H4. *The benefits of increasing the use of temporary contracts are concentrated to firms highly exposed to labor leverage.*

H5. *On the contrary, firms with relatively low labor share are likely to benefit less from increasing the employment of temporary workers, and might actually incur in increased costs associated with higher workers' churn.*

We follow Daruich, Saggio and Di Addario (2020) and exploit the quasi-experimental variation introduced in the Italian labor market from a reform implemented in 2001 that liberalized the use of temporary employment relationships by reducing the requirements necessary to *start* a temporary contract.

Using an event-study design, we show that the liberalization of temporary contracts caused a significant increase in the share of workers employed under these contracts and that these changes had a profound impact on firms depending on their exposure to labor leverage. Notably, despite similar effects on workforce's contractual composition and labor costs, firms characterized by a high permanent workers labor share (i.e. more subject to labor leverage) benefited disproportionately more from the liberalization of temporary employment, experiencing both an increase and a stabilization of their profits.

5.1 Institutional background and identifying variation

The Italian labor market is characterized by stark differences in the employment protection legislation between permanent and temporary contracts. Prior to the fundamental changes implemented by decree 368, signed into law on September 6, 2001, Italian firms were allowed to use temporary contracts only for very specific reasons and firms were required to formally notify the motivating circumstances for the use of temporary contracts to the social security institute.[21] The reform lifted many restrictions on the *creation* of temporary contracts without modifying the protection on permanent contracts and de facto liberalizing the use of fixed-term employment relationships. The reform did not in any way affect current employment protection provision for existing (and permanent) contracts, thus creating a strong asymmetry in the protection of workers under different contractual regimes, and further increasing *dualism* in the labor market.[22]

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[21]See Daruich, Saggio and Di Addario (2020) and Cappellari, Dell'Aringa and Leonardi (2012) for a comprehensive description and analysis of different reforms to the Italian labor market up to 2001.

[22]Interestingly enough, dualism and young workers employment instability (*precariato*) associated with the alleged abuse of temporary contracts were among the reasons mentioned for the labor reform enacted by the Renzi government between 2014 and 2015, which aimed to introduce a unique contract with employment protection increasing in tenure disciplining the Italian labor market. The reform was accompanied by the temporary introduction of subsidies for the hiring of permanent workers. Part of the provisions of the reform, especially regarding public employees, were neutralized by a judgment of the *Corte di Cassazione* in 2016. Still in 2016, a popular referendum was passed to abolish labor *vouchers*, a contractual form utilized to pay salaries and and regularize extremely flexible temporary or seasonal employment. In 2018 a further labor reform, commonly known as *Decreto dignità*, was enacted by the newly appointed Conte government. The reform was aimed at severely increasing the cost of utilizing temporary employment contracts. To this date and despite all these reforms, barring a temporary decrease during the period in which permanent contracts were directly subsidized by the state, temporary contracts have steadily increased as a share in total contracts in the economy. No reform has substantially modified the dualism between incumbent and new workers developed over time in the Italian labor market.

Importantly, the reform established that the new norms on temporary contracts were to become effective in a given sector in a staggered way, following the renewal of the associated national labor contract (CCNL).[23] Given that CCNLs in Italy are negotiated separately by different unions, they have different expiration dates defined in advance upon signing of each renewal. The decree 368/2001 did not interfere with the renewal patters of CCNLs and therefore the new norms on temporary contracts have been introduced at different times across CCNLs, depending on their pre-determined renewal schedule. We use Daruich, Saggio and Di Addario (2020) data on the patterns of renewals for 181 CCNLs to identify the year in which each CCNL adopted the 368/2001 decree and effectively liberalized the use of temporary contracts.

The staggered and plausibly exogenous timing of implementation of the reform offers a quasi-experimental source of variation in the regulation of temporary contracts across CCNLs. We use it to justify the identification of a causal effect of the liberalization of temporary contracts on Italian firms' real activity.

5.2 Empirical strategy

We estimate the casual impact of the liberalization of temporary employment contracts exploiting the staggered implementation of the 368/2001 decree across CCNLs. As such, the reader should keep in mind that the identification is determined by the comparison of as-good-as-randomly early treated to units with later-treated ones.

In particular, in our *baseline* specification we quantify the effect of the reform on relevant firm-level outcomes, such as employment levels, profit margins, total labor costs, total assets, the labor share itself, financial leverage and average wages (for all workers and by contract subgroup) and the standard deviation of wages for incumbents at the time the reform is implemented. We complement this analysis reporting novel heterogeneous effects of the reform for firms at different points of the permanent workers labor share distribution (*heterogeneity by labor share*). With a similar logic to the one in Section 4.1, we consider the average labor share in the years before the enactment of the reform (from 5 to 1 year in the pre-period), in order to leverage differences in the long-run, persistent component of permanent workers compensation.

Given the staggered implementation of the liberalization of temporary contracts, the reader might be concerned with the possibility that the standard two-way fixed effect estimator, usually used in the literature, might suffer from confounding effects stemming from potential treatment effect heterogeneity, as highlighted by a growing number of papers in the event study design literature (see for example Sun and Abraham, 2020, De Chaisemartin and d'Haultfoeuille, 2020, Goodman-Bacon, 2021, Borusyak, Jaravel and

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[23]In Italy almost all employment relationships follow a common set of regulations stated in a national labor contract (CCNL). Even if CCNLs are not specific to a single sector, there is a large overlap between sectors and the prevailing CCNL in each of them. In terms of representativeness, CCNLs negotiated by unions are valid *erga omnes*, that is even for all workers that are *not* union members. At the time it was impossible to opt out of any CCNLs under any condition.

Spiess, 2022). To address these concerns, we report estimates based on the Sun and Abraham (2020) estimator in Appendix B.1.

Baseline analysis (average effects). The baseline specification of our event-study is based on the following regression at the firm level:

$$y_{f,t} = \psi_f + \lambda_{p(f),t} + \sum_{k=-4}^{4} \mathbb{I}\{t = t^*_{c(f,2001)} + k\}\theta_k + \varepsilon_{f,t}, \tag{4}$$

where $t^*_{c(f,2001)}$ denotes the reform implementation year for a firm that had c as the most common national labor contract in 2001; $\mathbb{I}\{\cdot\}$ is an indicator function that identifies a year dummy for each year of a (-4,+4) window around the reform implementation year for contract c. We also include ψ_f to account for firm fixed-effects and $\lambda_{p(f),t}$ for province by time fixed-effects (where $p(f)$ indicates the province where firm f is located).

Heterogeneity analysis by permanent workers' labor share. To quantify possible heterogeneous effects linked to firms' labor share, we include an interaction term between the dynamic estimation coefficients and the terciles of the labor share on permanent workers. The specification we use is the following:

$$y_{f,t} = \psi_f + \lambda_{p(f),t} + \phi_{\tau,t} + \sum_{\tau=1}^{3}\sum_{k=-4}^{4} \mathbb{I}\{t = t^*_{c(f,2001)} + k\} \times D_{f,\tau}\theta_{\tau,k} + \varepsilon_{f,t}, \tag{5}$$

where all variables follow the same definition of Equation (4) and $D_{f,\tau}$ is a dummy variable that takes value one if firm f belongs to the τ tercile of the labor share distribution; ϕ_τ are labor share terciles fixed effects.

Given the staggered implementation over time of the reform, we normalize two θ_k coefficients to correctly identify the dynamic effects of the reform. In all specifications we normalize θ_{-4} and θ_{-1} to zero and we cluster the standard errors at the CCNL by province level.[24] The specifications of the event study are unweighted. [25]

5.2.1 Results: baseline specification

The liberalization of temporary contracts determined a significant relative increase in the share of workers employed under these kinds of contracts. Our estimates indicate that the liberalization promoted by the 2001 reform induced a relative increase in the share of temporary contracts of approximately 6 percentage points for early adopters with respect to late ones, as shown in Figure 4a. In context, the average pre-period share of temporary

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[24]The CCNLs do not exactly overlap with ATECO sectors definitions, but nonetheless CCNLs broadly identify industrial sectors. The clustering choice is thus analogous to the one in the previous section, even if one should keep in mind that, while the unit of treatment is the CCNL, 2-digits sectors utilized in Section 4 tend to be fewer, and thus form a broader categorization.

[25]The specifications tend to be slightly noisier but qualitatively unchanged when different weighting schemes are applied. Results available upon request.

workers in our sample was 8%, with approximately null average variation to the post-period and a 16% standard deviation.[26] Figure B.1-1a reports the results for the AS estimator.

Figure 4. Effect of the reform on firms' workforce and size

(a) Employment and share of temporary contracts

(b) Employment and total assets

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level.

This increase in the use of temporary workers has not been accompanied by an expansion in employment levels which are, if anything, decreasing in the long run (almost 6% after 3 years).[27] On the other hand, when one considers the effect on firm size (measured by total assets), it is clear that the reform did not stimulate investment and overall firm growth. Results regarding firm size specifications are shown in Figure 4b (see Figure B.1-1b for the AS estimator results). In both cases, we see that the liberalization of temporary contracts has surely *not* been matched by an increase in firm sizes.[28]

The reform also had sizable consequences on the firms' overall labor costs. As highlighted by Figure 5a, after the reform, firms were able to significantly reduce their labor costs, up to around 9%. As shown in the figure, these adjustments have happened mostly trough a stark reduction of workers' compensations, as highlighted by the significant decline in the average wage paid out by firms (up to 2.5% after three years). To put the effect into perspective, the average (unweighted) variation in labor costs for all firms between their own pre- and post- period was .25, whereas the standard deviation was .62, thus

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[26]Given the similarity of the empirical exercise, the magnitudes are broadly in-line with other recent estimates of the effects of this reform (Daruich, Saggio and Di Addario, 2020). It should be noted however that, by virtue of our access to the full *Uniemens* database, we are able to extend the analysis of Daruich, Saggio and Di Addario, 2020 to a wider cohort of firms and sectors, whereas their paper is limited to a representative sample of relatively larger manufacturing firms (and attached workers).

[27]This surprising result is similar to the one in Daruich, Saggio and Di Addario (2020), who do not however find any significant decrease in firm sizes in their manufacturing firms sample.

[28] Another indication of the fact that the reform did not promote investment and funding capabilities of firm is given by the finding that we do not detect any significant effect on firm leverage (Figure A.1a in the Appendix). It is however possible that, in the long run, transitioning to a more flexible workforce composition allows firms to decrease their reliance on short-term fungible credit, as found in **?**. This could in turn increase their financial capability and their demand for longer term and more stable credit, which would allow for more capital-intensive investment. Given that we do not have credit data available for this project and the event study under consideration is not appropriate for the analysis of long term effects, we leave this interesting question to future research.

Figure 5. Effect of the reform on firms' costs and profitability

(a) Total labor costs, average wage and labor share **(b)** Profit margins

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level.

indicating that the magnitudes of the adjustment implied by the reform was sizable. The reform substantially moderated labor cost increases over the period. The corresponding average variation for average wages was .18, with a .33 standard deviation.

The stark reduction in labor costs has been matched by a significant increase in profit margins, measured as net income over sales, of up to 0.6 percentage points, as shown in Figure 5b. Also in this case, the effect is both statistically and economically significant against an average *decrease* from the pre- to post- period of 1.6 percentage points and a standard deviation of .10. Importantly, this average effect hides substantially heterogeneous dynamics across different firms, as we show in the next section.

The reform led to a profound change in the firms hiring and separation strategies, which determined a further (relative) stabilization of the incumbent permanent workers positions and incentivized firms to let go temporary workers more often (Daruich, Saggio and Di Addario, 2020), replace them with other temporary workers and thus relatively increase their churn rates. Figure 6a reports the effects of the reform on separations rates, with a decomposition for temporary and permanent workers. The reform led the separation rate in the post-period to decrease eventually by almost 6 percentage points for early treated firms (against a pre-period average of 26%). We decompose the effect by looking at how much of that is due to permanent and temporary workers. The downward trend is *entirely* driven by the decrease in permanent workers share of separation rates over employment, and a contemporaneous increase in the share of temporary contracts that were not converted to permanent.

It is thus clear that temporary workers, while still a relatively minor share in total employment, are responsible for a strongly increasing share of separations. During the same period, as seen in Figure 6b, the hiring rate of temporary workers increased on average for treated firms.

Figure 6. Effect of the reform on firms' separation and hiring rates

(a) Separation rates   **(b)** Hiring rates

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The separation rate is defined as the number of separations (next year) over the period employment. Separations are split into separations of temporary and permanent workers, keeping the same denominator. By definition point estimates of temporary and permanent workers' coefficient sum to the total separation rate one. The hiring rate of temporary workers is defined as the number of hirings (next year) over the period employment. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level.

5.2.2 Results: the role of labor leverage

In this section we verify whether the reform providing incentives for firm to expand their utilization of temporary contracts had indeed heterogeneous effects depending on firms previous exposure to labor leverage, as proxied by permanent workers' labor share. According to **H4** and **H5** we would expect firms with previously higher labor share to be the ones that stand to benefit the most from the reform, as they are the kinds of firms that would save relatively more on monetary adjustment costs given the hypothesized efficiency drawbacks.[29]

Figure 7 reports the heterogeneous effects from the event-study in Equation (5) for the top and bottom labor terciles of permanent workers' labor share for three main outcomes: firm profit margins , the share of temporary contracts and the average wage paid by the firm (see Figure B.1-4 for the AS estimator). Following our hypotheses, firms in the top labor share tercile are the *most* exposed to labor-induced operating leverage, while those in the bottom tercile are the *least* exposed to this leverage effect. From the figure one can immediately notice that, even if the employment strategies of different firms in response to the reforms are qualitatively (and quantitatively) similar, a drastically different effect emerges as regards profitability dynamics.

Figure 7a and Figure 7b report that, at the onset of the reform's implementation, firms at opposite sides of the labor share distribution (bottom and top terciles) behaved similarly. Both sets of firms increase their share of temporary workers averages increases by approximately 4 after three years. As a consequence of changes to their employment policies, firms are able to compress their labor costs and average wages. Notably, early

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[29]According to Daruich, Saggio and Di Addario (2020) there are no significant positive effects from the reform on labor productivity, which actually *decreased* as a consequence of it. We confirm this finding in our data.

Figure 7. Effect of the reform on firm outcomes by labor share tercile

(a) Share of temporary contracts

(b) Average wage

(c) Profit margins

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (5) for three firm-level outcomes. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level.

adopter firms in the top and bottom terciles of labor share end up compressing their average wage similarly and up to approximately 10% compared to later adopters.

Despite similar changes in their employment policies, the dynamics for profitability of the two sets of firms are drastically different. Figure 7c reports the estimated effect of the reform on profit margins for firms in the top and bottom tercile of the labor share distribution. As shown in the figure, it is evident that the positive average result presented above is predominantly driven by firms in the top tercile, the ones with the greatest exposure to labor leverage, which benefit from a 1.5 percentage point increase in profit margins. The corresponding effects for the bottom labor share tercile are not significantly different from zero in any post-period year, and if anything the effects are mildly negative in the first years immediately following the reform.

As a consequence of the reform and consistently with the average results, both kinds of firms experienced an overall relative decrease in total separation rates, driven by the lower likelihood for incumbents to separate from the firm (Figure 8). A decomposition exercise of this result analogous to the one in Section 5.2.1 reveals that, upon adoption of the reform norms, firms most exposed to labor leverage increased separation rates for temporary workers *more* than firms less exposed to labor leverage. Both types of firms instead decreased the separation rates for permanent workers by approximately 6 percentage

Figure 8. Effect of the reform on firms' separation and hiring rates by labor share tercile

(a) Total separation rates

(b) Separation rates for permanent workers

(c) Separation rates for temporary workers

(d) Hiring rates for temporary workers

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The separation rate is defined as the number of separations (next year) over the period employment. Separations are split into separations of temporary and permanent workers, keeping the same denominator. The hiring rate of temporary workers is defined as the number of hirings (next year) over the period employment. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level.

points by year three. Figure 8d shows that both kinds of firms experienced an increase in the hiring rates of temporary workers, albeit the increase for early adopters in the top labor share tercile is approximately four times stronger than for their counterparts in the bottom labor share tercile. The previous results indicate that, given a similar relative response in terms of adoption of temporary contracts, comparable relative declines in labor compensations and similar labor adjustment policies, firms with high labor share have benefited more from the liberalization of temporary employment. Thus, the result suggests that the marginal benefits from increasing contractual flexibility of the workforce might be decreasing the lower ex ante labor leverage, whereas the efficiency costs might be correspondingly increasing. This is consistent with what discussed in Section 4. Given that firms with high labor share are more sensitive to aggregate shocks and temporary contracts can effectively be used as a smoother, the liberalization of this type of contracts has been particularly beneficial for firms that were more exposed to operating leverage. Low labor leverage firms, on the other hand, tend to feature a lower share of inflexible labor costs to start with, and do not benefit much from reducing their exposure to this inflexible factor in production.

The results in the section are consistent with a model in which there is an optimal degree of workforce flexibility. In such model, marginal benefits would derive from lower separation costs. Marginal costs, on the other hand, would be plausibly associated with start-up costs (e.g. the difficulty to continuously integrate new workers in the team-work), fairness and workforce morale concerns, and possibly an under-appreciation of the value of training workers with general and firm-specific human capital. Given the likely short-term nature of the savings and the plausible longer-term nature of the costs, our empirical estimates suggest that firms themselves might fail to correctly assess costs and benefits and might have been tempted by the immediate short-term savings of embracing dual employment.

5.2.3 Robustness

In this section, we run additional exercises to assess the robustness of our results to different empirical and interpretation concerns.[30]

Possible attrition. First, we address the concern that in the event study the identification of the coefficients of interest is based on a shifting distribution of firms in presence of firms' exit. We thus run our empirical event study specifications in Equation (4) and Equation (5) on the set of surviving firms up to the end of their own relevant period of analysis. On the one hand, this exposes us to a second kind of bias, that is survival selection bias. However, the set of firms included in the empirical specifications is now consistent across years given the structure of the staggered diff-in-diff specification.

Results from running the specifications on the sample of surviving firms are qualitatively similar to the ones for the full sample, even if some results show slightly different dynamics. On the one hand, we see that in the survivors' sample size adjustment and wage or labor costs adjustments tend to be slightly stronger on average. In the heterogeneity results by labor share we uncover an even more striking pattern. Average results on profit margins are now generally weaker (Figure B.2-4b). As shown in Figure B.2-7, this is due to the fact that among surviving firms profit margins for high labor share firms increase by the same magnitude as in our main sample, while for firms in the bottom tercile of the labor share we estimate a *negative* impact of the reform. [31] The effects on the share of temporary workers and firm sizes (Figure B.2-3), average wages (Figure B.2-4a) and flows (Figures B.2-5, B.2-6, B.2-8 and B.2-9) are however qualitatively similar to what we find in our main sample.[32]

Alternative factors. Second, the reader might be concerned that what we label as labor leverage exposure might actually be a spurious result determined by other factors. For

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[30]Note that the results discussed in this section are based on the TWFE estimator.

[31]We do not find significant effects on exit in our analysis, but the results seem to suggest that the panel characterized by attrition, if we believe to the results on the survivors' sample, misses firms that, had they not exited, would have been even *more* negatively impacted. Regardless of this hypothesis, one can still notice that, albeit not significant, full results in Figure 7c seem to suggest the presence same trend for low labor share firms.

[32]Interestingly, while qualitatively similar, the results on the full sample seem to detect slightly stronger effects for firm sizes (Figure B.2-3b).

instance, one might think that the effect is not driven by financial exposure to workers per se, but is just a by-product of the firm being older, relatively less dynamic and employing older, highly paid and less productive workers. If this was the case the entirety of the effect would be just captured by the age structure of the workforce. Our hypothesis, instead, is that labor leverage might emerge *regardless* of this concerns, for firms at all productivity levels. Some firms, in fact, might need to invest in their workforce (high skilled workers to be trained, for instance). As workers' human capital is not pledgeable, labor leverage might emerge as a by-product of this (Acabbi, Panetti and Sforza, 2022). A related possibility is that, by virtue of product specialization, firms might structurally need to maintain a high share of value added compensating labor. Investment-like dynamics and labor adjustment cost concerns (Oi, 1962) might drive labor hoarding policies (Giroud and Mueller, 2015) that firms find useful to employ better adapt to the business cycle, or idiosyncratic or sectoral shocks. For this reason we rerun all specifications while removing the mechanical effect due to workforce aging, and show that all our labor leverage results from Section 5.2.2 are absolutely robust.[33]

One might also be concerned that labor share is masking characteristics of firms that actually proxy for financial constraints, and in this sense our results are only spuriously reporting effects that are standard in the finance literature (Caggese and Cuñat, 2008). For this reason we re-run all our specifications while controlling for financial leverage directly and for a measure analogous to the Whited-WU index (Whited and Wu, 2006).[34] All our results are robust to the addition of these controls, thus indicating that the labor leverage mechanisms captures a relatively novel and distinct source of financial frictions affecting firm dynamics.[35]

Figures B.3-1, B.3-2 and B.3-3 report results of the estimations where we saturate our empirical model with non-parametric controls for median age, median tenure (in the pre-period), the Whited-Wu index and financial leverage (average of the pre-period), in the form of interaction of tercile of the distributions of the variables with year dummies.

Placebo. Figure B.4-1 reports the results for a placebo test on the dates of contract renewals. Specifically, for each CCNL we assign a renewal year that is different from the renewal that implemented the decree 368/2001. If the liberalization of temporary contracts was not the cause of our main results we would see some significant effects in this placebo exercise. Reassuringly, this is not the case. In fact, as shown in B.4-1a changing the treatment year delivers a flat profile for the share of temporary workers in Italian firms. The same results hold for both profit margins (B.4-1b) and employment (B.4-1c).

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[33]The lack of education and occupation level data for the period of analysis prevents us from verifying hypotheses related to labor investment and their possible relationship with leverage-like dynamics. See Acabbi, Panetti and Sforza (2022) and Baghai et al. (2020).

[34]We cannot exactly compute the Whited-Wu index in our data, because we lack information on dividend payouts. We thus compute the index without that component.

[35]Importantly, we are not claiming that results previously found in the literature are not present or valid. As a matter of fact, in unreported results we confirm that the predictions of the theory in Caggese and Cuñat (2008) are true in our data.

5.3 Variability of firms' profits

One would expect that one of the main benefits of employing a more flexible workforce, by allowing firms to better manage their liquidity, would be to decrease the volatility of firms' financial outcomes and improve their overall stability. By liberalizing the use of temporary contracts, the reform caused a large shift in workforce composition of Italian firms (Section 5). In Section 4 we showed that a higher level of temporary contracts is correlated with a lower variability of firm financial outcomes. In this section, we follow this intuition and check if the reform caused any change in the variability of firm-level profits. If the use of temporary contracts truly alleviates the amplification effect of shocks due to operating leverage, the overall process of firms profits should become less volatile post reform.

Directly observing the data generating process for firms' cash-flows and net income is impossible: after all, we only observe one realization at a time of these outcomes, and we would be interested on the other hand in its standard deviation at each moment, not over time. We thus adopt a different approach. Given the structure of our analysis, we assume that firms with same prevailing CCNLs, belonging to the same local labor market (an Italian province) and with similar salient characteristics (in this case, the permanent workers labor share) are likely to have very similar data generating processes underlying their fundamentals. We thus collapse our dataset at the year by CCNL by province by labor share bins level, and compute the standard deviation of firm-level (hyperbolic arcsine of) net income, weighting observations by total assets in the year before reform enaction for each CCNL by province. Therefore, in the following specifications the depended variable, $sd_{q,t}$, is the standard deviation of firm-level profits at time t *within* cell q (CCNL by province by average labor share tercile in the pre-period). As for our main event study specifications, we report results for the TWFE and we report the Sun and Abraham (2020) estimator in Appendix B.

Baseline. Our baseline specification follows Equation (4) and therefore, for a cell q, we estimate the following:

$$sd_{q,t} = \lambda_{p,t} + \sum_{k=-4}^{4} \mathbb{I}\{t = t^*_{c(q,2001)} + k\}\theta_{\tau,k} + \varepsilon_{q,t}, \tag{6}$$

where $\lambda_{p,t}$ are province by year fixed effects and the indicator $\mathbb{I}\{\cdot\}$ identifies the (-4,+4) window around the reform enactment year in the cell.

Heterogeneity by labor share. To estimate the heterogeneous effects by labor share we follow Equation (5). Thus, for a cell q we measure:

$$sd_{q,t} = \lambda_{p,t} + +\phi_{\tau,t} + \sum_{\tau=1}^{3} \sum_{k=-4}^{4} \mathbb{I}\{t = t^*_{c(q,2001)} + k\} \times D_\tau \theta_{\tau,k} + \varepsilon_{q,t}, \tag{7}$$

Figure 9. Effect of the reform on profits' volatility

(a) Average effect

(b) Heterogeneity by labor share

Notes: The figure report the dynamic effects of the 2001 reform on the within-cell standard deviation of firms' profits. Cells are defined as CCNL by province by labor share bin level. The coefficients are estimated following Equation (6) (Panel **(a)**) and Equation (7) (Panel **(b)**). Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level.

in which the additional regressors compared to Equation (6) are $\phi_{\tau,t}$ and D_τ. They are respectively, a labor share terciles by year fixed effect and a dummy variable that takes value one when cell q belongs to the τ tercile of the labor share distribution.

Regressions ran at the cell level are also weighted by the sum total assets each cell represents in the year before reform enactment. We again cluster the standard errors at province by CCNL level.

5.3.1 Results

We report the main results from Equation (6) and Equation (7) in Figure 9, while Figure B.1-6 in the Appendix reports the results using the AS estimator.

In particular, Figure B.1-6a reports the average effect of the 2001 reform on the within-cell variability of firms profits. The graph indicates a reduction in the standard deviation of firm profits in the four years post reform, up to a maximum of -0.2 (against a starting pre-period weighted level of 3.5), a 5% reduction.

Looking at the heterogeneity by labor share, shown in Figure 9b, one uncovers a now familiar pattern: the stabilization effect of the reform, at this time on profits variability, is stronger and significant only for firms characterized by a greater labor leverage exposure, while it is not significant for firms that operate in the bottom tercile of the labor share distribution. After year 3, the effects are statistically distinguishable from each other.

Combining this result with the one on firm profit margins (Figure 7c) we can see that the liberalization of temporary contracts has led to an increase in firms' profit margins *and* a reduction in the volatility of their profits. These effects, however, have been concentrated on firms characterized by a high labor share which were more exposed to the labor leverage. Firms least exposed to labor-leverage to start with do not get any benefit from increasing

workforce flexibility on profitability (if anything, they might actually have it worsened). They also do not get any meaningful stabilization effect regarding profit volatility.

5.4 The role of employment concentration in local labor markets

An intriguing implication of our results is that the beneficial effect of having access to temporary workers is higher if firms operate in a highly concentrated market. As long as workers location choices are somewhat sticky (either because it might be costly to relocate or because of idiosyncratic preferences) a highly concentrated labor markets reduces workers' outside options allowing firms to extract more surplus from their matches. Through these lenses therefore, an increase in the availability of temporary contracts should be relatively more beneficial for employers that are located in labor markets where workers have fewer employment options. This implies that the structure of the labor market or the ability of firms to wield power in the labor market has implication not only for their growth prospects or profitability but also for their liquidity management.

We test this implication by running our specification in equation (5) across local labor markets (LLM) with different degrees of employment concentration. In particular, we measure concentration in each LLM using the employment Herfindal index in 2001, before the enactment of the reform. We then consider LLM with *high* concentration those belonging to the top tercile of the employment HHI distribution, and LLM with *low* concentration those in the bottom tercile.[36]

5.4.1 Results

Figure 10 reports the heterogeneity results by labor share for firms that operate in LLM with high concentration versus firms located in LLM with low concentration.

As shown in Panel 10a, the implementation of the reform caused an increase in profit margins of approximately 2.5 percentage points for high labor share firms located in highly concentrated LLM. This is approximately one percentage point higher than the increase in margins experienced by firms located in less concentrated markets (see Panel 10b).

Similarly to our baseline result, the increase in profit margins is entirely driven by firms that have a higher labor share and are therefore ex-ante more exposed to labor induced operating leverage. These dynamics are still present despite a similar response to the reform in terms of share temporary contracts, both across the labor share distribution and LLM, as shown by Panels 10c and 10d.

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[36] For local labor markets we use the ISTAT definition for *Sistemi Locali del Lavoro* which implements a measure of local labor markets based on commuting zones.

Figure 10. Effect of the reform on Profit margins and share of temporary contracts in LLM with different employment concentration

(a) Profit margins
LLM with *high* concentration

(b) Profit margins
LLM with *low* concentration

(c) Share of temporary contracts
LLM with *high* concentration

(d) Share of temporary contracts
LLM with *low* concentration

Notes: The figure reports the effects of the 2001 reform on firms profit margins and share of temporary contracts across local labor markets (LLM) and for firms in the top and bottom terciles of the labor share distribution. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level.

6   Concluding remarks

In this paper, we present new evidence on the role of temporary and permanent contracts for firms' management of labor-induced operating leverage. Given the smooth nature of labor payments, in fact, labor costs can give rise to a form of leverage that amplifies the transmission of aggregate shocks to firms financial outcomes.

Using a panel-regression setting, we provide evidence of labor leverage at work for incorporated Italian firms. In addition, we show that temporary contracts are associated with a lower variability of firm cash-flows and profits, acting as a smoother for the pass-through of aggregate shocks. Importantly, we provide evidence that the smoothing effects of temporary employment is stronger the larger firms' exposure to labor leverage.

We complement this analysis by studying the 2001 Italian labor market reform and focusing on a novel dimension of heterogeneity: firms' labor share, a proxy for their labor leverage. Using an event-study design, we show that the liberalization of temporary

31

contracts significantly increased profit margins and stabilized profits only for firms characterized by an high labor share. Notably, however, these beneficial effects on firms profits were not matched by larger responses on the use of temporary contracts nor on the reduction in labor costs. In fact, firms along the entire labor share distribution responded to the reform in similar ways on these margins, reducing labor costs and increasing the share of temporary workers. We interpret the stronger effects on profits of high labor share firms as evidence that the use of temporary contracts hides a fundamental trade-off: the possibility of defusing firms' labor leverage, stabilizing financial outcomes at the cost of incurring in higher expenditures of managing the workforce. A more precise identification of the inflection point of the trade-off is an interesting extension of the evidence presented in this paper and we leave it for future research.

Our findings are also consistent with the presence and relevance of significant ex-ante unanticipated start-up costs for new workers, fairness concerns across the workforce and eventually what becomes a persistent contrast between privileged insiders and unprotected outsiders to the system, an idea which dates back to Lindbeck and Snower (1989). Interestingly, our analysis also hints that, beyond probable long run scarring effects for workers determined by employment instability, harder career progression and low on-the-job training (Acabbi, Alati and Mazzone, 2023), firms themselves fail to anticipate the inefficiencies inherent in the dual employment system. A deeper analysis of these trade-offs, of the long-term effects for workers and of the financial implications for firms are extremely interesting and constitutes a fundamentally important and exciting research challenge that we hope to tackle in future projects.

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Appendix for

Defusing Leverage: Liquidity Management and Labor Contracts

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Table of Contents

A Additional figures

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Figure A.1. Effect of the reform on firms' leverage and labor share

(a) Financial leverage

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Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). Financial leverage is defined as financial indebtedness over total assets. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [21] .

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B Robustness checks

In this section, we report additional results and the main robustness checks of our analysis.

B.1 Main results using the Sun and Abraham estimator

In this section we report our event study results for the Sun and Abraham (2020) estimator. The results are qualitatively and quantitatively very close to the results discussed in the main text based on the TWFE estimator.

Figure B.1-1. Effect of the reform on firms' workforce and size

(a) Total employment and share of temporary contracts

(b) Total employment and total assets

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [20] .

Figure B.1-2. Effect of the reform on firms' costs and profitability

(a) Total labor costs and average wage

(b) Profit margins

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) .

Figure B.1-3. Effect of the reform on firms' separation rates

(a) Separation rates

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The separation rate is defined as the number of separations (next year) over the period employment. Separations are split into separations of temporary and permanent workers, keeping the same denominator. By definition point estimates of temporary and permenent workers' coefficient sum to the total separation rate one. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) .

Figure B.1-4. Effect of the reform on firm outcomes by labor share tercile

(a) Share of temporary contracts

(b) Average wage

(c) Profit margins

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (5) for three firm-level outcomes. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [23] .

Figure B.1-5. Effect of the reform on firms' separation rates by labor share tercile

(a) Total separation rates

(b) Separation rates for permanent workers

(c) Separation rates for temporary workers

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The separation rate is defined as the number of separations (next year) over the period employment. Separations are split into separations of temporary and permanent workers, keeping the same denominator. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) .

Figure B.1-6. Effect of the reform on profits' volatility

(a) Average effect

(b) Heterogeneity by labor share

Notes: The figure report the dynamic effects of the 2001 reform on the within-cell standard deviation of firms' profits. Cells are defined as CCNL by province by labor share bin level. The coefficients are estimated following Equation (6) (Panel **(a)**) and Equation (7) (Panel **(b)**). Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Sample of surviving firms. Referenced on page(s) [29] .

B.2 Sample of surviving firms

Figure B.2-1. Labor share specific sensitivity to aggregate shocks, survivor firms

(a) Cash-flows

(b) Employment

(c) Profits

Notes: The figure plots the interaction terms between labor share terciles and the cyclical component of real GDP as in Equation (1). Labor share terciles are defined on the three-years lagged MA(3) average of permanent workers' labor share. Cyclical GDP is measured using an Hamilton filter with two leads and one lag. Standard errors are clustered at CCNL by province level and the regressions are weighted by lagged total assets. Error bands are 95% confidence intervals. Referenced on page(s) [17] .

Table B.1. Sensitivity to aggregate shocks and role of temporary contracts, survivor firms

Dep. Variable Δ	Cash-flows	Employment	Profits
GDP	2.905	0.315	5.059
	(0.098)	(0.012)	(0.173)
Temp. Share	-0.107	-0.268	-0.299
	(0.019)	(0.006)	(0.035)
GDP × Temp. Share	-3.230	0.696	-4.710
	(0.460)	(0.085)	(0.790)
Firm FE	Yes	Yes	Yes
R^2	0.151	0.173	0.111
N	2,024,627	2,024,627	2,024,627

Notes: Sample of surviving firms. *GDP* is the cyclical component of real log-GDP, Hamilton filtered. *Temp. Share* is the two-years lagged MA(3) share of temporary workers. Outcome variables are the first-differences of the inverse hyperbolic sine for *Cash-flows* and *Profits* and the first-difference of log-employment for *Employment*. Standard errors in parenthesis, clustered at 2d-sector by province level and all specifications weighted by lagged total assets. Referenced on page(s) [17]

Figure B.2-2. Labor share and contract specific sensitivity to aggregate shocks, survivor firms

(a) Cash-flows

(b) Employment

(c) Profits

Notes: The figure plots coefficients from the specification in Equation (3) for the three different dependent variables. The reported coefficients are: i. (left panels) the interaction terms between labor share terciles and cyclical GDP (β_τ) and, ii. (right panels) the triple interaction terms between labor share terciles, cyclical GDP and the lagged share of temporary contracts (δ_τ). Standard error are clustered at 2d-sector by province level and regressions are weighted by lagged total assets. Error bands are 95% confidence intervals. Referenced on page(s) [17]

Figure B.2-3. Effect of the reform on firms' workforce and size, survivor firms

(a) Total employment and share of temporary contracts

(b) Total employment and total assets

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The sample only includes firms which survive up until the end of the post-period. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [26] .

11

Figure B.2-4. Effect of the reform on firms' costs and profitability, survivor firms

(a) Total labor costs and average wage

(b) Profit margins

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The sample only includes firms which survive up until the end of the post-period. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [26] .

Figure B.2-5. Effect of the reform on firms' separation rates, survivor firms

(a) Separation rates

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The separation rate is defined as the number of separations (next year) over the period employment. Separations are split into separations of temporary and permanent workers, keeping the same denominator. By definition point estimates of temporary and permement workers' coefficient sum to the total separation rate one. The sample only includes firms which survive up until the end of the post-period. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [26] .

Figure B.2-6. Effect of the reform on firms' hiring rates, survivor firms

(a) Hiring rates

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The hiring rate of temporary workers is defined as the number of hirings (next year) over the period employment. The sample only includes firms which survive up until the end of the post-period. The sample only includes firms which survive up until the end of the post-period. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [26] .

Figure B.2-7. Effect of the reform on firm outcomes by labor share tercile, survivor firms

(a) Profit margins

(b) Share of temporary contracts

(c) Average wage

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (5) for three firm-level outcomes. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Additional controls for leverage, financial constraints (Whited-Wu Index Whited and Wu 2006), age and tenure composition are added as variable terciles by year fixed effects. The sample only includes firms which survive up until the end of the post-period. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [26]

Figure B.2-8. Effect of the reform on firms' separation rates by labor share tercile, survivor firms

(a) Total separation rates

(b) Separation rates for permanent workers

(c) Separation rates for permanent workers

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The separation rate is defined as the number of separations (next year) over the period employment. Separations are split into separations of temporary and permanent workers, keeping the same denominator. The effects are reported for firms in the top and bottom terciles of the labor share distribution. The sample only includes firms which survive up until the end of the post-period. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [26] .

Figure B.2-9. Effect of the reform on firms' hiring rates by labor share terciles, survivor firms

(a) Hiring rates

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The hiring rate of temporary workers is defined as the number of hirings (next year) over the period employment. The effects are reported for firms in the top and bottom terciles of the labor share distribution. The sample only includes firms which survive up until the end of the post-period. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [26] .

B.3 Specifications with additional controls

Figure B.3-1. Effect of the reform on firm outcomes by labor share tercile, controlling for leverage, financial conditions, age and tenure composition

(a) Profit margins

(b) Share of temporary contracts

(c) Average wage

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (5) for three firm-level outcomes. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Additional nonparametric controls for leverage, financial constraints (Whited-Wu Index Whited and Wu 2006), age and tenure composition are added as variable terciles by year fixed effects. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [27] .

Figure B.3-2. Effect of the reform on firms' separation rates by labor share tercile, controlling for leverage, financial conditions, age and tenure composition

(a) Total separation rates

(b) Separation rates for permanent workers

(c) Separation rates for permanent workers

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The separation rate is defined as the number of separations (next year) over the period employment. Separations are split into separations of temporary and permanent workers, keeping the same denominator. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Additional nonparametric controls for leverage, financial constraints (Whited-Wu Index Whited and Wu 2006), age and tenure composition are added as variable terciles by year fixed effects. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [27] .

18

Figure B.3-3. Effect of the reform on firms' hiring rates by labor share terciles, controlling for leverage, financial conditions, age and tenure composition

(a) Hiring rates

Notes: The figure plots the dynamic effect of the reform following the specification in Equation (4). The hiring rate of temporary workers is defined as the number of hirings (next year) over the period employment. The effects are reported for firms in the top and bottom terciles of the labor share distribution. Additional nonparametric controls for leverage, financial constraints (Whited-Wu Index Whited and Wu 2006), age and tenure composition are added as variable terciles by year fixed effects. Error bands are 95% confidence intervals, standard errors clustered at CCNL by province level. Referenced on page(s) [27] .

B.4 Placebo

Figure B.4-1. Placebo test

(a) Share of temporary workers

(b) Profit margins

(c) Total employment

Note: The figure reports the results for a placebo test on our event study design. For these estimates, for each CCNL the year of reform enactment is assigned randomly and therefore not linked to the actual implementation of the 368/2001 decree. Referenced on page(s) [27] .

C Data construction and sample selection

We rely on two main data sources provided by INPS through the VisitINPS Program: i) data on employment relationships in Italy from 1998 to 2018, ii) balance sheet data for incorporated Italian firms from 1998 to 2018. We complement these data with information on the renewal dates for 181 CCNLs provided by Daruich, Saggio and Di Addario (2020).

C.1 Worker-level data and contract types

Starting from data on virtually the universe of Italian employment relationships at the contract level, we calculated for each worker her yearly gross real earnings and for the workers with multiple contracts we selected the information associated to the highest paid contract in the year and we find the associated annualized income using information on the number of actual weeks worked.

We restrict our focus on workers employed under either full-time or part-time working schemes and with either temporary or permanent contract and between 16 and 65 years old. Importantly, we also have information on the national labor contract (CCNL) regulating each employment relationship.

C.2 Firm-level data

At the firm level, we combine two datasets: i) information on the workforce characteristics for Italian firms from *Uniemens* and ii) balance sheet data from *Cerved*.

From *Uniemens* data we can construct the share of temporary contracts employed by each firm in our sample in every year. Firm size is calculated from worker-level data using the main contract to uniquely assign workers to firms. The intuition for this choice is that a central variable in this paper is firms' precommitted labor costs, we opt for being conservative and include only workers that have their main job at the firm.

In addition, for each firm we can identify the *prevalent* CCNL exploiting the worker-level data discussed above. This information is crucial to time the implementation of the 2001 reform for Italian firms correctly.

From *Cerved*, we have access to firm balance sheet data. We drop firms that report an account before their founding year and that have negative fixed assets or a negative value of production or that report zero labor costs. We also exclude financial services, health and utilities (ATECO codes: 64-66; 35-39 and $\geq$84) and winsorize our main variables at the 5% level (two-sided).

Table C.1. Descriptive statistics by labor share terciles

	Mean	SD	p25	p50	p75	p90	# firms
Low LS							
Employees	7.29	10.94	2.00	4.00	8.00	17.00	232,006
Total assets	2570.55	3704.26	460.79	1128.20	2913.80	6815.19	232,006
Total sales	2750.21	3781.99	532.15	1273.57	3208.21	7242.25	228,696
Perm. w. labor share	0.16	0.21	0.09	0.17	0.25	0.34	231,542
Profit margin	0.01	0.09	-0.00	0.01	0.03	0.08	232,006
Leverage	0.24	0.21	0.04	0.21	0.40	0.55	107,291
Medium LS							
Employees	12.43	15.53	3.00	7.00	15.00	29.00	259,606
Total assets	2309.28	3270.00	432.24	1072.59	2674.04	5997.50	259,606
Total sales	2771.75	3579.44	583.08	1419.29	3384.27	7078.06	257,595
Perm. w. labor share	0.32	0.14	0.26	0.32	0.37	0.45	259,230
Profit margin	0.01	0.07	-0.00	0.00	0.02	0.06	259,606
Leverage	0.23	0.20	0.05	0.21	0.37	0.51	121,771
High LS							
Employees	13.26	16.73	4.00	8.00	16.00	31.00	239,012
Total assets	1756.85	2739.61	294.94	764.10	1946.46	4449.30	239,012
Total sales	2150.61	3054.69	400.18	1017.93	2505.54	5512.68	237,860
Perm. w. labor share	0.49	0.22	0.37	0.45	0.56	0.76	238,233
Profit margin	-0.02	0.09	-0.02	0.00	0.01	0.03	239,012
Leverage	0.22	0.20	0.03	0.19	0.36	0.51	106,537

Note: The table reports the descriptive statistics by labor share terciles for the sample of firms used in the event-study described in Section 5.